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

APRIL, 1866.

PROVINCIAL EXHIBITION.

CLASSIFICATION OF SUBJECTS IN FINE ARTS DEPARTMENT.

A short time since we addressed communications to several of our principal oil and water-colour painters, to somewhat the following effect:—

"At each recurring Annual Provincial Exhibition, difficulties arise as to who are amateur and who professional exhibitors, in the Fine Arts department. The trouble increases year by year, which renders it highly desirable that a re-classification of the prize list should at once be made, and the appellation 'professional' and 'amateur' be given their distinct meanings—if these terms are to be retained. One person defines the application of the word 'professional' to the artist who lives entirely by the pencil and brush; another to the artist also who may occasionally sell the work produced, or who to any extent teaches the art to others. These definitions may all be held as unsatisfactory, and some therefore contend that these terms should be done away, and the classification of 'originals' and 'copies' be substituted. This might be an improvement, if in addition there should be a class for pupils not over a certain age. Will you have the goodness to furnish me such suggestions as may occur to you, at your earliest convenience?"

In answer to the above we have received several communications, from both professional and amateur artists, who agree in several of the points under consideration.

For the purpose of giving the general import of these communications, and also for the purpose of affording publicity to some useful suggestions, which may be of benefit to amateur artists, we take the liberty of making some lengthy extracts, and shall therefore designate the writers by consecutive numbers.

No. 1 says:—"The questions for consideration appear to be, 1st,—Whether, for the future, originals shall be distinguished from copies, and the superiority of the former marked by a higher scale of prizes; and 2nd—How the competition shall be classed under these two heads.

1st.—It would seem that there can be no doubt whatever that both propositions should be answered in the affirmative. With permission, I will proceed to point out how great is the superiority of originals over copies, which might not otherwise be wholly apparent.

In the first place an original picture sets the mind thinking upon choice of subject and general treatment, which may be heroic, historical, moral, poetical, humorous, or pathetic; or it may be—as it must be admitted it very often is—only imitation of natural objects. Then comes design, composition, drawing, light and shadow, color, and general effect.

These are the *component parts* of every original work of any merit, and, so far as I am aware, *there are no others*. They are all subjects of mental study and reflection, more or less assisted by natural genius. A copyist *can dispense* with every one of them—they are all *made ready* to hand.

All that a copy requires is imitative power and executive skill; and both of these are indispensable, in at least an equal degree, to the original artist."

The writer goes on to show that "copies can bear no sort of comparison with originals," and "never possess more than a small relative value. The artists who produce them, however meritorious in their own way, have scarcely any rank as artists." He does not wish to be understood "that a good copy of a superior work by a great artist may not be better than an average original, and may be very advantageous, whether as practice or example."

This writer also points out how "manifestly unjust and discouraging it is that copies should be allowed to compete with originals," for the same prizes; and instances a peculiar case of hardship where the first prize was given to a copy of a print after Sir Edward Landseer, in which the engraver's work was well imitated, while the second prize was awarded to an original drawing.

2nd.—With regard to classification, it is suggested that there might be four classes—"originals and copies for professional artists, and the same for amateurs;" but thinks that to simplify the matter the mere distinction of originals and copies would be best, without reference to whether by professional or amateur artists. A separate class for pupils he does not approve of.

On the question, what constitutes a professional artist, as distinguished from an amateur, he says: "A professional artist, as I have always understood the term, is surely one who lives by art as a profession;" and arguing on the presumption that an artist does not cease to be an amateur because he sometimes offers his work for sale, he remarks

" it is not a very uncommon thing for amateurs to do so. It has been done by officers in the army. Are they, on that account, professional artists? * * * To those who are conversant with the subject it is known that there is, strictly speaking, no such thing as a professional education in Art, as it is understood in other professions, as in Law, Physic and Divinity. There are schools of Art, doubtless, but an artist has no need to pass through these. A minority only do so; and many of the most famous artists have not done so; landscape painters scarcely ever. * * * The success of an artist does not, in fact, depend upon the instruction that he may receive, or may not receive, but upon his own natural genius. This may be proved by hundreds of instances. There are cases in which pupillage of that kind is time lost, or even disadvantageous. * * * I would urge that it does seem extremely unfair that a man, who is not an actual professional artist, should be allowed to compete with those who are professional, and whose bread may be supposed to depend upon whatever reputation and money they can obtain; while to the amateur it must be a matter of comparatively small consequence. I cannot help thinking that the last argument should have great weight."

This communication contains many other valuable suggestions, which will, no doubt, receive due consideration by the Association.

Writer No. 2, a lady amateur, says:—" I venture to call your attention to the great importance of encouraging original works. At present copies (to produce which nothing but care, patience and practice are required) are allowed to compete on equal terms with drawings from nature and imagination, for which very different qualities are necessary. Copies should, I think, be sent in, exhibited and judged as such, if it be thought desirable to admit them at all." After some useful hints on classification, this writer argues for the principle of awarding both 1st and 2nd prizes to the same artist, or not, according to the relative merits of the works exhibited; but asks, with the former correspondent, that the rule should be uniform; and also suggests that names of the competing artists be not made known to the judges. A doubt is also expressed as to whether it is necessary to distinguish between artists as professional and amateur, as " in this country many amateurs have received a far better education in Art than their professional brethren; and were that vitally important distinction made between the *true artist* and the *copyist*, other differences might be disregarded."

Writer No. 3 strongly expresses his approval of a suggestion made in a former issue of this journal, that all pictures be sent in during the week previous to the exhibition, and that they be judged not later than the Monday of the exhibition week. He thinks it would tell against the success of the exhibition to require professionals and amateurs to exhibit in the same sections; as a large number of pupils shew as amateurs, who would not exhibit if they had to compete with professionals, probably their own masters or teachers; and expresses the opinion also that no one should be allowed to exhibit as an amateur who now either sells pictures or teaches for a livelihood, or as a matter of profit; or who has at any time heretofore done so.

Writer No. 4 says:—"I think the only true method of giving fair play to all, would be to have a class for *originals* by professionals and also for copies; also a class for originals and for copies by the same. I think there should be a distinct class for pupils." He also urges the Association to have the clause requiring the drawing to have been executed since the prior exhibition to be reinserted in the rules. The terms 'professional' he understands to apply to any artist who sells or offers for sale any of their works." This, we think, is rather indefinite.

For Photographs this correspondent argues that a plain copy should in all cases be hung beside the colored one, and the Photographer who exhibits should be required to declare that the coloring is done by himself; or if colored by an artist other than himself, it should be so stated.

A Lady Professional, No. 5, says: "The suggestions which have been made to change the terms 'Professional' and 'Amateur' to 'Originals' and 'Copies,' are, according to my mind good, and would draw the line as distinctly as any terms which could be employed—the line then being between different capacity, effort and experience; while in the past it has been between different positions (in one way understood). I should judge it to be highly desirable to offer a class of prizes to pupils separately, as the number who are practicing under teachers is large, and early efforts need encouragement, quite as much as later ones."

Writer No. 6, says:—

"The opinions I have on the matter, I hold with some diffidence, for I cannot but feel the difficulties and objections which might *fairly* be raised against any classification.

The suggested classification, originals and copies—as also a class for pupils—would, I think, be better than the present one. The design of the exhibition and competition should be paramount. I take it to be for the purpose of encouraging originality and ability; the prizes should therefore be for such, and be so arranged. To copies, an

inferior position should be given, for a copyist is merely a transcriber of anothers work and merit, and as such should rank no higher in art than a pupil—a copyist is merely a pupil of somebody.

Three divisions might be adopted. 1st originals, 2nd copies, 3rd copy work by pupils.

Present division one might be amended—in Canadian subjects—and more prizes offered.

Sec. 13 'any subject' omitted.

Sec. 17 'pencil portrait' omitted.

Sec- 19 'pen and ink sketch' omitted.

These have no artistic merit, any one with patience (with no art feeling) could execute such. Moss pictures excluded, or placed with extras. I agree with your suggestion (*Journal Board of Arts and Manufactures,*) that no second prize be awarded in the same section to the same exhibitor in any department whatever. In Canadian subjects, I think from three to fifteen prizes might be given, even if the 1st and 2d are lowered thereby; the design of encouraging art should be so evident, that all persons should have an inducement to compete. At present, artists of well known excellence, ability and deserved repute, divide the prizes. The system of attaching exhibitor's names is in one sense objectionable, while in another it is but fair to the public that they should know who are exhibitors. Objections might be met by having the cards filled up on both sides—one without the name, the other with it—the first being placed uppermost before the decision of the judges, after which an attendant might reverse the cards.

A clause might be added that all articles arriving after a specified time, would be exhibited, but not allowed to compete. They cannot be called perishable or involving keeping expenses; therefore every thing in the Fine Arts Department ought to be in the building and arranged one clear day previous to the opening day. It would answer far better to have an incomplete competition, orderly and arranged, than the dissatisfaction resulting from disorder and damage."

Correspondent No. 7, in answer to our communication, writes:—"1st. A professional artist is one who paints to support himself. An amateur is one who paints for honor. 2d. Originals and copies should not compete in the same section. 3d. The distinction between 'professional' and 'amateur' ought not to be done away with. I would advise that no prize be given to a professional for copies; but that prizes, both for copies and originals may be given to amateurs. [An opinion is here expressed that a professional artist who has not practised for profit for a number of years past, should be entitled to enter as an amateur. Another correspondent expressed a similar opinion.] No *soi-disant* amateur or pupil, wishing to exhibit pictures in which he has had the assistance of others, ought to be permitted to exhibit either as professional or amateur."

We believe we have given in the above extracts, a fair representation of the writers' views; and although on some important points considerable unanimity is shown, yet, on others, such as "what constitutes a professional artist?" nothing satisfactory has been elicited. The council of the association will have to give the subject full consideration before publishing the rules for the coming exhibition in this city, in September next.

THE CHOLERA—SANITARY PRECAUTIONS.

In our last issue we referred to the probable visitation of cholera to Canada during the coming summer. We now revert to the subject, and to some sanitary precautions connected therewith, not with a view to creating a panic or exciting the fears of the people, but rather to allay such fears. We hold that to be familiar with the designs or mode of approach of an enemy is a point of advantage gained in defence; and to understand as far as possible the nature of cholera, the circumstances which tend to induce it and the steps necessary to prevent or check its development, as far as possible, is the duty of every one. These points should be intelligently studied, and rendered familiar to the mind; every available means of prevention or amelioration of the disease should be attended to—such as cleanliness of person, dwellings, yards, &c.; avoiding "all those employments or engagements in pleasure which tend to exhaust nervous energy and depress the bodily powers;" the practice of strict temperance in both eating and drinking, and avoiding all sudden or important changes in diet; avoiding the use of all quack or patent medicines, except such as are recommended by reliable medical men; the performance of our duty towards our fellowman, and the exercise of every Christian virtue, especially maintaining a firm trust in God, who alone can control the pestilence. These things secured, the mind will not be disturbed by undue fears, nor will the body be especially liable to attack of cholera or any other form of disease.

Having said this much we may point out some of the existing causes of sickness and epidemics, which exist to a greater or less degree in almost all our towns and villages. The first and most important of these causes is the absence of good and sufficient drainage. Mr. Edwin Chadwick, in an address in the city of Salisbury, says, that for

nine years before the completion of their new drainage work the average death rate was twenty-seven in a thousand; and that for the nine years after the completion of these works, the average death-rate had not exceeded twenty in a thousand; and that to every case of death reduced, there are, as a general rule, a decrease of twenty cases of sickness. He also shows that they have reduced the exposure of the population to extraordinary epidemics by about one-third. We might produce any amount of evidence on this point, but this, with the statistics of decrease in London, Liverpool and Philadelphia, given in our last issue, is sufficient to show the importance of attending to sanitary improvements.

Connected with our drainage, however, may be mentioned the foul emanation of sewer gas into houses, arising from the absence of *traps* to sinks and service drains. This foul gas, permeating as it does every part of the dwelling, no doubt creates a large amount of fever and other malarious diseases. We give in another column a plan and description of a cheap trap for service drains; but what is wanted to render the street sewers free of this foul gas, is, tall ventilating shafts placed here and there, the air therein warmed by jets of gas or a stove fire, so as to create a rapid upward current of the foul gases; or, as is now proposed in Paris and being carried out in Woolwich, England, connecting the tall chimnies of steam factories with the sewers for ventilating purposes; or so placing the furnaces of these factories that they shall derive their supply of air from the sewers, thus withdrawing the mephitic air and destroying it by combustion—fresh air from the atmosphere supplying its place in the sewers. This, undoubtedly, is the best known mode of ventilating sewers and rendering their contents harmless.

In many cases there is a total absence of drainage from cellars, or the drains have so little fall that a backward flow in times of floods often occur, introducing sewer filth under the cellar floors. The ventilation of cellars is also a very important matter, and but seldom attended to, or very imperfectly. A cheap and effective mode of ventilating is to continue the flue of the ordinary house chimney downwards to the cellar, with an opening near the floor. The warmth of the chimney above will cause a rapid withdrawal of foul air from the cellar, its place being supplied with pure air from the ordinary door, windows or other openings.

In many cases one service drain is made to answer three or four separate tenements—an internal drain running from one extremity under the floors of all the cellars, and sending up its impure gases, ere it reaches the untrapped service drain at the other extremity. No one drain should be allowed to serve for more than two houses or tenements.

Another sanitary evil is the close proximity of privy vaults to dwelling houses, and, what is even worse, to the wells or other sources of water supply for family use. Where the soil is a good blue clay the evil is not likely to exist, but in a sandy or other porous soil, the liquid filth percolates through into the well, and renders what should be the means of preserving health the most dangerous promoter of disease. We could furnish abundant evidence of the truth of this statement, if necessary; but we believe it is admitted by all intelligent persons to be the case. The only means of preventing this is by constructing water tight tanks for privies, either in the form of the usual circular wooden cistern, or by brick cemented with water-lime, and by puddling around the well with blue clay, at least 9in. in thickness and to a depth of five or six feet. Stables and cowsheds should also be as far as possible removed from the water supply, drained, kept clean and well ventilated, and not less than about 1,000 cubic feet of space being allowed for each animal.

In cities and populous towns the pig should not be allowed to exist at all. As a city *habitant* he is an unclean animal, and breeder of disease. Slaughter-houses should also be entirely banished from populous neighbourhoods. The blood and offal of the slaughter-house saturates the materials of the structure, clogs and chokes up the drains, and fills them with impure gases; their existence also necessitates the keeping a supply of animals on the premises ready for slaughter. Public slaughter-houses should be erected where the blood and offal could be accumulated and mixed with other matter, and produce a rich agricultural manure.

We next come to the water supply of towns. This, undoubtedly, is in many cases very bad. In old and thickly populated places the whole soil has become so saturated with impure soakage from privy vaults, stables and cowsheds, and decaying animal and vegetable matter, that, in rare instances only can anything like pure water for domestic uses be obtained from sinking wells; and when water is procured from rivers and lakes, it not unfrequently happens that the whole or a great portion of the sewage of the town empties into the place from which the supply of water is derived. Such is the case in this city; the evil is not much felt yet, owing to the source of supply being so extensive, in proportion to the amount of sewage returned to it. The evil will, however, go on increasing, and eventually render it necessary

to turn the sewage in another direction—utilizing it for agricultural purposes, and leaving our water supply pure. The present system of robbing the soil for the support of the cities and towns, and returning but little back will have to be given up, if the productiveness of the soil is to be kept up to the desired or necessary standard.

