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CANADIAN MECHANICS' MAGAZINE AND PATENT OFFICE RECORD

Vol. 5. DECEMBER, 1877. No. 12.

TO OUR READERS.

IN closing the fifth volume of this MAGAZINE, we cannot but express our deep regret at the great depression which still continues to affect all branches of manufactures and trades. The building trade, especially, has so severely suffered during the last two years by the great falling off in the value of real estate, that thousands of mechanics will, we fear, this winter, find it very hard to avoid running into debt. It should not be forgotten however, and the moral lesson now taught to us borne in mind, that for some years past, mechanics have had ample employment and at a rate of wages beyond what capitalists could long go on paying, and that very few of them have laid by out of good pay, any provision against a depression which is sure to follow a long train of prosperity. We hope that such proprietors who are able to spare their money in improving their property, will confer a boon upon a large body of industrious men by finding them employment, and help them to maintain their wives and children during the trying period of a long Canadian winter.

When we say that the building trade has suffered more than any other, it is because there are so many branches of mechanical trades involved in the building of a house; at least twelve different trades are interested in its construction; and when we know it to be a fact that a great number of these have been for a long time past, and are still, out of employment, and the rest working on reduced wages, it is not surprising to us when we are informed that all scientific publications feel the pressure of the times as well as those who have always contributed so largely to their support. To say that this Journal has not felt the effect of this stagnation in business, would be pretending to a degree of prosperity not in accordance with the facts; but still hoping that the day may not be far distant when the wheels of all our manufactories will be again revolving, and trade moving on a firmer basis, we look forward for the continued support of all those who have so generously retained their names upon our subscription list, and hope for a rapid increase of subscribers as soon as the times improve. We were in expectation that, ere this, the prospect of a change for the better would have enabled us to have added some additional attractive matter to the MAGAZINE, and we regret that the desire to add something additional by way of a useful supplement, must be deferred for brighter days, as at present every publication of this kind is carried on at a great disadvantage to the publishers. The subject matter, however, will be made more varied, and certain desirable changes will be introduced to make the reading lighter; although always keeping in view the useful and scientific, we desire to make its columns more generally attractive to a greater number of readers to whom heavy and dry mechanical matters, however important to large iron manufactories, have to a great body of readers little or no interest.

Hitherto, we have in vain sought for correspondence from both subscribers and non-subscribers, on subjects of general interest to mechanics,—such as those contributions and questions which fill the better half of the "English Mechanic and World of Science." We have no doubt but that there is a great deal of interesting information to be communicated with respect to our Industries, Manufactures and Inventions which would be most desirable for the country to know, and which would be more generally known if the facts were communicated to us, and some illustration afforded; besides, a great deal of information might be obtained through our columns in a page for Questions and Answers. A MAGAZINE of this kind is a natural channel for introducing to scientific men all such information; it would then be circulated throughout the whole Dominion and the United States (where, by the way, we acknowledge, with thanks, many subscribers). Such subjects, when accompanied with illustrations and appearing in this MAGAZINE, would receive far more attention from the public than when merely noticed by local papers. It should be the medium, also, of making known to the public all important inventions.

THE CANADIAN MECHANICS' MAGAZINE being also embodied with THE CANADIAN PATENT OFFICE RECORD of Canada, is the best medium patentees could use for making known their inventions. The mere record of

them by the Patent Office, in their official form, is more like a registration principally for the information of Patent Solicitors, and is not an advertising medium for drawing important or useful inventions to the notice of the public. Patentees of really useful inventions, desiring to give illustrations with an editorial notice in our pages, will be met in a very liberal spirit, and we trust that for the future our columns will be made the channel of giving more publicity to Canadian inventions, many of which are of a very high order of merit.

Having faithfully, we trust, fulfilled our part to our subscribers, it may not be out of place here to respectfully solicit an early settlement of all arrears at the close of the year. Thanking them also for past favours, and hoping for a continuance of their support, we beg to wish all of our readers a Happy New Year, and hope the tide of depression in business has reached its lowest line, and that the flow will now set on bearing prosperity and peace on its waves.

THE EDDYSTONE LIGHTHOUSE.