Another cause of impure air in cities and towns on this continent, is the neglect of the authorities to have the streets and lanes kept free of deposits of manure, and of decaying animal and vegetable substances. In the smallest villages in England, as well as in the largest towns, old and somewhat infirm men, and many strong ones too, may be constantly noticed going their rounds with barrow, broom and shovel, gathering up everything that may be formed into manure. This is done in most cases without any expense to the authorities, as the matter thus accumulated is readily sold to the farmers, who pay such a price for it as enables many families thus to derive a comfortable sustenance. Here the filth is left upon the streets, except as it may be scraped up perhaps once or twice a year, and the product lost to any useful purpose, while we have crowds of beggars and idlers who might avail themselves of this source of gaining a livelihood; especially if the municipal authorities should supplement their profits by a small bonus, according to the amount of work done.

Carrying out sanitary regulations of this character is at present considered a very expensive operation; but when properly understood, and the agriculturists and market gardeners come to rightly appreciate the value of town sewage and other waste vegetable and animal matters, joint stock companies will be formed for collecting and preparing it for use, in the form of concentrated manures; who will not only take it from the cities and towns, but will also pay a liberal bonus for the privilege of being allowed to do so. This has been the experience of British towns, and will undoubtedly yet be so of Canadian.

Next in importance to these subjects of drainage, ventilation, pure water and thorough cleanliness, is a knowledge of the best and cheapest disinfectants—facilities for obtaining them and their modes of application. From time to time different prescriptions are published, but in most cases the articles named are a class of chemicals that can with safety only be placed in the hands of scientific persons to use. What is required is knowledge of those of a simpler kind, for general use.

In another column will be found a communication from M. Barrett, M. A., M. D., Lecturer in "The Toronto School of Medicine;" and also the following paper on the same subject, from W. Tempest, M. D., of this city; for both of which we beg to return our thanks, especially as these gentlemen have each given considerable attention to the study of this subject:—

On some Useful Disinfecting Agents.

For the sick-room, one of the most pleasant deodorizers or disinfectants is burnt coffee. One or two ounces of ground unroasted coffee may be sprinkled on a hot shovel, so as to roast it, when so long as the air is greatly charged with organic matters, the smell of burnt coffee will be comparatively imperceptible; but when the odour of the coffee predominates, the offensive matters before present will have disappeared.

For use in the vessels of a room, the Disinfecting Solution of the Canada Chemical Company is very good. It is a solution of chlorine, neutralized with suitable bases, and forms a safe disinfectant.

Where rooms or houses are uninhabited, or where the effluvium is so strong that powerful reagents are required, chlorine gas is most efficacious, and may be thus prepared:—

Mix three ounces of black oxide of manganese with eight ounces of common salt, place in a strong dish or jar, and pour on it four ounces by weight of sulphuric acid, diluted with four fluid ounces of water. The acid and water had better be added to each other by the druggist. It must be borne in mind that chlorine is irrespirable and attacks metals, therefore this formula is not to be used in a house that is occupied. The matter left after the evolution of chlorine has ceased is still possessed of disinfecting properties.

In rooms where scarlatina, measles, small-pox, diphtheria, &c., exist, it may serve a good purpose to have about two drachms of iodine placed in a two ounce stoppered bottle on a shelf or table. The bottle can have the stopper removed, and be placed in a saucer containing a little hot water, two or three times a day, until the odour of the iodine is perceptible in the apartment. If it becomes unpleasantly strong, the stopper can be inserted for a time, while if the room be kept rather warm, a sufficient diffusion of the iodine vapour may take place without the aid of heat.

Where the air is very unpleasant, and a patient dislikes the smell of chlorine preparations, a little iodine, equal in bulk to two or three peas, may be placed in a saucer, and the latter held over a lighted candle or lamp until the iodine is volatilized. If the diffusion of a small quantity of iodine vapour cause a very perceptible smell, it may be taken as a proof of the comparative purity of the air, and *vice versâ*.

For pouring down the pipes of sinks, water closets, &c., tar water is a very useful deodorizer. A few pounds of coal tar can be kept in a bucket, hot water poured on and stirred with a stick will take up some of its properties, and a little of it can be used occasionally as indicated. The same portion of tar will do for several quantities of water.

The use of chloride of lime is pretty well known. It may be placed in saucers or dishes in cellars, and in holes and corners of doubtful cleanliness, and especially in rat holes.

At this season, cellars and root houses where vegetables have been stored should be looked to, all decomposing matters removed, drains examined, and preparation made for a thorough spring house-cleaning and whitewashing. The latter is best done with quick lime. People should bear in mind that pure air and water are nature's great disinfectants and deodorizers. In times of epidemic disease, dry scrubbing is better for cleaning floors than the use of much water, and bed-rooms would be more easily kept clean and the air in them sweet, if the carpets were not fastened down, but were left so as to be readily and frequently taken up and exposed to the air.

STENCH TRAPS FOR HOUSE DRAINS.

From almost all untrapped house drains, during, or immediately preceding rainy weather, emanations of foul gases take place. In this city, the low level of the water in the Bay, for the last few months, has left the mouths of the main sewers exposed; and whenever the wind has blown from the south or east these gases have been forced up into every dwelling connected with the sewers, where the service drains are not sufficiently trapped, rendering it both disagreeable and unhealthy. Considering that the various traps in use are either too expensive or inefficient, we have endeavored to procure one of a simple construction, and at a moderate cost, so that, if found to answer the purpose, no one will have an excuse for leaving drains un trapped.

FIG. 1.

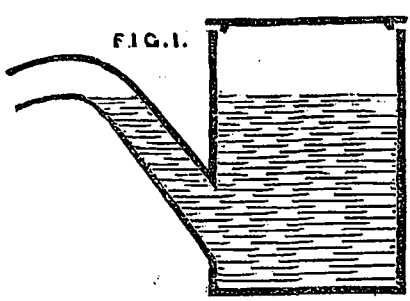
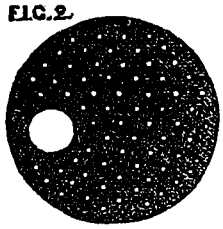


Fig. 1 is a sectional view of this trap, which may be described as similar in form to a stone-ware butter crock, with a tea-pot spout. We have had a sample one made by Messrs. Campbell, of Hamilton, who undertake to deliver them in Toronto, in quantities, at $1.50 each. Mr. Nightingale, of Yorkville, will also undertake to supply them at a cost certainly not exceeding the above sum, and probably less.

The sample we have received is made of the same material as their street sewer pipes It is 14 inches in depth, 8 inches in diameter, with a spout 4 inches in diameter—inside measurement. All that is necessary in placing the trap is to sink a hole under the cellar floor, at the mouth of the service drain, as low as will allow the spout of the trap to enter the mouth of the drain, where it must be securely cemented in, so as not to allow the sewer gas to pass through the joint into the dwelling. Water being then passed in, it will stand at about 3 inches above the point where the upper portion of the spout connects with the body of the trap, which will prevent any gas or smell passing from the sewer.

FIG. 2.



The perforated cover, Fig. 2, is placed on simply to prevent any stones, or large pieces of earth or other substances, from falling in. One hole 3 inches in diameter is left in the cover, to insert the waste pipe from the sink, if required; but it would be better still to connect the sink pipe with the drain *beyond* the trap, and then to use the common *cup* or *syphon* trap for the sink pipe. This would insure against any smell rising from sink water remaining in the trap; although should any smell arise from the trap itself, a bucket of clean water poured down would remove the impure water, causing it to flow into the drain; or a little quicklime, sulphate of lime, vegetable charcoal, or coal tar water, as mentioned in Dr. Tempest's paper on disinfectants, would destroy the cause.

Another advantage of this trap is, that the lid can be removed at any time and the trap cleaned of any sand or dirt that may have accumulated at the bottom.

When the mouth of the *service* drain is sufficiently low to allow of it, the water from the *surface* drain under the cellar floor may be led to flow into the trap, through the perforated cover; but when the mouth of the service drain is scarcely

below the flow, it is next to impossible to trap the drain inside the house, or to lead surface water off from under the building. The floor of the cellar, in such cases, should be raised and filled under with earth, or the drain lowered.

Board of Arts and Manufactures

FOR UPPER CANADA.

TRADE MARKS.

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

(*Continued from page 62.*)

John J. Brown & Son, Boston, Massachusetts; per S. J. Lyman, Montreal. "Brown's Bronchial Troches." Vol. A, fol. 99. Dated Feb. 21, 1866.

James Aitken Harte, Montreal. "Aqua D'Oro or Golden Lotion." Vol. A, fol. 100. Dated Feb. 21, 1866.

Lamplough & Campbell, Montreal. "Savage's Ursina," a preparation for the hair. Vol. A, fol. 101. Dated Feb. 26, 1866.

Harris & Chapman, Boston, U. S.; per T. S. Harris. "Cedar Camphor." Vol A, fol. 102. Dated March 2, 1866.

Jeremiah Curtis & Son, New York, U. S. "Mrs. Winslow's Soothing Syrup." Vol. A, folio 100. Dated March 14, 1866.

J. S. Rutherford, Stratford. "Rutherford's Bridgewater." Vol. A, fol. 103. Dated March 14, 1866.

BOARD OF ARTS AND MANUFACTURES FOR LOWER CANADA.

The Annual Meeting of this Board was held in the Mechanics' Institute, Montreal, on Tuesday, the 2nd of January. We regret not having received copy of proceedings so as to have published it earlier. The only business done was the adoption of the Report of the Sub-Committe for the past year, and the election of the following *office bearers* for 1866:—

President, Henry Bulmer; *Vice-President*, G. A. Drummond; *Secretary*, Dunbar Browne, M. A., B. C. L.: *Treasurer*, N. B. Corse; *Sub-Committee*, David Brown, G. W. Weaver, A. A. Stevenson, B. Chamberlin, M.A., B.C.L., W. H. A. Davies, F. B. Mathews, Henry Lyman, Alexander Murray, George Fothingham.

REPORT.

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

That up to the present, the position of the Board in connexion with its claims on the Government, remains as reported last year. The promises formerly made are yet unfulfilled, but renewed assurances have lately been given that, at the earliest moment circumstances will admit of, the contractors' claim on the Exhibition building will be paid, and the property assumed by the Government; in the meanwhile all that the Board has been able to do is to meet regularly the interest on that debt, and this absorbs $770 of the small sum annually granted by Parliament for the aid and encouragement of the arts and manufactures of the Province.

As an appendix to this report *is* submitted a letter addressed by the President on the 14th of August last, to the Honorable the Minister of Agriculture, recapitulating the just complaint of the Board and its claims on the consideration of the Government, and suggesting three modes by which relief might be afforded. This communication embraces briefly the representations that have so long and hitherto so fruitlessly been pressed by several Sub-Committees of this Board, and obviates the necessity of any more extended allusion to these claims in this report.

Your committee feel compelled, however, to notice one statement in the last annual report of the Minister of Agriculture: it is there said—

"The Lower Canada Board of Arts and Manufactures is not yet freed from the paralyzing embarrassment in which it was placed by the building of the Montreal Crystal Palace, at the time of the Prince of Wales' visit, notwithstanding that the $20,000 voted for an exhibition at that time was employed on the building, a heavy mortgage amounting to, I believe, $11,000 still remains."

This statement that the $20,000 was employed on the building is so plainly erroneous, when it is considered that a most successful and expensive exhibition was held at the time referred to, and has been so often officially contradicted in communications with Government, that it is with surprise and regret that we find it coming up again in so important a public document. In letters to the Hon. M. Sicotte, in 1863, and Messrs. Holton and Letellier, in December of the same year, the injustice done to the Board by this assumption was fully pointed out. In these last letters, referring to what would be the cost to Government did it assume the property, it is stated:

"It will be seen that I do not include in the above the $20,000 which was granted out of the money voted by parliament for the reception of H. R. H. the Prince of Wales, to the predecessors of this Board, for the purpose of procuring an exhibition of the raw and industrial products of the country. It was on one occasion assumed—but in the opinion of the Board very unfairly—that this sum should be considered as part of the cost of the building to government. The Board

would still respectfully represent that that money having been given for the purpose of getting up an exhibition, and that that exhibition which was a most creditable one to the Province having been carried out at a very great cost, it should not be charged against this property. Indeed, the Board, under whose management the exhibition was held, always take credit for having saved to the government, in the shape of a permanent building suitable for future occasions of the kind, about one-half of that grant, instead of having sunk it as formerly in mere temporary erections."

It is only necessary to add that the Board at that time raised $10,000 in subscriptions, entrance fees, &c., and took from its ordinary funds over $2,000, all of which was devoted to the erection of the building, and will accrue to the benefit of the Government should it assume the property as promised; also that the building has been used for military purposes since September 1861, and that large sums which would otherwise have had to be expended by the agricultural association for temporary accommodation has been saved by using this building, but on neither of these accounts has any allowance been made to the Board.

On the 18th of March last the sum of $500 was placed by Government at the disposal of the Board, and its agency required in the selection and purchase of a collection of samples of manufactures in the city and neighborhood for exhibition at Dublin. Manufacturers and others were at once requested by advertisemement to communicate with the Board, but little attention was paid to the opportunity which the occasion afforded.

It became necessary for the Sub-Committee to take the initiative, and they proceeded to make as complete a collection as the small amount granted and the short time allowed would permit.

This collection, though necessarily an imperfect one, was, with that from Canada West, very successful in securing attention and creating interest at Dublin: indeed there is every reason to believe that the result of the exhibition of Canadian manufactures there, will be the opening up of a remunerative market in the United Kingdom for more than one class of our productions.

Out of the twenty-four silver medals awarded to Canada, nine were taken by the collection sent by this Board.

It is to be hoped that, warned by the opportunity which many of our manufacturers have on this occasion lost by their own apathy, more general interest will be manifested by them in preparing for the Paris exhibition in 1867, the privilege of exhibiting at which will doubtless be afforded them.

Your sub-committee appointed a delegation to visit London, C. W., on the occasion of the Provincial Exhibition there in September last; and although at the time much busied in preparations for the exhibition to be held here during the following week, the Vice-President and Secretary were enabled to pay a hurried visit to London. Their report to the sub-committee is on file.

The Industrial department of the Lower Canada Provincial exhibition of 1865 proved a decided success. The collection of products was on the whole better than on former occasions, and the attendance larger. The number of entries was 397—this of course not including the agricultural products exhibited in the buildiug. The number of tickets sold at the Industrial department was 13,288, realizing $3,437.

The sum awarded in prizes amounted to $2,200; and 40 diplomas, 10 silver and 2 bronze medals were granted.

The government have decided upon having Canada effectually represented at Paris, in the great industrial exhibition which is to be held there in 1867, and your sub-committee have addressed the honorable the Minister of Agriculture, suggesting that during the present year, one central exhibition of the products of both Provinces should be held, at which a complete and satisfactory selection might be made from the prize goods, for after transmission to Paris. Whatever mode of procedure may be approved by government, it is to be hoped that timely and effectual preparations may be made by our manufacturers, to do credit to themselves and to the country.

Your sub-committee has not felt warranted, in the present involved position of the Board, in incurring any but the most unavoidable expenses. The only addition to the library during the past year has been the specifications received from the British Patent Office: these are bound, as received, and placed on the shelves for public reference.

The evening classes in connection with the Montreal Mechanics' Institute were very satisfactorily conducted and attended during the winter of 1864 and '65. They were examined and reported on favourably by Professor Dawson and the Secretary, and a grant of $80 in aid of these classes was made by the sub-committee. Similar classes have been organized this winter, with a reported average attendance of about 120.

No further steps have been taken by the government in reference to the much required amendments to the Patent Laws.

A short act was passed during the last session of Parliament to amend the act 32 of the Consolidated Statutes of Canada, in so far as it relates to the Boards of Arts and Manufactures. The principal alteration in the law being to change the time for

election of delegates to the last regular meeting (of each respective Institution) of the year; to modify and somewhat restrict the number of representatives of colleges; to admit as ex-officio members the principal officers of the Geological Survey; and to admit to representation at the Board incorporated societies of workingmen, and art associations, under certain conditions.

Of course there has not yet been time to judge what effect these changes may have upon the position of the Board: they fall far short of the amendments petitioned for for several years by the Board, and embodied in a bill introduced last session by Mr. Cowan, which it is much to be regretted failed to become law.

The Treasurer's account, which is now submitted and on the table for audit, shows a balance of $1,983 30 at the credit of the Board. This result has only been obtained by the strictest economy: and it will be for the next sub-committee to decide on the application of the balance, two courses being left open, either, notwithstanding adverse circumstances, to endeavour to increase the field of usefulness of the Board, or to apply the greater portion of the amount in reduction of the debt on the building.

APPENDIX.

Quebec, Aug. 14, 1865.

SIR,—I desire on behalf of the Board of Arts and Manufactures for Lower Canada once more to call your attention, and through you that of His Excellency the Governer General in Council, to the state of that Board:

It was formed for the purpose of discharging certain functions in respect of the education of mechanics and of the manufacturing classes, by means of night schools, schools of design for women, free libraries, museums, publications and Provincial Exhibitions; functions which could not be discharged for a less sum than $4,000 to $10,000 per annum. It was understood between the then Minister of Agriculture and those who were engaged in organizing the Boards for Upper and Lower Canada, that the former would be the annual grant. Only $2,000 has been granted. When remonstrances were made upon the subject I received answers from the government that, it was the intention to take away the grants from Mechanics' Institutes, many of whom were found to be in a very inefficient condition; and out of the saving thus effected to increase the amount placed at the disposal of the Boards. This saving was effected in 1858, but no increase has been made in the grants to the Boards of Arts and Manufactures: on the contrary, last year, by the change of the financial year the grant was in effect reduced one half.

Acting in 1860 upon the conviction and the repeated assurances received from members of the government of an increasing grant, the Board for Lower Canada undertook the erection of a costly building and acquired ground for that purpose and for its extension. With a revenue of $4,000 the Board could have made arrangements to pay off the debt thus incurred, and have carried forward its ordinary work.

Under present circumstances this has been impossible. The Board has for four years been paralyzed and almost defunct for lack of means to do that for which in the wisdom of Parliament it was created to do.

The building has been occupied for a great portion of the time by a battery of artillery, and from time to time as a drill shed for various other militia corps, for which no compensation has ever been received.

I have therefore to complain for myself and on behalf of my colleagues on the Board, of a very grievous injustice. We were called upon by law to perform certain functions which the parsimony of successive governments has absolutely hindered us from doing; we have received repeated assurances of assistance which have remained unfulfilled: we have been placed in a false and injurious position before the public. For myself, since the formation of the Board eight years ago, I have served it as Secretary and President, earnestly endeavouring to find means and do the work Parliament intended, without receiving any remuneration for the time and labour thus bestowed on the public service; of that I would not complain if labour had not been baffled, and rendered almost fruitless by the refusal of the government of the country to afford effective assistance to our work. Others on the Board have also laboured for all that time with a self-sacrificing zeal, at much personal inconvenience and loss, to promote objects which they feel to be of the highest importance to the labouring classes; and this in spite of the discouragements which the neglect of successive governments has produced. In previous reports it has been shown that, especially in respect of evening classes and a free library of reference, some good work has been done.

Under the circumstances I beg leave, once more, very respectfully to urge that you will move His Excellency the Governor General in Council to afford relief by one of the following methods, in order that faith may be kept with those who have endeavoured to serve the government and their countrymen, and with the class whose interests they represent:—

1st. By raising the annual grant to $4,000 as first promised.

2nd. By raising the grant to $3,000 per annum and paying a reasonable rental for the use of the building for militia purposes during the past four years, enabling the Board by so much to reduce the principal sum of the debt.

These methods of relief would, in one respect, be preferable, as furnishing an obvious basis for equal justice to the Upper Canada Board.

3rd. By paying off the debt of $11,000 due to the builder, and holding the property as security; or receiving a direct transfer of the right and title of the Board to the property for such payment.

Besides these but one alternative remains: the repeal of the act and dissolution of the Board—its property in that case, of course, reverting to the government.

But I am compelled once more to call your attention, in that case, to the great injustice done to that class of people for whose benefit these Boards were established, The special education of clergymen, physicians, lawyers, merchants and agriculturists are provided for by liberal grants to colleges, academies and high schools, especially adapted to their wants. Skill in agriculture is stimulated by liberal grants to the societies which hold exhibitions.

The artizans or manufacturing classes in that case would, alone, seem to be utterly unworthy of any care or assistance from the government of the country.

Even now the grants made to the Boards are so petty as to be but a small fraction of the amount per head voted annually in the manner above stated, for the benefit of the other classes of the community. To double these grants would not nearly place the artizans on an equal footing with the others.

I have the honour to be
Your very obedient servant,
(Signed,) B. CHAMBERLIN,
President Board of A. & M. for L. C.
The Honourable T. D. McGEE,
Minister of Agriculture, &c., &c., &c.

Correspondence.

ON DISINFECTANTS.

To the Editor of the Board of Arts Journal.

SIR,—The articles published in the March number of the Journal on the subject of cholera prompt me to submit the following remarks in regard to disinfection and disinfectants. My desire is to be as brief as possible, knowing that in this age the value of time is so well understood that persons listen willingly to those only who offer what they have to say in the fewest words.

By disinfection I understand the destruction of influences, both material and atmospheric, which are prejudicial to health. With respect to food, the liquid matter most notably liable to exercise a pernicious effect is impure water. The chief impurity to be guarded against in drinking water is, first, the presence of fæcal matter derived from privies in too close contiguity to the source whence the water is obtained; the only remedy for such an evil is the avoidance of the cause. Secondly, the presence of organic matter in the water derived from decaying vegetable matter—this evil may be remedied by filtration; and thirdly, water holding noxious gases in solution—these may be driven off by boiling the water. Of solid matter, both animal and vegetable, used as food, attention should be chiefly directed to its perfect integrity. Whenever decomposition in the slightest degree has set in, from that moment the matter is no longer fit for food. In the case of flesh that of the full-grown animal is to be preferred. Pork is unwholesome during hot weather; and the same may be said of fish.

Avoiding thus some of the chief causes of disease which may arise from the character of the food, I proceed to point out the poisonous influences which may exist in the air we breathe, and which are thus liable to be introduced into the body by the way of the lungs. Manufacturing establishments, giving rise to deleterious gases, are comparatively unknown in this country, and therefore require no further notice. The chief difficulty we have to contend with is an atmosphere rendered impure by the presence of organic matter, arising from the decomposition of animal and vegetable substances. The cause should be avoided by the aid of the scavenger, by a perfect system of drainage, and by free ventilation; supposing these to be in full operation, there would be no necessity for the use of disinfectants.

The essential principle upon which disinfectants act is that of oxidation, and therefore fire must be regarded as the most thorough of all disinfectants; nor can any substance be entitled to rank as a disinfectant which does not oxidize the impurity we seek to remove. If, therefore, the air we breathe be contaminated by the presence of organic matter, the latter may be destroyed by the aid of a high temperature.

Water, though not a disinfectant, obviates infection, first, by washing away the cause, and secondly by holding gases in solution which would otherwise contaminate the air. Water so charged should not be allowed to evaporate in the vicinity of dwellings, and thus set free the noxious gases it hitherto held imprisoned, but should be conveyed into the general current,

This same power of absorbing gases is possessed to an extraordinary degree by many porous substances. Among these may be mentioned freshly burned charcoal and vegetable mould; fæcal or putrid matter when covered with a sufficient layer of either of these substances is speedily and completely deodorized.

The air acts as a disinfectant by diluting poisonous gases, whether emanating from decaying animal or vegetable matter. The freest ventilation secures the purest air. Thus the four elements of the ancients are each in their own way disinfectants. Corresponding with the first of these in its mode of action, ozone stands pre-eminent. As an active oxidizer it is most powerful, decomposing the products of putrefaction, and thereby purifying the air we breathe. For the disinfection of the air within confined apartments it is thoroughly

effective. The difficulty of generating ozone in quantity sufficient for purification on a large scale is to be regretted. Some mode may be subsequently discovered, it is to be hoped, by which this most valuable agent may be rendered all-sufficient. The article by B. W. Richardson, M.A., M.D., F.R.C.P., transferred to the pages of the March number of this Journal, is full of interest, and worthy of the deepest consideration by all who interest themselves in hygienic matters.

Next to ozone, chlorine gas is usually regarded as a most efficient disinfectant. Its power is supposed to depend on its affinity for hydrogen, by which it effects the decomposition of the vapour of water, liberating the oxygen, whereby any organic matter contained in the atmosphere may be oxidized. Chlorine fumigations have been most extensively tried in cholera epidemics, but their efficacy has not proved such as to justify any reliance being placed upon them. At Moscow, chlorine was extensively tried and found unavailing, nay, apparently injurious in cholera. "At the time," says Dr. Albers, "that the cholera hospital was filled with clouds of chlorine, then it was that the greatest number of attendants were attacked." It has also been tried in the Small Pox Hospital, London, during an epidemic of erysipelas, but while all offensive smell was destroyed, the contagion remained behind. It certainly has the power of destroying noxious effluvia and putrid odours, and is well adapted for use in prisons, ships, hospitals and all other places which require deodorizing, but I am led to believe that it acts chiefly by the abstraction of hydrogen from the noxious effluvia, rather than by setting free oxygen, which in its nascent condition would act upon the organic matter contained in the air, and thereby destroy its infectious power.

Bleaching powder, or chlorinated lime, which is a compound of hydrate of lime, chloride of calcium, and hypochlorite of lime, and La Barraque's solution of chlorinated soda, also may be advantageously substituted for chlorine gas; the irritating properties of the latter upon the organs of respiration precludes its use in inhabited dwellings. Pereira says, "When these substances are in contact with organic matter, it is supposed the hypochlorite gives out oxygen and is converted into a metallic chloride, the oxygen being the effective disinfecting and antiseptic agent; or it may act by abstracting hydrogen. These substances evolve chlorine so slowly, and in such moderate quantities, as not to produce noxious effects, though their action on organic matters is very powerful."

As in the case of chlorine, so with regard to these chlorinated compounds, much doubt still exists as to their power of destroying infection or contagion, but that they are most effective deodorizers is fully proven.

Condy's disinfectant is a solution of the manganate and permanganate of potash: these substances in the presence of organic matter readily yield up a portion of their contained oxygen, and are converted into the sesquioxide of manganese. This constitutes their real power as disinfectants. The patentee states that "a wine-glassful of the concentrated fluid poured into a hogshead of offensive drinking water, will render it sweet as fresh water. Should it be so bad as to require another half wine-glassful, let it be added, and when the sesquioxide of manganese has settled, it may be run off and drank, or if filtered after the addition of the permanganate, will be found as good and sweet as fresh water."

My own experience leads me to believe that the chloride of manganese possesses deodorizing powers nearly if not quite equal to the manganic and permanganic acids, and Mr. Horsley states that a most powerful and cheap deodorizer is obtained by mixing three parts of the black oxide of manganese and one of chloride of lime.

Sir Wm. Burnett's disinfecting fluid is a solution of chloride of zinc, and is a very effective deodorizer, but has not the oxidising power of manganic acid, or of chlorine and the hypochlorites, and cannot therefore be regarded as a true disinfectant.

A solution of sulphate of iron is also an effective deodorizer, but not equal to the chloride of zinc solution.

Quicklime, by virtue of its caustic properties, is a valuable and cheap deodorizer. The claims of many other substances might have been brought under consideration. I set out, however, with the proposition that oxidizing substances are the only true disinfectants. To more than notice any others than such as are well known to possess this property would extend this communication beyond the limits I had at first assigned to it, and would accomplish no useful purpose that I am aware of.

My conclusions may be summed up as follows: oxidizing agents are the only true disinfectants, and these, so far as at present known, are fire, or a temperature above 250° F., ozone, manganic and permanganic acids, and probably chlorine and the hypochlorites.

Your obedient Servant,

M. BARRETT, M.A., M.D.

Toronto, March 19, 1866.

To renovate Manuscripts.

Take a hair pencil and wash the faded part with a solution of prussiate of potash in water, and the writing will again appear.

Transactions of Societies.

HAMILTON MECHANICS' INSTITUTE.

The Annual Meeting of the Members of the Hamilton Mechanics' Institute was held on Friday, the 23rd February, 1866, Thos. McIlwraith, Esq., President, in the chair.

The President opened the proceedings by briefly stating the objects of the meeting. The Secretary, Richard White, Esq., then read the Report for the year ending 31st January, 1866, of which we give the following abstract:

NUMBER OF MEMBERS.

"The number of Members on the 1st Feb. 1865, was	443	
Members have been elected during the year, numbering	101	
		544
Deduct number of those who have retired during the same period	67	
		477
From which deduct also those over six months in arrear		46
		431

FINANCE.

The receipts and expenditures for the past year, and duly audited, are as follows:

RECEIPTS.

To balance from last year	$142 60
" Subscriptions to 1st February, 1866	1076 92
" Hall rent	886 25
" Donations	7 00
" Paper sales	102 51
" Reunions	469 35
" Show cards	22 00
" Art exhibition	669 17
" Rent	80 46
	$3,456 26

EXPENDITURE.

By cash paid for	Magazines	$38 07
" "	Newspapers	144 35
" "	Building, repairs, &c	480 33
" "	Water rates	3 75
" "	Gas account	348 20
" "	Outstanding debts	44 96
" "	Salaries	713 00
" "	Cleaning hall and room	72 64
" "	Mortgage to Canada Life Co.	700 00
" "	Fuel	104 90
" "	Postage	73 68
" "	Printing	13 00
" "	Books and binding	59 68
" "	Reunion expenses	197 38
" "	Art exhibition	450 61
"	On hand	11 71
		$3,456 26

LIBRARY.

The number of volumes added to the Library during the year has been (of which 24 were purchased, and 12 were donations)	36
The total number of volumes at the date of the last report was	2979
	3015
Deduct damaged and incomplete works	38
The number of volumes in the Library on the 1st inst. was therefore	2977

The number of volumes issued during the year was 5,193, or an average daily issue of over 17 volumes, and over 81 volumes have been re-bound."

NEWS ROOM.

For the gratuitous supply of 54 journals and newspapers, the Board in their report recommend that thanks to the gentlemen supplying them be recorded.

51 periodicals and newspapers are reported as purchased by the Institute.

"By a reference to the foregoing statements, it will be observed that although the receipts for the year just closed are not quite equal to the previous one, yet after providing for the current requirements of the News Room and Library, the amounts paid on building account and towards the debt, which really represents the profits on the transaction of the year, is in excess of the amount realized for some years. The deficiency in the receipts is mainly caused by the withholding of the usual grant by the G. W. R. R. Co., and in some degree to the fact that the Hall has been less frequently rented than formerly.

The Directors have pleasure in referring to the Art Exhibition, held in connection with the Institute during the month of May last. It is exceedingly gratifying to know that in addition to the very important effect such exhibitions must have upon the general public taste, the result in this instance was also pecuniarily advantageous to the Institute. The Directors trust that the incoming Board will be enabled during next summer to have another exhibition, which with the experience of last season, may, it is thought, be made even more attractive and useful than the one already held.

The Directors have had under their consideration the expediency of leasing a portion of the hall at present used for a reading room. They have now an offer for the portion referred to, but as their term of office was so near ended they have decided to submit the matter to the general meeting for its consideration.

In the discharge of their duties during the past year, the Directors have been much encouraged by the very ready and hearty assistance extended to them by gentlemen not members of the Board, and they take this opportunity to acknowledge the very great obligations under which the Institute is, to very many of our citizens for the liberality and hearty co-operation they received, particularly on the occasion of the Art Exhibition and Reunions.

In conclusion, the Board have pleasure in testifying to the continued zeal and ability with which the office of Superintendent has been filled by Mr. Rutherford."