Not a little interest was awakened at the last meeting of the British Association, at Plymouth, by a very interesting paper on the Eddystone lighthouse, by Mr. Isaac Douglass, who surprised his hearers by announcing that Smeaton's great work was not destined to exist much longer. Owing to a very considerable tremor which occurred with each wave-stroke during heavy storms from the westward, fears had been entertained for the safety of the structure, particularly as sea-water had frequently been driven through the joints of the masonry. The upper part was strengthened in 1830 and 1865 with internal wrought-iron ties, extending from the lantern floor downwards to the solid portion of the tower. On the last occasion he found that the chief mischief arose from the upward stroke of the sea at the cornice, but repairs were affected, and further leakage prevented. The tower was still sound, but unfortunately the gneiss rock on which the lighthouse was built had been seriously undermined and weakened by the sea. This appeared to be chiefly due to the incessant straining of the laminated rock by the heavy sea-strokes on the tower. It had, therefore, been determined to erect another lighthouse of larger dimensions, for which a good foundation had been discovered about 120 feet off. The elevation of the light for a range of 19 nautical miles was very desirable, so that it might be extended more towards the Channel rock, and made to overlap the range of the neighboring Lizard lights to the westward. Unfortunately, the sea rose during stormy weather considerably above the top of the lantern, thus often eclipsing the light and altering its distinctive character. This was a matter of much greater importance in the present day than it was at the date of the erection of the structure, from the enormous increase in the number of shipping, and the additional lighthouses which had been established, each having a distinctive character. The power of a light in so important a position ought to be raised to the first-class; but the capacity of the present tower was insufficient for this as well as for the provisions of a first-class fog-signal. Telegraphic communication between rock lighthouses and light-vessels and the shore, for purpose of reporting casualities at sea, was very desirable, but the difficulties which presented themselves appeared at present too considerable to justify the necessary outly for construction and maintenance. Four lightkeepers were attached to the Eddystone, three being constantly on the spot, and one on shore in rotation. They were relieved from Plymouth monthly by a steam vessel. The average annual cost of maintaining the lighthouse was about £585. In conclusion, he could not help expressing a hope that if Smeaton's noble structure had to be taken down, as doubtless it would be after the erection of the proposed new lighthouse, the nation would consider it as worthy of a site on English soil as Cleopatra's needle.

NEW BIRD.—Prof. O. C. Marsh announces a new genus and species of toothed bird, which he calls *Baptornis advenus*. He also describes a new fossil lizard, by far exceeding in magnitude any land animal hitherto discovered, which must have been fully 50 to 60 feet long. It was probably a herbivorous reptile. It comes from a bed on the eastern flank of the Rocky Mountains.

KILLING CATTLE BY DYNAMITE.

Mr. Thomas Johnson, of Dudley, England, has recently made experiments with the above. A small quantity, the size of a thimble, was placed on the foreheads of several animals and exploded in the ordinary way with a short piece of safety fuse and detonator, and the cattle were instantly killed, and only required bleeding. Lately other experiments were made at Mr. Bruton's, Red Hill, Dudley. The charges were exploded by electricity instead of the ordinary way, and by this means any number of animals may be instantly killed by the same current of electricity. Two large horses and one donkey, unfit for work, were drawn up in line about half a yard apart, the donky being in the center. A small primer of dynamite, with an electric fuse attached, was placed on the forehead of each, and fastened by a piece of string under the jaw. The wires were then coupled up in circuit, and attached to the electric machine. Mr. Johnson turned the handle of the machine and discharged an electric current, which exploded the three charges simultaneously, the animals instantly falling dead without a struggle.—*Land and Water.*

DURABILITY OF TIMBER.

The durability of timber is almost incredible. The following are a few examples for illustration, selected for the *Railway Age*, from various sources, and vouched for by scientific men: The piles of a bridge built by Trajan, after having been driven more that 1600 years, were found to be petrified four inches, the rest of the wood being in its ordinary condition. The elm piles under the piers of the London Bridge have been in use more than 700 years, and are not yet materially decayed. Beneath the foundation of Savoy place, London, oak, elm, beech and chesnut piles and planks were found in a state of perfect preservation, after having been there for 650 years. While taking down the old walls of Tunbridge Castle, Kent, there was found in the middle of a thick stone wall a timber curb, which had been inclosed for 700 years. Some timber of an old bridge was discovered while digging for the foundations of a house at Ditton Park, Windsor, which ancient records incline us to believe were placed there prior to the year 1396. The durability of timber out of ground is even greater still. The roof of the basilica of St. Paul, at Rome, was framed in the year 816, and now, after more than 1000 years, it is still sound, and the original cypress wood doors of the same building, after being in use more than 600 years, were, when replaced by others of brass, perfectly free from rot or decay, the wood retaining its original odor. The timber dome of St. Mark, at Venice, is still good, though more than 850 years old.

PRESERVATION OF TELEGRAPH POLES.

Mr. Tiveyrat proposes to protect the portions of telegraph poles which are burried in the earth by sleeves of galvanized iron about 0·4 inch in thickness, covered with tar or red lead. The sleeves are imbedded in the wood of the post and extend somewhat above the ground. Tar is applied to the upper joint so that no water can enter between the sleeve and the wood, and the lower part of the former is bent over the bottom of the post and covered with an iron cap.

DANGER OF OVERSTRAINS.—The dangers of such sudden strain are not confined to failure of the heart upon the spot. Very commonly in those cases where apparently healthy old people are found dead in bed, there may be traced out a history of sudden effort made during the preceding day. The overstrain so put upon the heart does not manifest itself fully at the time, but during the sleep of the ensuing night. Even in cases of fatal syncope of the heart, preceding ruptures are found at times with a clot blocking the opening. These are extreme cases truly, but they demonstrate beyond doubt that serious injury may be inflicted upon the heart without instantaneous consequences. With elderly people sudden exertion during the day is undoubtedly one cause of failure of the heart's action during the night; so that the effort may really be only apparently made with impunity.

MENDING ALABASTER ORNAMENTS.—The *English Mechanic* commends the following as an excellent cement for this purpose: Get a dram of quick-lime, slake it with a little water, powder it very fine and sift it through a very fine lawn sieve. Mix this powder, while quite freshly prepared, with two table-spoonfuls of raw white of egg; work up very smooth with a spatula and apply to the surfaces to be joined, which must be held together with tape straps, &c., until the cement has set thoroughly.

SUBTERRANEAN LONDON.

(See page 356.)

The cuts which accompany this article will give our readers some idea of the various works which are effected beneath London. And now that they are ready and in operation, people find it difficult to comprehend how it was possible to pass so long time without them. They have cost much money, but the subterranean railway is a lucrative enterprise ; and if the other works are not of equal profit, the facilities which they offer to the multitudes who inhabit the great capital of the world are certainly worth the money they have cost. Of these works the principal, as well as the first projected, is the Metropolitan Subterranean Railway. It was projected about the year 1860. To the capital stock of the company, which proposed to execute it, the Great Western R. W. Company subscribed £200,000, on account of its accession to its traffic in the centre of the city ; and the city of London subscribed an equal sum.

On the 10th of January, 1868, the permanent way was opened for the transportation of passengers between Paddington and Farrington Streets. At first, the directors of the Great Western Railway took the management of the line ; but after the 10th of August of that year it was worked by the Metropolitan Company.

This subterranean railway has had a grand success. In the first year there were transported on it nearly 9,500,000 passengers. Two years later the number of passengers annually transported was almost doubled, and now, the line making almost the entire circuit of the city, about 50,000,000 persons avail themselves each year of this means of transit from one part of the city to another. On working days 350 trains make the round of this line ; and on Sundays 200. So complete and perfect is the system of signals used to give exact notice of the respective positions of the various trains, that they can be despatched with entire security at intervals of two minutes.

To the mind of one not having seen this subterranean tunnel, the question would naturally suggest itself whether the passengers of this line are not subjected to many inconveniences in travelling thus in a dark tunnel and breathing the gases generated by the fires of the engines. These fears have, however, no foundation. The cars are lighted with gas carried in rubber bags in wooden cases, and fastened to the roofs. The bags are subjected to the pressure of a weight, and thus the gas is conducted to all parts of the car, furnishing a brilliant and safe light. An index always shows what quantity of gas is contained in a bag, and when it is necessary to refill the bags, it can be done at the terminal station in two or three minutes.

The locomotives are light and powerful machines, made so that the steam does not escape in the stack, as in ordinary locomotives, but condenses in tanks attached to the sides of the engine, and which contain 4,500 liters of water, a quantity sufficient for the going and coming of the train. The fuel is coke, prepared especially for this line, and so coked as to give no sulphurous gases. And there is none in the subterranean line in all its extent ; a great part of it is, and especially at the stations, open to the light of day.