The Report was received and adopted. The further consideration of the question of renting the front part of the Reading Room was submitted to the new Board. The election of Office Bearers was then proceeded with, which resulted as follows:

President, Thos. McIlwraith, Esq.; Vice-President, Judge Logie; Directors, Messrs. W. H. Glassco, Wm. Turnbull, Jno. W. Murton, J. W. Ferguson, Fred. Creswell, Jas. Matheson, Richard White, Wm. Young, and the Rev. W. P. Wright.

Votes of thanks were passed to the Retiring Officers and Directors, and to the ladies and gentlemen who have given their services at Re-unions and the Art Exhibition of the past year; when the meeting adjourned.

TORONTO MECHANICS' INSTITUTE EXHIBITION.

In the April number of this journal for last year, we noticed a successful Exhibition held by the Toronto Mechanics' Institute, of a character quite novel to this country, with the exception of those previously held by the same body. The Hamilton Mechanics' Institute, encouraged no doubt by the success of this Institution, in the June following held a similar Exhibition, which continued open for fourteen days, and was very successful. The Toronto Institute Exhibition for the present year is now being held, and differs but little in interest from the preceding one.

The specimens on exhibition comprise a large number of Paintings in oil and water colours; Drawings in chalk, pencil, &c.; Photographs, plain and coloured; Heraldic Paintings and specimens of Illuminating; Geometrical Drawings; Engravings and Lithographs. There are also a number of beautiful specimens of Statuary, comprising busts, groups of figures, and statuettes; modelling in plaster; figures and groups of figures in bronze; many beautiful vases, and numerous other specimens of ancient and modern art.

In Natural History there are upwards of 40 cases, many of them of large size, comprising stuffed birds, fishes and animals, besides several individual specimens not in cases, and six drawers of Insects. There is also a beautiful fountain Aquarium, well stocked with fishes; specimens of minerals; an extensive collection of shells, ferns, &c.

Specimens in the antique and curious are very numerous, and comprise articles from almost every part of the globe. There are also many ancient printed and manuscript books, coins and medals.

A small steam-engine, a few models, and one each of Steinway's and Fox's pianos comprise the principal articles in machines and manufactures.

The above are all shown in the Music Hall. The four ante-rooms, last year occupied by the Educational Department with school apparatus and appliances, have now been fitted up by a committee of ladies connected with the Institute, and form a most attractive feature of the Exhibition. It comprises a large collection of most elaborately worked devotional and other chairs, ottomans, screens, cushions, worsted-work, bead-work, braiding, crochet, embroidery, lace-work, wreaths, wax-work, &c., &c.

The Exhibition is to be kept open for ten days, and is being visited by a large number of persons—the charge for admission is but 10 cents.

Such expositions as these are not only very interesting, as a means of spending a few pleasant hours, but tend to promote a correct taste in every department of arts and manufactures. The contributors are entitled to the warmest thanks of the Institute, and of the public.

We have no doubt but that in the locality of almost every small town where a Mechanics' Institute is established, an interesting collection might be brought together for such an exhibition. It would be one means of infusing new life into many of these institutions, and might be made profitable for the purchase of new books for their libraries.

Selected Articles.

DR. VŒLCKER ON DISINFECTANTS.

Dr. Vœlcker recently delivered a practical lecture to the members of the Royal Agricultural Society on the subject of disinfectants, of which we reprint a portion.

The professor stated that microscopic researches have proved that the contagious matter of cattle plague consists of minute and peculiar organic cells, moving about rapidly, that these cells were found in the dung of diseased animals, and, it was believed, might be given off by lungs and skin, and thus, either from the droppings, or floating about in the atmosphere, and capable of being wafted some distance, were introduced into the blood of animals brought within range of their baneful influence. He divided the subject under three heads—viz: 1. Various disinfectants recommended, their mode of action, and efficiency. 2. Application of same for particular purposes. 3. Means of prevention. He first explained the nature of a true disinfectant, and how incorrectly the term was often applied to agents that acted in a totally different manner. The term disinfectant should only be applied to those matters that can actually destroy the contagious matter, whereas it was often applied to substances which neutralize or destroy gaseous products of decomposition; thus, sulphate of iron removes sulphureted hydrogen from the air without destroying the animal matters, which, on decomposition, evolve this gas; whereas chlorine and nitrous acid completely break up or destroy decomposing matters, converting them into their ultimate gaseous products, which are comparatively harmless. The latter are true disinfectants, as well as deodorizers. Again, substances which retard or prevent putrefaction are antiseptics; thus, weak solutions of carbolic acid do not destroy, but arrest putrefaction.

As true disinfectants we may class chloride of lime, chlorine gas, sulphurous acid, nitrous and nitric acid, charcoal, quicklime, caustic alkalies, earth, manganates and permanganates, and the action of fire.

Chloride of lime, which is, perhaps, the most useful of the above, acts by yielding up oxygen, which destroys organic matters; 1 pound of chloride of lime to 3 gallons of water forms a proper solution for applying to droppings of cattle, washing down floors, walls, etc.; while 2 ounces of the same with one gallon of water, is a suitable mixture for washing our hands, or sprinkling on the clothes of those engaged in attending on diseased animals.

Chlorine gas and sulphurous acid fumes are useful for disinfecting buildings. The latter is the easiest to apply, as the combustion of ½ pound of flour of sulphur in three or four little heaps on the floor will produce abundance of sulphurous acid.

Nitric acid for the same purpose, obtained by mixing 4 ounces powdered nitre, 4 ounces oil of vitriol, and 2 ounces water in an earthen vessel, and heating over a brazier.

Nitrous acid is made by pouring ½ pound of oil of vitriol on 2 or 3 ounces of copper shavings. All these produce disinfecting fumes.

Wood and peat charcoal are powerful disinfectants, as the condensed oxygen in the cells hastens decomposition and eats up organic matter; fresh supplies of oxygen being absorbed from the atmosphere and condensed; and thus the process continues. A small quantity of peat charcoal will destroy a large quantity of animal matter. This substance is very good to cover carcasses that are buried.

Porous earth acts as a true disinfectant.

Caustic soda and soda ash: the latter is better than lime, as it dissolves in water, readily enters porous materials, and removes impurities from the surface.

Condy's Fluid, a solution of manganate and permanganate of potash, is a good disinfectant, freely supplying oxygen; but it is not practically available by farmers. Fire and high-pressure steam destroy infectious poisons.

As simple deodorizers Dr. Vœlcker merely mentions perchloride of iron, in solution of 1 to 10 of water; sulphate of iron (green vitriol); sulphate and chloride of zinc, and nitrate of lead, in the same solution.

As antiseptics we have creosote and carbolic acid, derived from distillation of coal, and which is the most powerful and cheapest antiseptic that we have. This substance enters largely into the composition of a number of materials, as McDougall's Disinfectant, Cliff's Antiseptic Fluid, etc., which are just now offered to the public. Dr. Vœlcker next considers the application of disinfectants according to the particular object: 1. For treating animal carcasses. 2. Disinfecting cow-sheds, etc., where disease has been. 3. Manure. 4. Pastures. 5. Cattle tracks, barrows, stable tools, clothes, etc.

The manure may be sprinkled with a solution of chlorate of lime before moving, then a good layer of quicklime when put in the barrow, and taken to a field, and made into a heap, consisting of alternate layers of soil, manure and lime; 5 cwt. of lime to each ton of manure. At the end of three months the heap may be turned and ingredients mixed, and after lying another month, Dr. Vœlcker considers it might be safely used.

The pastures which diseased cattle have inhabited should be left without stocking for some months, the clots knocked about, and 100 bushels per acre of quicklime applied.

Trucks, barrows, etc., cleaned thoroughly with soft soap and water, and then washed with a solution of chloride of lime.

Laborers and inspectors must also be disinfected—the latter, it was suggested, might keep at each farm, where animals were diseased, a pair of pattens, and stump about the sheds in these. The boots of attendants should be most carefully washed in the caustic soda, or else the men made to pass over a layer of fresh lime, and it strikes us as an excellent plan if the entrance to the sheds and premises generally were daily strewn with a layer of quicklime.

Lastly, the question of prevention was slightly touched upon, rather to point out how very little we really know about antiseptics, and how desirable some thoroughly exhaustive experiments would prove than to suggest anything. Perfect isolation was pointed out as all important; then the distinction of contagious matter. The use of carbolic acid in weak solution (1 to 100) to wash over the animal's body and sprinkle about, might, probably, be a wise precautionary measure, and could do no harm.

The most noticeable remarks in the discussion that followed were those of Colonel Talbot, who related his experience in a dairy of over one hundred cows, at Sudbury, about six miles from London, which, till within a week, had escaped the plague. He had employed Burnett's Fluid, (chloride of zinc) to sprinkle about, and wash the animal's body, and had also given internally charcoal daily and nitre occasionally. Whether this treatment has been of any use he could not say, but up to the time stated no disease appeared. His treatment of the disease, which he could not trace to any contagion, was as follows:—First, if the bowels were constipated, a mild aperient should be given, consisting of one and a half pounds of treacle, two or three ounces of salts, two table spoonsful of sulphur, and a bottle of Day's Fluid; after some hours, a dose of warbena—a patent medicine of Dr. Collis Browne's, much resembling chlorodyne. If not cured in two days, he tried hydropathy, as recommended by Mr. Graham, of Capheleie; and if this was unsuccessful, he applied external stimulants to the region of the abdomen. According to Col. Talbot's account, the effects of the warbena had been most remarkable, as, although the disease only first appeared a week or ten days ago, several animals were considered to be recovered, and one was giving nineteen quarts of milk daily.—*London Field.*

NEW THEORY RESPECTING THE CHOLERA.

A work was published in 1855, by Dr. Pettenkober, Professor of Chemistry in the University of Munich, entitled "Investigations and Observations in regard to the Propagation of Cholera, with Reflections on the proper means of arresting its Progress." The author was engaged for a lengthened period, by the government, in investigating

the progress and mode of propagation of the disease in Bavaria; and this volume of facts is the result of his and other physicians' researches, not only in Germany, but in England and India.

Dr. Pettenkober claims to have established the following facts:

1. That it is not contagious, in the usual sense of the word; but that it can, nevertheless, be carried from one place to another.
2. That it always follows the usual routes of commerce.
3. That no elevation above the level of the ocean furnishes a guaranty against the disease, nor is any depth necessarily exposed to its ravages.
4. That no contagious matter is floating in the atmosphere, and that consequently the disease is not propagated by floating currents of air.
5. That it is not propagated through the water.
6. That it is propagated through the earth.
7. That the earth receives and developes the cholera contagion from the excrements of diseased persons.
8. That excrements from a diseased person thrown into a sink or privy, are capable of transforming the whole mass into a hearth of cholera contagion.
9. That the gases disengaged by the decomposition of organic substances, especially of excrement, penetrate the earth, rise to the surface, and become then the cause of fever and of cholera.
10. That there has not been a single case of cholera observed in Bavaria that could not be traced to that species of infection.
11. That the stools of persons afflicted with cholera, or that peculiar species of diarrhea which usually precedes cholera, are more infectious than of those who are actually seized with the disease.
12. That cholera is always carried to a place where it has not yet appeared by a diseased person, and communicated through excrements brought in contact with the earth; and that there is no other way of propagating the disease. Immediate contact with the patient, inhaling the air of the sick room, washing the dead body, nay, even dissecting it after death, does not communicate the disease.
13. Not every species of earth acts on the process of decomposition in like manner, and the capacity for spreading the contagion in the manner above stated varies in consequence with the composition of the soils on which dwellings are built. On rocky foundations, granite or sandstone, cholera never becomes epidemic. An alluvial soil, underlaid with lime or clay, or any other cause which keeps the ground moist, may become a teeming womb for the cholera contagion.
14. The cholera poison may be in a person from one to twenty-eight days, without manifesting itself. This fact furnishes a measure for the distance to which it may be carried from one place to another.
15. The disease which is not communicated by contact is carried to the inmates of houses, sleeping in rooms exposed to the cholera poison as above engendered.
16. If the cholera, as proved in London, is more intense and fatal in the plains than on elevations, it will, on investigation, be found that it is owing to the better drainage, by which filth is removed before it is decomposed, or before it enters, as in damp and wet soils, into process of fermentation. Dr. Pettenkober found some of the worst cases of cholera on hills where the privies of houses still higher situated emptied into sinks or sewers of improper fall.
17. To prevent contagion, the stools of cholera patients must be disinfected before they are emptied. The best disinfecting agent is vitriol of iron. Chloride of lime only purifies the air, but does not destroy the cholera poison.*
18. When strangers from cholera districts are expected to arrive, the privies of hotels and boarding houses where they are expected to put up, ought to be disinfected with vitriol of iron—say once a week. In the rooms and corridors of hospitals, turpentine may be spread on paper and exposed to the atmosphere. The ozone (electrified oxygen) thus given out is the best purifier of the atmosphere.
19. Care must be had not to allow any linen to be washed which is soiled with the excrements of a cholera patient. The process of maceration to which soiled clothes are usually subjected is capable of devoloping and communicating the disease in its worst form. Jameson found the same truth in 1817-18 and '19, in India, without tracing it to its source.
20. There are no other sanitary regulations capable of preventing or arresting cholera in its progress, than those which have reference to cleansing and purifying those places which serve to collect or convey human excrements.

Town Sewerage.

The Boston papers are discussing the question of sewerage, and the value of city drainings for manure. The primary object of drainage is the removal of offensive matter and improved healthfulness thereby. The question of profit in securing and restoring to the land the waste of cities is to be determined by many circumstances. Its value is dependant upon the cost of securing it, and the demand for it in the immediate neighbourhood. It would seem as though it could be manufactured into poudrette, so that its offensive nature would be removed, its conveyance be rendered easy, and it be adapted to any soils or productions. We presume that the waste of a city, like Boston for instance, would be sufficient to average the keeping of one acre of land in a good state for cultivation to every inhabitant. If so, the city of Boston should return to the country the dressing for 160,000 acres of land. In that case the result would be that instead of the city exhausting the country, it would absolutely serve to enrich it; for it would not alone return what is contributed to feed the city within a radius of a hundred miles, but what is received from the new lands and pastures of the distant West, and from tropical and other climes beyond the seas; and if some system could be devised and adopted in all the large towns and cities, New England would in time become a garden, as Old England has from

* Dr. Vœlcker, in a paper on disinfectants in relation to the cattle plague, in another column, speaks of sulphate (vitriol) of iron as only purifying the air, whereas chloride of lime is a true disinfectant.—Ed.

its importation of food for the soil, from all parts of the earth.

The fields are like the animals that live upon them, whether human or brute; they must eat and drink and breathe, or else they fail to produce, and die. We do not expect labour from a man, or speed from a horse, that is starved. It is just so with the land; it must be nourished and fed; by rains or irrigation it must have drink; and by moving and opening and ventilating, it must breathe. Men see that they must feed the cow to obtain milk; but they do not see clearly that they must feed the earth for crops; and hence three-quarters of all the land under tillage in New England is starving to death. We take off the crops and send them into the cities to sell, but the cities do not return what will enrich the fields. Hence the failure to produce and the discouragements that follow. The garden is turned into the field—the field into the pasture; and the pasture given back to wilderness; so that to-day there is probably no more cultivated land in New England then there was forty years ago. Very few agricultural towns increase their population, and from most of them there is constant emigration to the manufacturing places and the West. The system we have pursued is one of exhaustion. Whether it is cheaper in the present state of the country, when land is plenty and of little value, to use up one spot and then to move to another, rather than keep up and improve the old, is a question that others might decide better than we. We feel sure that a proper sewerage system for the cities, and a return of the drainage to the farms, would every year give a better and a more productive agriculture.