The first-class "coaches" carry ninety passengers each, those of the second-class eighty and more.

The traffic on this railway is regulated so systematically that at the terminal station, called "Mansion House," where ground is so dear that the space belonging to the company is very limited, having place for only three platforms and three lines of rails, three trains have entered the station, discharged their passengers, taken others, and been supplied with gas, all in the space of six minutes. In this station thirteen trains come and go each hour from eight in the morning to eight at night.

The first of the four cuts represents in transverse section the works constructed beneath one of the streets of London. Here we see, first, the concrete foundations for the sewers and for the gas and water pipes and telegraph wires ; one also sees the galleries, the means by which they are ventilated, and the means adopted to prevent the noxious gases generated by the decomposition of the sewage materials from rising to the surface by the pipes which conduct the rain water from the street by the subterranean galleries, and one sees also the system of paving adopted on many of the streets of the city. There is first a layer of brick ; above that another of coarse stones ; this is covered by another layer of concrete made of hydraulic lime and fine gravel ; and above all this is placed the pavement of granite parallelopipedons.

In Fig. 4 the upper railway is part of the Metropolitan Railway, and the lower is part of the Midland and Great Northern. When we flect that the upper line is thirty feet below the surface of the ground, we will understand that truly it is one of the greatest works of engineering to construct a railroad at a still greater level. And this only a part of the grand enterprise which offers so great convenience to London, and which now appears almost absolutely necessary.

Fig. 2 represents Kings' Station, where, besides part of the principal line, one sees part of a branch. Of these there are so many that there are very few places in all the great city of London (containing few less than four millions of inhabitants) that have not easy access to one or the other of the many stations of the subterranean railway.

Fig. 3 shows part of the raifroad, and besides this some of the greatest of tho subterranean works, which are one of the glories of London. It represents a section of the famous Thames tunnel. When the subterranean railroad passes by this tunnel, its roof, in place of being of a semi-circular section, as in the other subterranean parts, is formed of straight iron beams, placed transversely eight feet apart in the spaces between them. The roof is of brick in a low arch.

In gallery 1, which is nine feet in height, we find the gas and water pipes, and the telegraph wires. In the first cut we see that in some other parts of the city these galleries are much more elaborate. They are easy of access, having many places for entry ; at a slight distance apart are iron gratings in the top, to permit daylight to enter, and where it is not possible to have these gratings, the galleries are lighted by gas.

2 shows a sewer conduit. Of these there is in the whole city an immense net work ; being in total extent at least 1,300 miles or 2,001 kilometres. The section of the greater part of the galleries is circular, of the rest, elliptical. The smaller ones are four feet in diameter ; the larger measures twelve feet in height, and nine and a half in width. The thickness of these walls, which are made of brick and cement, varies from nine and a half to twenty-seven inches.

In the construction of the sewerage works of London were employed 818,000,000 bricks and 180,000 yards of concrete ; there were removed 3,500,000 cubic yards of earth ; and the cost was £4,100,000. The total force of the steam engines employed to work the pumps is numerically 2,380 *HP.*, and they consume annually about 20,000 tons of coal.

To give an idea of the means employed to conquer the difficulties encountered in the construction of this work, we may mention only the grand aqueduct of wrought iron, with a span of 150 feet, and which weighs 240 tons, which conducts the sewage stuff from above the Metropolitan Railway to Farringdon Street.