But if it will not pay so to drain the cities and save the refuse here, as they find that it does in England where the population is more dense; and in China, which is the most densely peopled of any part of the world, where they are as careful to save food for the soil, as wheat to be reduced to flour and feed the people, one thing at least might be done by families. If the cities can not look after such matters, it would conduce to comfort and health to use their coal ashes and sweepings, with the grass that grows around their doors, and the weeds in their gardens which they want to get rid of, for each one to form a compost heap, which could take the slops of the house. This would be a profit in all particulars."—*Newburyport Herald.*

LIEBIG ON COFFEE.

The following extracts are from an article contributed to the *Popular Science Review* by Baron Liebig.

"If the raw berries are boiled in water, from 23 to 24 per cent of the soluble matter is extracted. On being roasted till they assume a pale-chestnut color, they lose 15 to 16 per cent, and the extract obtained from these by means of boiling water is 20 to 21 per cent of the weight of the unroasted berries. The loss in weight of the extract is much larger when the roasting process is carried on till the color of the berries is dark brown or black. At the same time that the berries lose in weight by roasting they gain in volume by swelling; 100 volumes of green berries give, after roasting, a volume of 150 to 160; or two pint measures of unroasted berries give three pints when roasted.

"The usual methods of preparing coffee, are, 1st, by filtration; 2d, by infusion; 3d, by boiling.

"Filtration gives often, but not always, a good cup of coffee. When pouring the boiling water over the ground coffee is done slowly, the drops in passing come in contact with too much air, whose oxygen works a change in the aromatic particles, and often destroys them entirely. The extraction moreover, is incomplete. Instead of 20 to 21 per cent, the water dissolves only 11 to 15 per cent, and 7 to 10 per cent is lost.

"Infusion is accomplished by making the water boil, and then putting in the ground coffee; the vessel being immediately taken off the fire and allowed to stand quietly for ten minutes. The coffee is ready for use when the powder swimming on the surface falls to the bottom on slightly stirring it. This method gives a very aromatic coffee, but one containing little extract.

"Boiling, as is the custom in the East, yields excellent coffee. The powder is put on the fire in cold water, which is allowed merely to boil up for a few seconds. The fine particles of coffee are drank with the beverage. If boiled long, the aromatic parts are volatilized, and the coffee is then rich in extract, but poor in aroma.

"As the best method, I adopt the following, which is a union of the second and third:—

"The usual quantities both of coffee and water are to be retained; a tin measure, containing half an ounce of green berries, when filled with roasted ones, is generally sufficient for two small cups of coffee of moderate strength, or one, so called, large breakfast cup (one pound of green berries, equal to sixteen ounces, yielding after roasting 24 tin measures [of one-half ounce] for 48 small cups of coffee.)

"With three-fourths of the coffee to be employed, after being ground, the water is made to boil ten or fifteen minutes. The one-quarter of the coffee which has been kept back is then flung in, and the vessel immediately withdrawn from the fire, covered over, and allowed to stand for five or six minutes. In order that the powder on the surface may fall to the bottom, it is stirred round; the deposit takes place, and the coffee poured off is ready for use. In order to separate the dregs more completely, the coffee may be passed through a clean cloth; but generally this is not necessary, and often prejudicial to the pure flavor of the beverage.

"The first boiling gives the strength, the second addition the flavor. The water does not dissolve of the aromatic substances more than the fourth part contained in the roasted coffee.

"The beverage when ready ought to be of a brown-black color; untransparent it always is, somewhat like chocolate thinned with water; and this want of clearness in coffee so prepared does not come from the fine grounds, but from a peculiar fat resembling butter, about twelve per cent of which the berries contain, and which, if over roasted, is partly destroyed.

"In the other methods of making coffee, more than the half of the valuable parts of the berries remains in the 'grounds,' and is lost.

"To judge as favorably of my coffee as I do myself, its taste is not to be compared with that of the ordinary beverage, but rather the good effects

might be taken into consideration which my coffee has on the organism. Many persons, too, who connect the idea of strength or concentration with a dark or black color, fancy my coffee to be thin and weak, but these were at once inclined more favorably directly I gave it a dark color by means of burnt sugar, or by adding some substitute.

"The real flavor of coffee is so little known to most persons that many who drank my coffee for the first time doubted of its goodness, because it tasted of the berries. A coffee, however, which has not the flavor of the berry is no coffee, but an artificial beverage, for which many other things may be substituted at pleasure. Hence it comes that if to the decoction made from roasted chicory, carrots, beet root, the slightest quantity of coffee be added, few persons detect the difference. A dark mixture, with an empyreumatical taste, most people fancy to be coffee. For tea there are no substitutes, because every body knows what real tea is like."

The *Scientific American* says :—

"Coffee should never be brought in contact with iron. Tinned coffee pots that have been used for some time are apt to get worn on the surface, so that the iron the tin plate is made of comes through. When this occurs the coffee will be bitter and black, for it attacks iron, forming an acid very quickly. This any one can see by putting a few drops on a case knife.

"Above all, to have good coffee, the pot must be scrupulously clean. It should be scalded every morning before using and once a week a piece of soda as large as a walnut should be put in the pot and boiled thoroughly. The result will surprise many who thought their vessels clean."

Machinery and Manufactures.

GALVANIC SOLDERING.

Under the name of "galvanic soldering," a process is known by means of which two pieces of metal may be united by means of another metal, which is precipitated thereon through the agency of a galvanic current. This mode of soldering by the "wet method" has been often recommended in various periodicals relating to the industrial arts; but it has been objected that, practically speaking, the union of two pieces of metal could not be effected by means of a metal precipitated by galvanic agency. In order, however, to arrive at a definite conclusion upon this question, M. Elsner undertook the following experiments, the results of which are in favor of the practical use of the operation of soldering by galvanic agency:—

In conducting these experiments, the kind of battery known as Daniell's "constant battery" was employed; and upon the end of the copper wire, which formed the negative electrode, a strong ring of sheet-copper was placed. This ring was cut asunder at one point, and the distance left between the several parts was about the sixtieth of an inch. At the end of a few days (during which time the exciting liquours were several times renewed) the space in the severed portion of the ring was completely filled up with copper regulus, which had been precipitated; and on partially cutting with a file through the part thus filled up, and examining it with a lens, it was observed to be very equally filled with solid and coherent copper.

Another copper ring was then cut into two parts, and the two semi-annular segments thus obtained were placed with the faces of the sections opposite each other, and submitted to the action of a galvanic current. At the end of a few days, the segments were united by the copper precipitated, thus forming again a complete ring. It was also found in this case, on removing with a file a portion of the thickness of the ring at the points of contact, that the spaces had been completely filled up by copper galvanically precipitated, which had united the whole. On observing these points carefully with a lens, the regular deposition of the copper could be readily traced between the formerly separated portions of the ring.

A third experiment was made in the following manner:—Two strong rings of sheet-copper were laid with their freshly-cut faces one upon another, so that the two rings constituted a cylinder. These rings were surrounded by a band of sheet-tin, which was coated with a solution of wax, so that the two rings were equally surrounded by a conducting material. Thus disposed, these rings were attached to the negative wire of the battery, and immersed in the bath of sulphate of copper. At the end of a few days, the interior surface of the rings was covered with precipitated copper, and between the contact surfaces of the two rings copper was also precipitated. These rings had only been submitted to the galvanic current to such an extent as to cover their interior surface with a thin coating of precipitated copper, and yet they were already completely reunited, and formed a cylinder consisting of a single piece. The exterior conducting covering, consisting of a sheet of tin, was of course removed before testing the cohesion or persistence of the galvanic precipitate. It may be remarked that these rings, after being for a certain time in contact (during the galvanic action), together with the plate of copper upon which they rested, became so incrusted with metallic copper that some force was found necessary to effect their detachment from the copper wire.

There would appear to be no doubt, then, according to the results obtained in the preceding experiments, that two pieces of metal may be firmly united by means of a galvanically-precipitated copper; in a word, that soldering by galvanic agency is perfectly practicable. It will, therefore, be possible to firmly unite the different parts of a large piece of metal, and to make a perfect figure of them by galvanic precipitation of a metal (copper, in ordinary cases). If solutions of salts of gold or silver were employed in as concentrated a form as those of copper above mentioned, there is reason to believe that galvanic soldering would also result. In fact, M. de Hackewitz states, that in some experiments on a larger scale which he undertook, to obtain hollow figures by galvanoplastic means, he had remarked that galvanic union often took place between the pieces operated upon. M. Elsner states, that while conducting the experiments above mentioned, he remarked that, by employing too powerful a current, the

negative electrodes of copper, and even the plate of copper, and ring of the same metal resting thereon, became covered with a deep brown substance, in the same manner as this occurs under similar circumstances in galvanic gilding, as is well known. After several unsuccessful attempts to prevent the formation of this brown coating, M. Elsner found that it was possible to remove it entirely on immersing the articles covered therewith, during a few seconds, in a mixture of sulphuric and nitric acids. By this means the precipitated copper was made to assume its natural red color. The possibility of practically effecting the operation of soldering by galvanic agency may be explained in a few words, in a theoretical point of view. The article is, in fact, in an electro-negative state of excitation, whilst the zinc operates positively; the result is, that the faces which are placed opposite each other, when the ring has been cut, are negative; that is to say in an electric condition of the same denomination. During the progress of the electro-lytic decomposition of the metallic salt in solution (sulphate of copper in the above case), the electro positive molecules of copper which are detached simultaneously arrange themselves upon the two opposite faces, and in the direction of the break. Now, from the moment that these molecules are deposited they constitute, with the piece, a homogenous mass; and from that time act negatively upon the copper which is contained in the solution, and again precipitate copper in the form of regulus. This method of operation continues until the space which existed between the two separate pieces of metal is filled up with metallic copper; in fact the layers of copper which become deposited in an equal manner upon the contiguous faces of the metal, gradually diminish the distance which separated the latter, until at length the metallic layers which cross in the opposite direction meet each other; the result being that the whole of the break which originally existed between the faces will have disappeared, and become filled up with copper.

With respect to the solidity (the degree of cohesion) of galvanic soldering, it is the same as that of copper or other metal precipitated by galvanic agency. It will, moreover, be well understood, that too energetic galvanic excitation must have an injurious influence upon the cohesion of the metal precipitated; and in this case precisely the same phenomena will be observed as those which have long manifested themselves in ordinary galvanoplastic operations.—*Technologist.*

WORKSHOPS OF MANCHESTER, ENGLAND.

BY MR. JAMES G. FLETCHER.

Forty-five years ago, at the commencement of the writer's career as a mechanic, tools were of a very rude and primitive description, the lathe and drill being about the only ones then in general use; slide lathes were possessed only by a few persons, being made with great labour and expense, and very inferior in point of workmanship.

The introduction of the planing machine, however, and its subsequent development, effected an entire change in the manufacture of tools and machinery of every class, giving the means of carrying out with facility many works which had been left unattempted previously as too expensive or impracticable, and opening the way for improvements and invention generally; and in a short time these machines became indispensable in every workshop. The slide lathe then became comparatively easy of manufacture, and, in conjunction with the planing machine and self-acting drill, formed a most important feature in the advancement of engineering work. Still, much remained to be effected; a large proportion of work was done by hand, especially the smaller portions of machinery, until slotting and shaping machines were brought into use, and special tools adapted for all parts where quantity of work was required to be produced. By the gradual introduction and perfection of the regulator screw, the wheel cutting engine, standard gauges, large surface plates, long straight edges, and scraped surfaces, combined with the improved tools, not only was the amount of manual labour considerably diminished, but the work was done more expeditiously, and a much greater degree of accuracy was attained, whereby the workmanship in all classes of machinery was remarkably improved, and at a great reduction in cost.

Another important feature in connection with improved tools, is the direct application of steam power to individual machines, especially those for the purpose of punching or shearing plates or cutting bars, etc., by the combination of a small steam engine with each machine, thus rendering the machines portable, entirely self-contained, and independent of other sources of driving power, and thereby saving, in many instances, the necessity of running a large engine and quantity of shafting to drive only one or two machines when pressed for the work upon which they are engaged, and entirely dispensing with shafting and the usual attendant expenses. By this means, and by the use of an under-ground steam pipe with branches at convenient points, either in workshops or along the sides of docks, these machines may be moved about to any part required, and thus obviate the inconvenience and loss of time in carrying work to and from the machines. Steam pipes of great length are now being used, and are found very satisfactory for purposes of this description; and this plan makes a much more convenient and less costly arrangement than shafting, which requires constant attention.

In the earlier construction of the lathe, the slide rest was the first great step toward the principle of the side lathe, and no doubt led to that invention, which was considered impracticable before planing machines were made of sufficient magnitude to plane a lathe bed of even small dimension. A few slide lathes had indeed been made, the bed of which were composed of a timber framing, covered with iron plates on the upper side to preserve the surface, similar to those which were previously used for the ordinary hand lathes, with the exception that the outer edges of the iron plates were made of suitable shape to form the Vs for the carriage to slide upon. It was not, however, until some time after the introduction of the planing machine that (the cost of workmanship being considerably lessened) slide lathes came into general use, and their utility was fully ac-

knowledged, and attention directed to their improvement.

The application of a screw to the slide lathe, so as to render it capable of both sliding and screw-cutting was the next important improvement; and a great amount of time, perseverance, and capital was expended by a few persons in endeavouring to perfect this portion of the lathe. A short screw was first made, as accurately as possible with the rude means then possessed, from which one was cut double the length, by changing the turned bar end for end in the lathe after cutting one-half. Subsequently, by following out this principle, screws were capable of being made of any length required.

After this, the surfacing motion was introduced, and also the use of a shaft at the back of the lathe, in addition to the regular screw, for driving the sliding motion by rack and pinion, instead of both the motions of sliding and screw cutting being worked by the screw alone; for it was found that the threads of that portion of the screw nearest the fast head stock, being most in use, were worn thinner than the other parts; and, in consequence, the lathe did not cut a long screw with the degree of accuracy which it otherwise would have done.

Thus, step by step, improvements were gradually brought forward; the fore jaw and universal chucks and other important appliances were added, so as to render the lathe applicable to a great variety of work, even cutting spiral grooves in shafts, scrolls in a face-plate, skew wheels, and also turning articles of oval, spherical, or other forms. The duplex lathe, with one tool acting in front and the other behind the work, is also found to be a very useful arrangement for turning long shafts, cast-iron rollers, cylinders, and a great variety of work, where a quantity of the same kind and dimensious has to be turned.

The planing machine is one of the most important tools in use, and has done more toward the advancement and success of engineering work than any other invention, with the exception of the lathe, and has passed through a great number of changes since its first introduction down to the present time. In the first planing machines the table was moved by a chain winding on a drum, as in the old hand machines; this mode was found to be very objectionable, the cut was unsteady, and, when the tool was suddenly relieved at the end of its cut, the table had a tendency to spring forward and backward, and thus a great loss of time was occasioned. This was much improved upon by the use of a rack and pinion, arranged to give a quick return motion, and also afterward by the screw arrangement.

In some of the earliest planing machines the Vs were made inverted, evidently with the idea of preventing any cuttings that fell upon the wearing surfaces from remaining upon them. They proved, however, to possess no advantage even in this particular, as the finer portions of the cuttings still adhered; and in addition it was found that, from the motion of the table, the oil, by its own gravity, would not remain upon the surfaces, and thus caused them to cut and wear away quickly.

The writer has in use a planing machine, with a bed 54 feet long, the Vs of which have two inches of surface on each side, and are planed to an angle of 85 degrees. This machine has been working upward of twenty years, and for the last six years both night and day. It has been employed during the whole of that time upon very heavy work, ranging from 5 to 20 tons. The Vs are still in good condition, apparently very little worn, and the work the machine does is at the present time perfectly true. The bed is in three parts jointed and bolted together, and the table in two parts, since, at the time it was made, there was no machine capable of planing a very long piece, and this was considered to be one of the largest in existence.

The planing machines were further improved by the use of two tool-boxes on the cross-slide, and by the application of slide rests or tool-boxes fixed upon the uprights, self-acting vertically, for planing articles at right angles to the tools on the cross-slide. The reversing tool-box is a very ingenious and useful contrivance for planing flat surfaces; but that plan is not so well adapted for general purposes. Planing machines have, like other tools, been specially adapted to a great variety of work, and the writer has made them with different numbers of tools, up to as many as sixteen, all of which were in operation at once.

The great changes which have lately taken place in the manufacture of wrought-iron and steel ordnance, and the revolution they have caused in the construction of vessels of war, have called into requisition a great many alterations and adaptations of the present machines, as well as many entirely new ones. The planing machine especially has been called upon to do work of a very curious and intricate character, namely, that of planing the edges of armour plates to different curves, shapes, or angles. In most cases this has been accomplished by a pattern bar of iron or steel, placed on edge in a small chuck fixed upon the surface of the table, adjustable by set screws, and shaped to the form to which it is required to plane the edge of the plate; as the table travels, this bar, which runs between two circular rollers attached to the under side of the cross-slide, moves the tool sideways, according to the amount of curve in the shaper or guide bar, the tool-box being disconnected for this purpose from the screw in the cross slide.

A duplex planing machine, made by the writer, is arranged with double beds and double tables, each table having a separate set of gearing, with starting, stopping, and feed motion. There are two tool boxes on the cross-slide, each of which is independently self-acting, so as to work with its own table. Thus the two tables may be used separately as two smaller machines working independently of each other, and capable of planing different length of work at the same time; or when planing a large article, the two tables, gearing and motion, may be coupled, so as to form one large machine, an arrangement rendering the machine capable of doing a variety of work. Also one table may be fixed stationary as a bed-plate to bolt awkwardly-shaped or long pieces of work upon, while they are planed by a slide rest fixed upon the other table. When used as one machine, both sets of straps and gearing are in operation, and are reversed by the stops in one table only, so

as to insure the straps moving at the same time.

This machine is capable of planing articles 10 feet wide and 10 feet high. The racks on the under side of the table are 3 inches pitch, with stepped teeth; the wheel working into the rack is 3 feet 9 inches diameter at the pitch line, and is driven by a smaller pinion. By this arrangement a steadier motion is obtained; and also the pulleys and driving gear can be placed entirely behind the face of the uprights, so as to leave the front of the machine perfectly clear, that the straps may not be in the way when taking the work off and on. The pulley being below the ground line, may be driven by a horizontal underground shaft at the back of the machine, and no straps will then be visible. The writer has made machines of this description with beds 40 feet long, to plane work up to 14 feet in width.—*Newton's London Journal.*

Copper Ore Roasting—Sulphuric Acid.

The following extracts are from an able lecture delivered before the Scottish Royal Society of Arts, by Dr. Stevenson MacAdam:—

"The large amount of sulphur which is burned off from metallic ores in Swansea and elsewhere, and which escapes into the atmosphere as sulphurous acid, and thereafter becomes, in part at least, sulphuric acid, has recently called for the attention of scientific and practical men. In the nei ghbour hood of works discharging such sulphurous smoke the ground is barren, scarcely any vegetation can be seen for miles, and even high chimney stacks are of little avail, as they merely carry away the sulphurous smoke, and distribute it over a wider and much more distant area.

"One extensive firm of copper melters discharge in this manner into the atmosphere about 1,000 tons of sulphuric acid every week, and it is estimated that annually there are burned off from the copper ore worked in Swansea about 70,000 tons of sulphur, of the value of £455,000, and which might produce no less than upwards of 210,000 tons of sulphuric acid, of the strength of oil of vitrol. Many of the manufactories of sulphuric acid have begun to use copper ore as a source of sulphur, and thereafter hand over the roasted ore to the copper smelters at Swansea. The ore is obtained in large quantities from the Guadiana River, Fort Formosa, in Portugal, from mines which were worked by the Romans, and it is used extensively for making sulphuric acid in London, Newcastle, Bristol, and other places. This is an excellent instance of the successful and economical employment of a material in the arts and manufactures which was till lately, and in many places still is, a nuisance over extensive tracts of country. The smoke in a very modified condition occurs in all large towns, where much coal is burned, and especially in manufacturing towns where the coal is often of inferior quality. In such towns, by the mere burning of the sulphur in the coals, many gallons of sulphuric acid must be formed, and in rainy weather be washed down on the people."

Colors from Coal Tar.

Aniline, or coal tar colors, have now been extended in number, so that all the colors of the rainbow, and all the shades, can be obtained from coal tar. Aniline was discovered by Unverdorben in 1826, who procured it by the destructive distillation of indigo. It is now obtained in small quantities directly from the destructive distillation of coal, as in gas-works, but is generally manufactured from the lighter coal tar naphtha. When the naphtha is rectified, the portion which distils over at a temperature of 180° Fah. is benzole, and this substance was discovered by Faraday in 1825. By the action of strong nitric acid, the benzole is converted into nitri-benzole, and this latter, when agitated with water, acetic acid, and iron filings, becomes aniline. By the action of oxidizing agents, such as chloride of lime, bichromate of potash, chloride of mercury, etc., the aniline, which is colorless by itself, can be transformed into all shades of violet, mauve, magenta, etc., By the researches of Hofmann, the number and beauty of the aniline colors have been increased. While numberless shades of red and purples can be obtained, there is a splendid green, called verdine, discovered by Eusebe, and which remains a true, pure green even by candle or gas-light; a blue which is clear as opal, a good yellow, and a fair black. In short, dyes of all hues can be obtained from aniline, which, in its turn, is procured from coal tar. The intensity of these aniline colors may be indicated by the fact that one grain of magenta in a million of water gives a good red; one grain in ten millions of water exhibits a rose pink; one grain in twenty millions communicates a blush to the water; and one grain in fifty millions tinges the water with a reddish glow. The powerful tinctorial virtues of the dyes may be learned from a circumstance which occurred during the passage of the *Great Eastern* between Liverpool and New York, when the sea was observed to exhibit a crimson hue for some distance around the vessel, and when it was afterwards discovered that the bloody sea owed its color to a wave having stove in a plate of the *Great Eastern*, and thus the water got accecss to certain vessels which contained magenta.—*Mining Journal.*

Utilization of Blast-Furnace Gases.

An improvement in the utilization of the waste gases of blast-furnaces has been patented by Mr. J. Cliff, of Wortley, near Leeds; but the patent has become void from neglect to file a complete specification.. It has heretofore been common to use the gases generated in the blast-furnaces for heating the hot-air stoves, and for generating steam in boilers, and for some other purposes. Instead of this, Mr. Joseph Cliff proposes to blow them back into the blast-furnace itself. One mode in which this may be done is using an exhaust cylinder, which is connected by pipes with the waste gas-pipe, and is provided with a piston, which is worked by the blast-engine, and thereby exhausts or draws the gases from the waste gas-pipe or furnace, and then forces the said gases iuto a receiver at such pressure as may be desirable. The gases pass from such receiver to the furnace either by an entirely separate pipe of suitable diameter, which shall deliver the gases close to the tweers, or shall join the air in the tweers immediately before it goes into the furnace, so that there may a rapid and complete mixture of the air and gases at the

point of ignition in the furnace. By these means such portions of the waste gases as may be found most suitable will be made available for the more economical working of the blast furnace, coals or coke will be saved, a greater heat maintained in the furnace, and the yield or make of iron will be increased.—*Scientific American.*

Loss by Incrustations in Boilers.

In the "Treatise on Steam Motors," by Messrs. Arthur Morin and H. Tresca (1865), it is said:—"We have an account, which we have every reason to deem exact, of the performance of the boiler in the Conservatory, burning charleroi coal. The results are as follows:—

	Water vaporized per hour, litres.	Coal burnt per hour, kilos.	Steam per k. of coal.
Boiler clean	200	25·5	8·50
Boiler incrusted	136	34·7	3·87

"Thus, after incrustation for a long time, the useful effect of fuel is reduced in the proportion of 3·87 to 8·50, or 48 per cent. of the effect when the boiler is clean."

ENGLISH NATIONAL BOILER INSURANCE COMPANY.

The Chief Engineer's report for the year 1865 states that no explosion has occurred to any boiler insured with this company. Some of the boilers have been injured through mistake or negligence of the attendants, and other cases have been reported where serious injury would have been sustained had the boilers been unprovided with good fusible plugs on the furnace crowns, which, by their timely action, prevented damage. One case of partial collapse of the furnace tube of an insured boiler is worthy of special note. The boiler is fed with water strongly impregnated with salt and chalky matter, which, owing to omission of frequent cleaning, was so thickly deposited on the furnace crown as to cause overheating of the plates, and consequent injury. The use of good surface blow-out apparatus would have prevented the accumulation of the deposit and subsequent damage to the boiler.

Many dangerous defects, some of them of most dangerous character, have been met with in the boilers inspected. Many furnace tubes were found which had been more or less distorted through previous deficency of water. Some of the defective tubes were strengthened by staying the weakened part, others had been partially restored to the original form, but still bore evidence of the distortion and strain to which they had been subjected. Cases of leakage at joints of fittings, and at manhole joints, are very numerous, and the consequent corrosion of the boiler plates frequently very serious. Leakage is often allowed to go on unnoticed until the adjacent plate is so much reduced by corrosion that extensive repair becomes necessary. Internal corrosion is frequently met with in some cases seriously weakening the boiler in a very short period. As an instance, Mr. Hiller mentions that the plates of an externally fired boiler (not insured) which exploded were stated to be reduced from the original thickness, $\frac{7}{16}$ in., to 1·16 in., although the boiler had worked but little over eighteen months. In most cases its progress may be arrested by the daily admixture of a small quantity of common soda with the feed water. In any case where the use of soda does not prove effectual, the water should be analyzed by a first-class chemist, who would doubtless be able to recommend an antidote. Many of the leading boilermakers now rivet on the boiler suitable joint-beds for the fittings, and good mouthpieces with planed joint faces at the manholes, which much facilitate the proper making of the joints and materially strengthen the boiler. Where these beds are properly attached, and the joints thereto carefully made, leakage is avoided, and much trouble and expense saved to the owners. The advantage of providing the rivet beds, however, does not appear to be generally appreciated. It is especially necessary to the safety of all boilers that the water-guages be carefully attended and frequently tested, but numerous instances of carelessness or neglect are reported. Many glass guages were met with where the handles of the taps were broken, and in other cases the taps were so leaky that the guage could not be properly tested; others were so dirty that the height of the water was scarcely distinguishable. Many instances of the consequence of neglect of the water-guages have been recorded. Several cases have been reported where the glass guages were fixed so low that the furnace crown would be actually bare of water, when several inches were visible in the glass. These were certainly proofs of gross carelessness or ignorance on the part of those who fitted up the boilers. Great difference of opinion exists among boiler owners in reference to the usefulness of fusible plugs; but the distrust arises in most cases from the faulty construction of many of the plugs in use. No fusible plug, nor other boiler-fitting, can ever dispense with the careful watchfulness of a well-trained attendant; but so many mistakes arise and consequent accidents occur to boilers unprovided with them, that it is advisable to attach good fusible plugs to the furnaces of all internally fired boilers. Smith's fusible plug, the patent right of which is the property of this company, is highly esteemed by boiler owners, as is proved by the great and increased demand.

The serious increase in the number of explosions of locomotive boilers calls for special remark, and must impress those persons intrusted with their charge with the necessity of providing in new boilers for more reliable and frequent internal inspection than is now practicable. The number of explosions recorded in 1865 is 11 against 6 in 1864, 2 in 1863, and 3 in 1862; the number of explosions of these boilers in 1865 being equal to the whole of those recorded for the three preceding years. The judicious application of the hydraulic test would probably have led to the detection of weakness in some of the boilers which have failed. As an instance of the value of the hydraulic test, the following is worthy of record. A large one-flued boiler was proposed for insurance with this company, which was in course of being generally overhauled and repaired, and also enlarged by the addition of several feet to its length. The old flue tube was 3 feet diameter throughout $\frac{7}{16}$ inch plates, the new part of tube was gradually enlarged to about 3 feet 4 inches, the total length being about 38 feet. The proposed load on safety-valve was 60 lbs. per square

inch. It was suggested to the owners to strengthen the tube by angle-iron hoops or cross-tubes, and their attention was directed to the fact that the calculated load (per Mr. Fairbairn's formula) under which such a flue might be expected to collapse, was little over 80 lbs. per square inch. It was also recommended to apply the hydraulic test after the alterations, etc., were completed. Unfortunately the tube was not strengthened as advised, and on the test being applied, the flue collapsed almost the entire length when the pressure had reached about 83 lbs. per square inch, thus illustrating most forcibly the correctness of the formula referred to, and the value of the hydraulic test; as, had the boiler been set to work, the flue would in all probability have failed with fearful results.—*Mechanics' Magazine.*

Useful Receipts.

Gilders' Composition for Frames, &c.

The composition at present in use is composed of best black glue, common rosin and linseed oil. Some use rosin oil, some boiled linseed oil. Nearly every manufacturer has a little change in the proportions, but in Europe, as in America, the above ingredients are those used, and are held as a secret. It is a useful material for many other purposes to which it might be applied were its mode of manufacture known.

Take ten pounds of best black glue, boil it in the usual manner, but with very little water. It should be at least four times as thick as carpenters' glue, as used for general purposes. Take six pounds of common rosin, and pound to dust; add linseed oil, or rosin oil, to form a thick paste with the dust, dissolve with heat, allow it to cool to about 212°, then add the rosin compound and the hot glue together; combine it well. Have sifted whiting prepared and combine the whole as in making bread; form it into cakes, and allow it to cool; at any time by the application of steam or heat, this composition may be brought into use.

THOMAS TAYLOR,
Washington, D. C.

To wash Woollen Garments.

In washing woollen garments put them in very hot soap-suds; then when cool enough to allow the hands to be put in, simply press the garment with the hands, and before taking it out, make the water for rinsing several degrees hotter than that from which it is to be taken, but, instead of wringing the water out, raise the garment out of the water, up and down, a good many times; and then lay it over a line and let it drip dry. This process will, to a considerable extent, prevent fulling or shrinkage.

To remove Grease from Silks or Books.

Lay upon the spot a little magnesia, or powdered prepared chalk, and under it the same; set on it a warm flat iron, and as soon as the grease is melted it will be all absorbed, and leave the paper clean.

We have removed as much as from 1 to 2 oz. of olive oil from a light coloured silk dress, so perfectly that the saturated spots could not afterwards be discovered, by first scraping on and covering the parts with French chalk, then covering with soft brown wrapping paper, and setting warm flat-irons over the spots for a few minutes. The application may have to be repeated.

Practical Memoranda.

Cast-Iron Pipes.

Table shewing the Weight of Pipes 1 foot long, of bores from 1 inch to 12 inches in diameter, advancing by ¼ of an inch; and of thickness from ¼ of an inch to 1 inch, advancing by ⅛ of an inch.