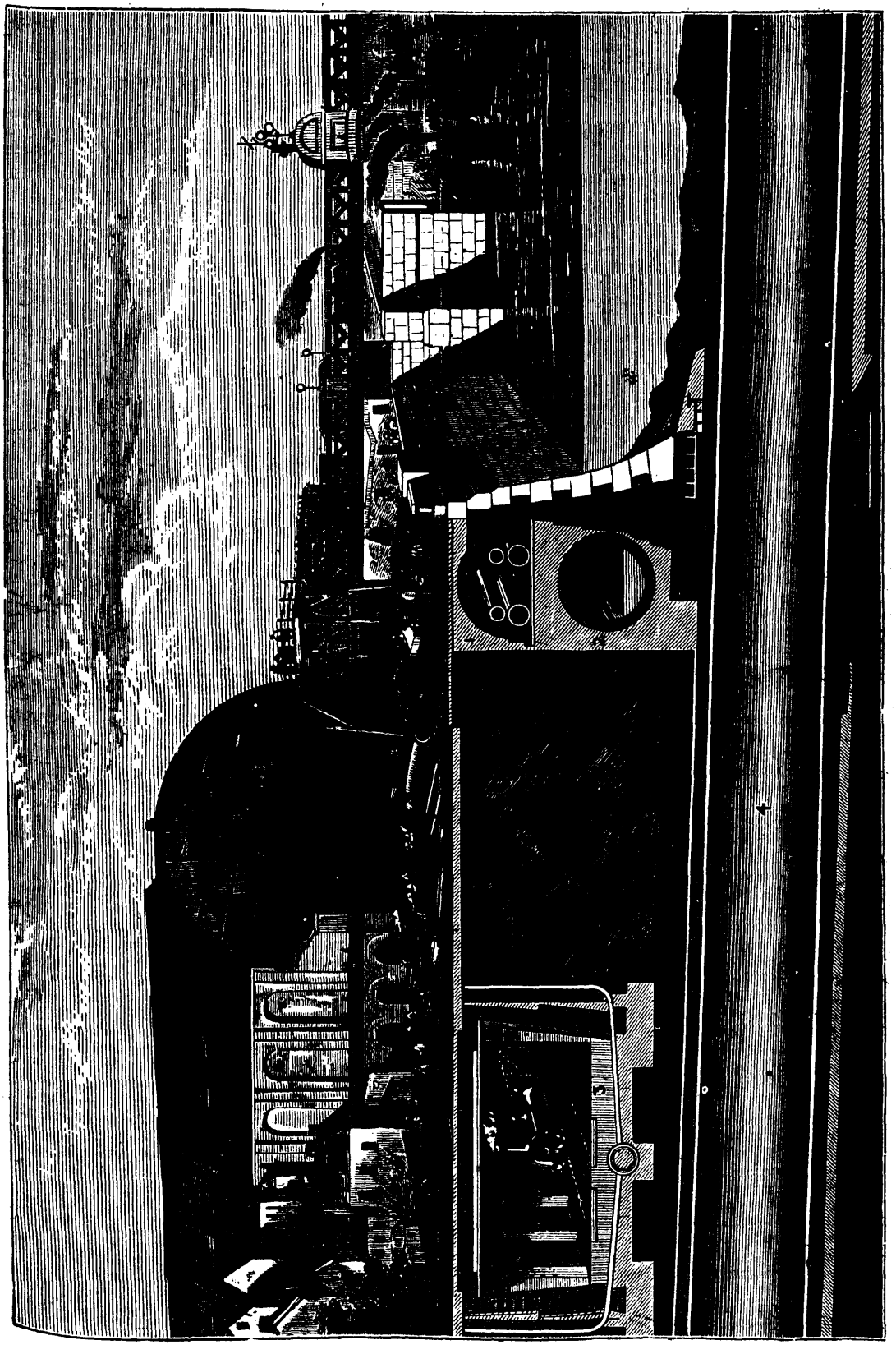
4 of Fig. 2 shows the tubes of the Pneumatic Railway, the company of which was organized in 1868, with the end of uniting various parts of the city by tubes, and transmitting through them, by air pressure, letters and small packages. It united also Euston square and the General Post Office, at High Holborn, where the principal station was. But the enterprise was not very successful. After an experience of 18 months it was evident that it would not give a reasonable profit, and it was abandoned.

The tubes, however, were in their places, and being below the tunnel of the railroad, they were employed, with the pneumatic machinery, which had served to transmit the letters, to ventilate a part of the tunnel where formerly the air had been very vitiated. But it is not at all improbable that the time is not distant when the pneumatic system will be an accomplished fact, with a basis as secure as now steam propulsion has.

[The foregoing is translated from the Portuguese of the *Revista Industrial ;* to which we acknowledge our indebtedness for the engravings.]—*Polytechnic Review.*

THE COSSACKS AND SCIENCE.—An English writer shows how the Cossacks may apply science in the present war, as follows : "In a belt around their wastes they carry a few pounds of gun cotton or dynamite, and with this highly destructive explosive they may work incalculable harm. A small charge of gun cotton placed singly upon rails and fired with a fuse suffices to blow several feet of the iron to a distance of many yards, thus rendering the railway unserviceable on the instant. A trooper may dismount, place a charge at the base of a telegraph pole, fire it, and be in his saddle again in the space of 60 seconds. Wires may thus be cut and communication stopped in the heart of an enemy's country by fearless riders, while the lines of railway are entirely at their mercy. Even light bridges and well built stockades may be thrown down by violent detonations of compressed gun cotton, and forest roads considerably obstructed by trees thrown across, which are never so rapidly felled as when a small charge of this explosive is fired at their roots.