Bore.	¼	⅜	½	⅝	¾	⅞	1
in.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1	3·1	5 1	7·4	10 0	12·9	16·1	19·6
1¼	3.7	6·0	8 6	11·5	14·7	18·3	22·1
1½	4·3	6·9	9·8	13·0	16 6	20·4	24·5
1¾	4 9	7·8	11·1	14·6	18·4	22·6	27·0
2	5·5	8·8	12·3	16·1	20·3	24·7	29·5
2¼	6·1	9·7	13·5	17·6	22·1	26·8	31 9
2½	6 7	10·6	14·7	19·2	23·9	28 9	34·4
2¾	7·4	11·5	16·0	20·7	25·7	31·1	36·8
3	8·0	12·4	17·2	22·2	27·6	33·3	39·3
3¼	8·6	12·3	18·4	23·8	29·5	35·4	41·7
3½	9·2	14·2	19·6	25·3	31·3	37·6	44·2
3¾	9·8	15·2	20·9	26·9	33·1	39·7	46·6
4	10·4	16·1	22·1	28·4	35 0	41·9	49·1
4¼	11·1	17·1	23·4	30·0	36·9	44·1	51·6
4½	11·7	18 0	24·5	31·4	38·7	46·2	54·0
4¾	12·3	18 9	25·8	33·0	40·5	48 3	56·5
5	12·9	19 8	27·0	34·5	42·3	50·5	58·9
5¼	13·5	20·7	28·2	36·1	44·2	52·6	61·4
5½	14·1	21·6	29·5	37 6	46·0	54·8	63·8
5¾	14·7	22·6	30·7	39·1	47·9	56·9	66·3
6	15·3	23 5	31·9	40·7	49·7	59·1	68·7
6¼	16 0	24·4	33·1	42·2	51·5	61·2	71·2
6½	16 6	25·3	34·4	43·7	53·4	63·4	73·4
6¾	17·2	26·2	35 6	45·3	55·2	65·3	76·1
7	17 8	27·2	36·8	46·8	56·8	67·7	78·5
7¼	18·4	28·1	38.1	48·1	58·9	69·8	81·0
7½	19 0	29·0	39·1	49·9	60·7	72·0	83·5
7¾	19.6	29·7	40·5	51·4	62·6	74·1	85·9
8	20·0	30·8	41·7	52·9	64·4	76·2	88·4
8¼	20 9	31·7	43·0	54·5	66·3	78·4	90·8
8½	21·7	32·9	44·4	56·2	68·3	80·8	93·5
8¾	22·1	33·6	45·4	57·5	70 0	82·7	95·7
9	22·7	34·5	46·6	59·1	71·8	84·8	98·2
9¼	23·3	35·4	47·9	60·6	73·6	87 0	100·6
9½	23·9	36·4	49·1	62·1	75·5	89·1	103·1
9¾	24·6	37·3	50·3	63·7	77·3	91·3	105·5
10	25·2	38·2	51·5	65·2	79·2	93·4	108·0
10¼	25·8	39·1	52·8	66·7	81·0	95 6	110·4
10½	26·4	40·0	54·0	68·3	82·8	97·7	112·9
10¾	27·0	41 0	55·2	69·8	84·7	99·9	115·4
11	27·6	41·9	56·5	71·3	86·5	102 0	117 8
11¼	28·2	42·8	57·7	72·9	88·4	104·2	120·3
11½	28 8	43·7	58 9	74·4	90·2	106·3	122·7
11¾	29·5	44·6	60·1	75·9	92 0	108·5	125·2
12	30·1	45·6	61·4	77·5	93.6	110·6	127·6

Windmill Power.

Smeaton ascertained that the effective power of a windmill with sails of the best form, and about 15½ feet radius, with a breeze of 13 feet per second, is about 1 horse-power.

Diseased Meat.

Dr. Letheby, medical health officer for the city of London, in a recent report on the cattle plague in England, gives the following valuable rules for choosing meat: "Good meat," he says, "is neither a pale pinkish nor of a purple tint. The former is indicative of disease, the latter a sign that the animal has died from natural causes, and not been duly slaughtered. Good meat has a marbled appearance, and the fat is hard and suety, and never wet; that of diseased meat is soft and watery, often like soddened parchment. The touch of healthy meat is firm and elastic, and it hardly moistens the fingers; diseased meat is soft and wet. Good meat has little odour, and that not disagreeable; whereas diseased smells faint and cadaverous, and often like medicine. Good meat will bear cooking without shrinking or losing much weight; bad meat shrivels up and often boils to pieces. It is better to have suspicious meat rather over-roasted."

Statistical Information.

Provincial Finances.

The following statement of the revenue and expenditure of the Province of Canada, for the month ended 28th February, 1866, is published in the *Canada Gazette* of Saturday last:—

Revenue—Customs	$458,914 51
Excise	117,805 75
Bill Stamp Duty	4,660 50
Post Office	88,920 06
Crown Lands Department	79,648 24
Miscellaneous	86,144 56
Total	$786,093 62
Expenditure	$517,190 49

Import of Paper Material into England.

FOR THE YEARS	1862.	1863.	1864.
	Tons.	Tons.	Tons.
Linen and Cotton Rags..	21,967	25,288	23,732
Esparto, and other vegetable fibres	878	19,190	43,403
Other materials for making Paper	1,097	969	682
Total	23,942	45,447	67,817

In 1863-4, the esparto formed the bulk of the second heading. It exists abundantly in most of the countries bordering the Mediterranean, and has recently been found in abundance along the coast of Cumberland, from whence local paper makers have been obtaining it at cost of collecting and cartage only.

Something about Coffee.

The total quantity of coffee consumed in Great Britain in 1864 was about 35,000,000 lbs., of which nearly 30,000,000 lbs. were the produce of India and Ceylon. The total imports to Europe now amount to about 290,000,000 lbs. France alone consumes one-sixth of the total production of the world. In 1809, the exports from Jamaica alone exceeded 83,000,000 lbs., while at present they do not reach 6,000,000 lbs. In British Guiana the exports have fallen from 9,472,000 to nothing, scarcely sufficient being now grown for consumption in the colony; even in Brazil the exports have decreased, 2,060,819 bags being shipped in 1859, and only 1,495,697 bags in 1864. Attention has lately been drawn to coffee-tea,—that is, "tea" prepared from the leaves of the coffee-tree. This beverage, which has been in use in the East Indian Archipelago for many years, is not only palatable, but preferred by some to the best Pekoe or Souchong.—*Lascelles's Nature and Cultivation of Coffee.*

Photography.

NEW PHOTOGRAPHIC PROCESS FOR PRINTING.

In all the ordinary methods of mechanical printing, gradation from light to dark is obtained by the use of lines or dots, which, having finer or broader surfaces, and being ranged in close proximity or spread wide apart, the spaces between being absolutely white, give the effect of the lightest tints or the deepest shades. This is the case whether the ink be applied to the portions in relief of a woodcut, to the hollows of a copper-plate, or to the portions of a flat surface for which it has affiinity on a lithographic stone. The ink is, in each instance, opaque, and gradation is only obtained by breaking its continuity of surface with small spaces of white. In photographic printing gradation is obtained by different depths of a continuous tint, resembling in effect, successive washes of a transparent pigment in water-color painting. The difficulty of reproducing this by mechanical means has been the obstacle in all attempts at photo-engraving, photo-lithography, or photo-block printing, and it has been for some time past admitted that the only means of success in this direction would consist in a method of translating the half tone of gradation of tint into the half-tone of grain or stipple.

In Mr. Woodbury's photo-relief printing, the end is secured without any such translation; the picture is produced with every gradation of a continous tint, and by mechanical printing, sufficiently rapid to compete with copper-plate or lithography. To do this, however, it has been necessary to introduce a distintly new principle into printing operations, and to prepare a plate which should apply or give up to the paper different proportions, in different parts, of a semi-transparent ink, according to the depth of tint required by different portions of the picture. This is the problem which Mr. Woodbury has solved, and we may remark in passing that we see no reason why the same principle might not find valuable application in the ordinary process of printing from engraved intaglio plates.

Mr. Woodbury's photographic intaglio is very simply obtained. The image in relief having been produced by the action of light through a negative on a film of bichromated gelatin, this gelatin relief becomes the matrix from which an indefinite number of metal plates, in intaglio, may be pro-

duced. The metal used resembles type-metal. A plate of this metal, about a quarter of an inch thick, with a perfectly plane surface, is placed in contact with the gelatin relief, and subjected to hydraulic pressure, by which a perfect transcript of every gradation in the gelatin is produced on the metal. Notwithstanding the softness of the metal, but slight trace of wear or deterioration is observed after some thousands of impressions have been taken from a plate. If the plate needed to be cleaned for each impression, like the copper plate, or if it were necessary to submit it, in printing, to a heavy or rolling pressure, it would doubtless be necessary to subject it to some hardening process; but the pressure being light and steady, this is not necessary. The process, moreover, of producing a new plate from the gelatin relief is just as simple and easy as producing a print on paper.

The method of printing is easier than any other with which we are familiar. In the various modes of photographic printing—except the collodio-chloride—several operations are necessary to render the paper sensitive to light, and several others are required to tone and fix the image when obtained. In the various mechanical printing processes, some skill and care are requisite to keep the ink properly distributed on the roller, and to transfer it from the roller evenly to the surface of the plate or stone. But in the new method of printing, a little of the ink—which consists of a warm solution of gelatin and lamp-black, with a little crimson lake—is poured on the surface of the plate, where it stands in a little pool in the center; upon this the paper is placed; the platen is brought down, giving the slight pressure necessary, which at once spreads the ink over the surface and drives off at the edges all that is not required to form the picture. In a few seconds the gelatin has congealed, and the paper, being lifted up, brings with it all the ink from the depressions on the plate. The printing is indeed rather a process of casting than of printing as ordinarily understood, and the picture is a relievo in colored gelatin, taken from a very shallow metal intaglio. As the gelatin dries, it of course contracts, and the finished picture shows very little effect of relief or impasto. As the coloring matter is carbon, the permanency of the pictures is tolerably certain.

If the picture were left in this state it would be readily liable to injury from moisture, although not more so than a water-color drawing, which is not usually regarded as a very unstable form of art. But it will be obvious that there are various modes of rendering a film of gelatin insoluble. Mr. Woodbury has, during the last few months, tried several of these, but has not found any so simple and effective as immersing the print in a solution of strong alum. This at once renders the film insoluble, and, when dried, it is impervious to moisture, and little liable to mechanical injury.

The possible rate of printing remains yet to be absolutely determined. With the mechanical appliances improvised for experiment, and the amount of manual skill obtained in the prosecution of experiments, Mr. Woodbury has been enabled to produce, single-handed, one hundred and twenty prints in an hour. In the production of several thousands required for our readers, all the experience and skill necessary in the successful working of any process had to be acquired, and the last two or three thousand are not only better in quality, but have been produced with more ease than the first two or three thousand. In each day's work with one pair of hands there are necessarily many interruptions, in preparing fresh ink and paper, clearing accumulated prints, etc., but we find the smallest number produced in a day's work of six hours and a half to have been 403 prints, and the largest number in the same time 560 prints. With a little practice and a large number of presses at work, which might easily be managed, we see no reason why the rate of production should not be at least doubled.—*London Photographic News.*

The Photo-Miniature.—Beecher's Formula.

First: Take the whites of two eggs and two ounces of water, beat well to a froth, and let it settle for two hours and pour of the clear solution.

Second: Coat your white plate with this solution (as you would with collodion), and set away to dry. When dry take in your dark room and coat the plate with the "opal solution," which is made thus:—

Plain collodion 8 oz. (thinner than you would use for iodizing), then dissolve in as little water as possible 60 grains nitrate of silver, and add this to the collodion and shake well. Then dissolve 16 grains of strontium in as little water as possible, and add this to the collodion, and shake well. Then dissolve 10 grains citric acid in as little water as possible, and add to the collodion. Shake well, and you have the opal solution.

When dry, put your negative in the printing frame—lay the opal prepared plate on the negative, and print from ten to 15 minutes in the sun, and print much darker than you would a photograph.

Tone and fix as you would a photograph, only you need not wash before toning—and wash but little before fixing. The "opals" tone in one tenth the time of a photograph.

Keep the opal preparation in a dark room. Have your toning bath a little alkaline, and not as strong as for toning photographs.—*Humphrey's Journal.*

The Dark Room.

In preparing a window for the illumination of a photographer's dark room, M. Obernetter mixes an acid solution of sulphate of quinine with some gum or dextrine, and paints the mixture over a thin sheet of white paper. With this he covers the window-panes, and he states that on the brightest day a window so prepared will allow no actinic light to pass.

Photographic Collodion without Bromine.

A Mr. J. J. Clarke, of New York, in a letter to the *Scientific American*, says:—"For the benefit of photographers, professional and amateur—who do not wish to use bromide in collodion, I am induced to give the following formula which I have used successfully for some years:

"Take of plain collodion, 6 oz., iodide of cadmium, 18 to 30 grains, iodide of ammonium, 12 to

20 grains; shake well, and let stand to dissolve and settle.

"Then take plain collodion, 2 oz., and chloride of calcium, 20 to 30 grains; shake well, and let stand to dissolve and settle.

"For use, add a small portion at a time of that containing the chloride to that containing the iodide, until the half tones are such as desired.

"Any other soluble chloride may be used, as also other iodides.

"I also take, say a couple of ounces of collodion already excited, and add a very small piece of phosphorus, about half the size of a pea; and of this two ounces, when the phosphorus is thoroughly dissolved, I add about from half to a drachm to the collodion I am using, which has a considerable effect in assisting reduction.

"In using this formula the beauty of the result depends:—

"First, Upon the materials of the collodion being good, and the collodion itself of the proper thickness.

"Second, The iodides being of good quality, and the quantity in exact proportion to the thickness of the collodion, a thick requiring more and a thin less.

"Third, A careful proportion of chloride to iodide, which must be determined by actual experiment.

"Fourth, An equally careful addition of the collodion containing phosphorus, to that already excited, and being used.

"Fifth, A proper regard to the time of exposure, light, developing, etc.

"I rarely strengthen with anything except by a 20-grain silver solution, and re-develop with iron. I do not use my developer too strong, and it is very seldom I have to even sulphuret my negatives.

Miscellaneous.

CAPITAL IN CANADA.

The following extracts from comments of the *Trade Review*, on the recent report of the Canada Landed Credit Co., show the writer's just appreciation of the subject treated of, and are worthy of the fullest consideration by all Canadians. We have, undoubtedly, been relying too much on borrowed foreign capital, instead of exerting our whole energies in creating capital at home:—

"The Canada Landed Credit Company, however, have found it difficult to raise money in England for some years back, and consequently their business has been of a very restricted character. They are now, therefore, turning their attention to the possibility of raising money in Canada, and this was the leading feature of their report just presented to the Stockholders.

"It cannot be questioned that this is a step in the right direction. It is time this chronic dependence on England, for supplies of money, should cease. Every year, like worthy children of noble parentage, we are becoming less and less dependent, politically, on the nation we are proud to call our mother; and the movement towards Confederation developed qualities of statesmanship we had not been supposed to possess. We have sent out Commissioners of our own, to foreign countries, to seek out new avenues of trade, and we had recently Commissioners negotiating in Washington as to a renewal of Reciprocity. All this, so far from being displeasing to Britain, is precisely what she desires.

"The same course should be pursued with regard to matters of finance. Time was, when a banker used to reckon a credit in England—*i.e.*, liberty to borrow money there—as good as gold in his vaults; but the prevailing high rates of the last few years have worked a marvellous change in his mode of looking at things. Similarly, when a county or city wanted to borrow money, nothing was thought of but sending off to England. But now there are so many other competitors for her surplus funds, that they find no chance of a hearing except at rates which would be ruinous. For all this we have reason to be devoutly thankful. It will do us good. Canada has borrowed too much from abroad, and it is a most admirable thing for us to be forced to depend on our own resources Let the county and municipal debts all be owned by Canadian capitalists, and the interest form part of Canadian incomes, it would have a wonderful effect on our general prosperity. The law of compound interest would then come into play through a thousand channels, and wealth would go on accumulating year after year. By-and-by the debt of the Province itself might be brought into the same happy position; and Canada would have the proud satisfaction of occupying the same position towards other countries as the glorious parent state, viz: to owe them nothing but good-will."

Gypsum in Stables.

The *Ger. Telegraph* says:—"Gypsum should be sprinkled daily over the floors and tie-ups, to absorb the ammonia of the urine. The strong odor observable on entering the stable on a morning, arises from the presence of ammonia, one of the most valuable products of stable manure, when properly economised. Gypsum and lime, either slacked or caustic, should also be sprinkled over the bottoms of cellars in the spring. This will tend to purify the atmosphere and prevent many deleterious effects resulting from the presence of *miasma*. After a few days it should be removed, and a fresh supply substituted in its place. Wherever there is a close atmosphere of any putrescent matter in a state of fermentation, gypsum should be liberally used. When gypsum is not to be obtained, lime may be used." The *Canada Farmer* remarks, in answer to a correspondent, "The plaster (gypsum) converts the ammoniacal vapour into what is called *sulphate of ammonia*. This is not volatile at a common temperature—that is, it does not escape in the form of vapour—and thus the ammonia is husbanded for future use. By such a course a threefold advantage is secured. 1st. An unpleasant smell is prevented. 2nd. Gases injurious to health are deprived of their power to do injury. 3rd. A most valuable manure is obtained for application to the farm or garden." Again, "The free use of gypsum, muck and other absorbants, about stabling and manure heaps, will prevent waste and conserve health. In view

of a probable visitation of cholera the coming season, the cost of a stink may be terrible. Not only in towns and cities, where large numbers of persons are collected, but even in country places and on every farm, this nuisance ought to be abated, and every possible precaution taken for the maintenance of the public health."

The Commercial Future of Canada.

At a dinner recently given to the Canadian Ministry, at Cornwall, the Hon. Finance Minister, Mr. Galt, said :—

"It is necessary for the Government to consider now, and it will be necessary for Parliament to consider soon in the most earnest way how they will deal with the commercial future of Canada, and what its trade policy shall be. It is perfectly clear that the Union with the Lower Provinces must speedily be carried out. We must complete our communications with them, and have our mutual commerce as free as possible. The Government have sent a commission to the West Indies and Brazil to forestall the action of the American Government. It is the intention of this Government to give effect to the recommendations of the commission whenever they have made their report to Parliament. With regard to the markets of England and France, the two great consuming countries of Europe, it can scarcely be imagined that they can be more free than they now are. But it is the duty of the Government to endeavour to make some arrangements with the colonies of these powers, and with Spain and her colony, Cuba, as will secure the reciprocal interchange of some of their products and ours. It is plain that the Government will have to propose to Parliament a complete revision of our system of taxation ; for the burdens of the people will have to be re-adjusted to stimulate the great agricultural interest of the Province, and to make Canada at once the cheapest country to live in, and the most attractive country in the world for the labour and capital of foreign lands. Our policy must be one of development, and not of stoppage—development not of Canada alone, but of all the vast territory stretching from Newfoundland on the one hand to the Pacific on the other. We may have to postpone for a time the enlargement of the canals, that has been spoken of for several years, because we have not yet the assurance that the American trade will be permitted to use them, but this will leave us all the more means for opening up the great North-West. The opening up of these lands, eastward and westward, and especially westward, will entail the inauguration of a new system of emigration. Immigration is what the New World must look to —and the fact that my hon. friend, Mr. McGee, is at the head of the department which has charge of that subject, must give the people confidence that emigration will be directed in the best manner for the hard-working sons of labour who come to Canada as a refuge from all parts of the world."

Mr. Peabody's Gifts for the London Poor.

Mr. Peabody promises to be the greatest benefactor, in a social sense, that London has ever enjoyed. He has not only made a magnificent commencement towards providing the labouring classes of the metropolis with decent lodgings, but he has forcibly, if indirectly, stimulated the Government into assisting the good work by loans on the same terms that they have previously been granted for the drainage of land, and the building of churches and schools. Scarcely have we had time to master the full amount of advantage in use and example from the American gentleman's first gift of the £150,000—so judiciously employed by the committee over which Lord Stanley presides—than our breath is taken away by a second boon to the same quarter on an equally munificent scale. Mr. Peabody presents £100,000, which he has invested in 5,000 fully paid-up shares in the Hudson's Bay Company, "representing one-twentieth part of that vast territory," to the trustees of the first fund, with directions that the dividends be invested in shares of the same company until £120,000 has been raised, or in certain events until July, 1869. The two gifts, amounting as a minimum to £250,000, will form a fund of progressive usefulness in providing lodgings for the labouring classes of London. As in the course of a few years it may be difficult to find desirable sites within the limits of the metropolis, the trustees are authorized to purchase sites within ten miles of the Royal Exchange, which they may consider eligible as regards health aad convenience of railway accommodation. It is further suggested that contracts shall be made with railway companies for the conveyance of the tenants at reasonable fares at convenient times. The trustees are also to be at liberty to establish schools near these suburban lodging-houses, of an exclusively elementary and literary character, and to use these school-rooms in the evening as reading-rooms and lecture-rooms. Mr. Peabody also suggests that where markets and shops are distant, co-operative stores be encouraged. Looking at the services rendered by Mr. Peabody to this country, the question of what acknowledgment has been made to him naturally occurs. Ribands and grand crosses are bestowed on princes of no remarkable distinction. We do not know whether an American citizen can accept the honour of K. C. B., but it certainly ought to be tried. He can but refuse.

THE ARTESIAN WELLS OF CHICAGO.

These wells, now discharging one and a quarter millions of gallons per day of the purest water, continue to excite much wonder and curiosity. They are located near the city limits—about three miles from the City Hall—are 700 feet deep, and discharge an immense volume of clear cold water. In several respects these wells are anomalies; first, the water which rises to the surface stands at 57 deg. Fah., which is below the mean temperature of the locality, while in all other deep wells the temperature increases in proportion to the descent, so that no water is found at a greater depth at much less than 75 deg., and in the great wells of Charleston and in the basin at Paris the range is up to 85 deg. and 90 deg. Then this water is free from the unpleasant and disagreeable mineral taints so common to Artesian wells. It is certified under chemical analysis, to be the best article of drinking water in the world, and from the force and power with which it comes to the

surface—it has a head of 125 feet above the level of Lake Michigan—there seems to be no doubt but that by an enlargement of one of the wells to the diameter of 20 inches, a sufficient supply, estimated at 17,000,000 gallons per day, could be obtained to meet the demands of the city for years to come, and this would flow into the reservoirs without the aid of expensive engines, steam pumps and fuel. Another curious feature in regard to those wells, and one which geologists have not yet explained, is found in the fact that they are located in no great valley or depression, like the basins of Paris and London, but are out on the level prairie, surrounded for hundreds of miles by country of a like character. This fact, taken in connection with the low temperature of the water and the great head of the fountains, seems to indicate that it has a source far in the north or northwest, beyond Lake Superior and beyond the Mississippi, perhaps away off in the Rocky Mountains. —*Mechanics' Magazine.*

Gardening in a Back-yard—The Country in the City.

In the February number of the *American Agriculturist*, a correspondent publishes his experience as a New York back-yard gardener on a small scale:—"On the first of May last the changes of this changing world found me—a *practical farmer* of twenty-five years' sojourn in 'sylvan scenes'—taking possession of a city house in New York. It had been engaged for me without my first inspecting it, and upon reaching my new dwelling-place I neglected to look at parlour and dining-room, but ran eagerly to the rear to survey the 'grounds.' Imagine how small the smallest kind of a city yard looked to a man who had been accustomed to till ten acres of a garden! When I was gardening on the large scale, I used to read in the *American Agriculturist* of wonderful things done in small plots of ground, and I recollected with sorrow the contempt I felt for those 'potterers in small patches." Here was so little land to be made most of. It had already been laid out, by a former occupant, into a grass plot which two bedsheets would cover, and a border around three sides of the yard. I had 36 feet of border, averaging 3 feet wide, and I borrowed a bit from one end of the grass-plot to make a bed 8 feet by three. A stable at hand supplied manure, and the ground was put in tolerable condition. The fence with the warmest exposure was furnished with a trellis of wire and strings, and Lima beans, planted as much for ornament as for the beans. Eighteen good tomato plants were set out along the borders and supplied with trellises. Two egg-plants filled spare corners while the bed I annexed from the grass-plot was devoted to two hills of cucumbers. Then all along the edges of the borders and beds parsley-seed was sown. The results were first shown in *one* cucumber! Do you believe there was such another cucumber in New York, and did I not on that day feel pity for those misguided persons who bought the wilted things at the corner grocery? Tomatoes came early, and plenty of them, all that five persons could eat and quanties to 'can' and pickle green; also about a dozen egg-fruit, aldermanic in proportions and delicious in flavor. Several pickings were made of Lima beans, and the parsley was always pretty to look at and handy to have. "And is this all?" some reader of large possessions will ask. No. All those nice things on the table were as nothing to the weeding, the pinching-in of rampant cucumber vines, the tying-up and cutting-up of tomato vines (how much cutting they do stand!) the fight with insects, the getting of the hands dirty, the back tired, and being happy generally. I don't think I can ever have a smaller garden, but if it comes down to a single cubic foot in a candle-box, I shall accept it thankfully and read the *Agriculturist*, which will tell me how to make it yield to the full extent of its capabilities."

A Steeple Jack at Westminster.

A daring individual named Burns, from Manchester, has succeeded at the House of Parliament in the dangerous operation of fixing the copper bands round two of the finials on the centre tower. The last November gale blew off one of the finials, and loosened another; and if it had not been for the lightning conductor, one would have dropped down, and might have done considerable damage, being one of the highest, and 9 inches square by 6 feet 5 inches from its basement to top, surmounted by a vane that would not revolve. From that cause the wind had such power over it that the third joint gave way, and the finial fell against the steeple; the west wind, however, moved it again, and placed in its position where it rocked. Burns made his way, 210 feet high, outside the tower, without scaffold, by a series of seven laddors, in an ingenious manner, and safely repaired it. Burns very recently got up to the top of the steeple of St. Mary's Church, Rotherhithe; succeeded in taking down the weather-vane, which is 7 feet four inches long, and 84 pounds weight, and after it had been repaired and regilded restored it to its place.—*Builder.*

Learning a Trade.

It was a wise law of the ancient Jews, that the sons of even their wealthiest men should be obliged to serve an *apprenticeship* to some useful occupation, so that in case of reverse of fortune they might have something to "fall back upon." The same still exists in Turkey, where every man, rich or poor, even the Sultan himself, must learn a *trade*. How fortunate would it be now had it been a law in this country. "Would to God I had a trade!" is the cry of thousands of our returned soldiers, North and South, who find themselves ruined in pocket, with no immediate prospect of gaining a livelihood. It should teach parents that whatever else they may give their sons they should give them a good trade. One of our cotemporaries most truthfully remarks that a popular idea among our people is that all their sons should adopt a clerkship, and the adoption of the business of book-keeping as a means of obtaining their livelihood, and every effort is made to give them an education to that end. So far as the education of their children in the science of keeping proper accounts is concerned, the idea is a good one, as every young man should have a sufficient knowledge to properly manage his own books, should he ever embark in business; but to make book-keepers and clerks of all our boys is a grand mis-

take. Better place them in a *workshop, mill,* or *foundry,* where they can learn independent trades, which at all times will secure for them employment, and the pecuniary compensation for which will be at least as much, if not more, than the business of accounts. We earnestly advise all parents to teach their sons trades, no matter what, so that it is an industrious pursuit; and let us in the future be spared the pain of seeing so many stout, able-bodied young men out of employment, and seeking situations where the pen can only be used. There is *a dignity in labour;* an honest trade is the best legacy a parent can bestow upon his child, for it will secure his bread where all else may fail. We base our remarks upon the fact that nearly one hundred applications from young men were received by a firm in our city who recently advertised in our columns only twice for an assistant book-keeper. This fact alone, taken in connection with the well-known scarcity in labour in the mechanical branches of industry, speak volumes in condemnation of the popular error of making book-keepers of all our boys.—*Albany (N.Y.) Journal.*

The Way Varnishes are Made.

A Mr S. A. Schmidt, in the *Scientific American,* gives the following method of making varnishes, and of bleaching shellac:—

"For one pound of good shellac take four ounces of crystallized carbonate of soda, and one gallon and a half of water; put the whole in a clean iron or copper vessel of double the capacity, and, under constant stirring, bring it to boil over a slow fire. The shellac will disolve, and, if it is intended to make colorless French polish, the solution has to be run through a woolen cloth. For brown bookbinder's varnish, or a colorless varnish for maps, photographs, etc., the solution has to boil for about an hour longer, but only simmering, and then to cool very slowly without stirring; better let it stand over night, and let the fire go out under it. In the morning you will find a wax-like substance on the surface of the solution, and the other impurities of the shellac as a deposit on the bottom of the vessel. The solution is likewise to be run through a woolen cloth, and then to be filtered. For the filter, I take a small wooden keg, remove the top and bottom, and fasten to one side a piece of muslin; on the muslin I bring about four inches of fine, washed sand, and on the top of the sand a layer of clean straw; then I pour the solution into the filter and let it run through. Should the first portion run through not be perfectly clear, like red French wine, it has to be brought back to the filter. When nothing will run through any more, pour some clean water on the filter to wash the remaining solution out. If you intend to make a transparent brown varnish—bookbinder's varnish—this filtered solution has to be precipitated with diluted sulphuric acid (one part acid to twenty parts of water), the precipitate collected on a coarse muslin cloth, and washed out with cold clear water till it runs through without taste. Then fill a stone or wooden vessel with boiling water, and throw the precipitate in it; it will directly soften and stick together; this half mass has to be kneaded in the hands, doubled up, melted, and drawn out till it assumes a fine silky lustre, then drawn out to the desired thickness in sticks, like candy, and it is then ready for solution.

To make white French polish, or transparent colorless varnish for maps, the solution has to be bleached. The bleaching fluid is made as follows, and the proportions are for one pound of shellac: Take one pound of good English chloride of lime, dissolve it in fourteen pounds of cold water, triturating the lumps well, let it subside and decant the clear fluid; add seven pounds of water to the residue, and when subsided, add the clear liquor to the other; precipitate this liquor with a solution of carbonate of soda, let the carbonate of lime settle, and decant the clear chloride of soda; wash the sediment out with water and add the clear liquid to the former, put it in a high stone jar, and give it a rotary motion with a wooden stick, pouring in at the same time very diluted sulphuric acid, till it assumes a greenish color and a smell of chlorine is perceptible. Then add of this liquid to the solution to be bleached, under constant stirring, till all the color is gone. French polish will look like milk, colorless varnish like whey, but more transparent. Then precipitate with dilute sulphuric acid, exactly as the solution for bookbinders' varnish, and treat the precipitate in the same manner, in hot water. All iron must be carefully avoided as soon as the chlorine liquor is added.

To make the different varnishes, it is only necessary to dissolve the different precipitates in alcohol. For bookbinder's varnish, take one part to two and a half parts alcohol; French polish, one to three; colorless varnish, one to two and a half, and add to the varnishes (not to the polish) one and a half drams of oil of lavender for one pint. For photographs this solution is too strong; one part of bleached shellac to six parts of alcohol will answer. For maps the solution should not be applied immediately to the paper, but the latter should first receive a coat of boiled and strained starch.

By dissolving shellac, either in a solution of borax or in one of an alkali, shellac acts as an acid—like most other resins, or like stearic or margaritic acid, contained in the fats—combining with alkali and forming a kind of soap, easily decomposed by any of the common acids The waxy matter, not saponifiable, is by slow boiling separated, and lighter than the solution, swims on the surface, where, after cooling, it can be collected. It is harder than common wax; made into candles it burns like wax, and resembles the vegetable wax of commerce.

It is a remarkable fact that all shellac contains a small quantity of arsenic, in the form of yellow sulphuret; it is found in the residuum, after the solution has cooled and is decanted off in small golden yellow particles, and out of a solution of ten or more pounds, enough can be picked out to reduce it to a metallic arsenic."

Ocean Postage.

The *Times* asks for a low uniform rate of ocean postage. Fine goods of any kind are carried from England to the West Indies at from £7 to £10 per ton, whereas a bale of letters of the same size would be charged £1,792 per ton. Letters to the United States pay at the rate of £3,584 per ton, whilst fine goods are carried for £3 per ton.