SUBTERRANEAN LONDON.—Fig. 1. Holborn Viaduct.



SUBTERRANEAN LONDON.—Fig. 1. Gas and Water Pipes. Fig. 2. A Sewer Conduit.
Fig. 3. Underground Railway. Fig. 4. Pneumatic Railway.

EDITORIAL CORRESPONDENCE.

THE PATENT MODEL SYSTEM.

The following correspondence from Messrs. R. D. O. Smith, of Washington, and H. Howson, of Philadelphia, Patent Solicitors, will be interesting to some of our readers.—ED. C. M. MAGAZINE.

WASHINGTON, D.C., Oct. 30, 1877.

EDS. POLYTECHNIC REVIEW:

I have just read in your issue of the 27th inst., the letter of Jno. Baldwin, and a reply thereto in relation to a proposition to dispensing with models in application for patents. This is a matter of importance, and in view of the fact that strong efforts are to be madeduring the present session of Congress to effect unfriendly legislation on the subject of patterns, too much light cannot be thrown upon the various questions surrounding that subject. In the absence of models, the Patent Office must be furnished with full working drawings; for the law requires that the disclosure of the patentee shall be sufficient to enable a person skilled in that art to construct and work the device without further invention. This would be impossible if every part was not fully shown and described. *In the absence of a model how can the solicitor prepare such drawings*? Clearly he must depend upon data furnished by the inventor. The solicitor, who, from sketches and such crude drawings as inventors usually are able to furnish, can venture to construct working drawings of a machine about which he never heard until yesterday, must have boundless intuition or—boundless cheek. It is difficult enough to avoid errors with a full working machine before one—it would be absolutely impossible to do so without better information than most inventors are able to furnish on paper.

A *very* large proportion of inventors are not mechanics, and a large proportion of those who are mechanics and who are fully able to read drawings, are utterly incapable of constructing working drawings. Yet if models are dispensed with, these men must either forego their patents, so thoroughly study the working drawings that no mistake in details are possible, or—make models.

Very few professional designers are capable of designing a machine of many parts so completely that no changes of detail will be required. How, then, can non-professional people be expected to accomplish this *every time*!

Supposing the models to be abolished, how much would be saved to the applicant?

In the first place, as models are usually constructed—built up piece-meal by the inventor himself—the cost is very much less than would be the cost of fully studied drawings. Secondly, the cost of reproducing these drawings for use in the Patent Office would be vastly in excess of the cost of *sufficient* drawings made from the model. Upon this point I have an experience which is, so far as I know, exceptional. I have directions from a client to take his models apart and prepare detail drawings of every piece. The models furnished by this gentlemau are always miniature duplicates of his machines, and my experience has been that the cost of drawings, such as he orders, pretty nearly approaches the cost of the model. Without the model as a basis, the cost would necessarily be much higher, and then invariably they would include a dangerous element of uncertainty.

But the argument of greatest force is: *the model comes from the inventor's own hands.* There cannot be any question that *it* embraces and illustrates the inventions of *his* brain; very often it has been constructed by his own hands—always under his own direction and supervision. The drawings and specifications are always the product of the hand and brain of another—a second-hand production; and it is manifest the chances of error or omission are infinitely greater in the latter than in the former case.

Unfortunately there are patentees who only desire the patent to trade upon. With them the importance of the invention or validity of the patent is matter of small consideration. *Such* men would be glad te dispense with models. Unfortunately, also, there are solicitors who care as little for either of these considerations, and only desire the highest obtainable fee for the amount of service rendered. Abolition of models would enable them—as it would compel us all—to enlarge *their* charges.

To the honest inventor, and to the solicitor who desires to do his duty conscientiously, there is no gain in dispensing with the models which will not be outweighed a thousand fold by the uncertainties which would be introduced thereby.

The absence of models will increase the cost of the official examinations. No man can read a machine from a drawing as quickly and accurately as from a model.

Without the model, it would be necessary to scrutinize every part of the drawing; with the model, only those parts concerned with the claim need to be examined. Without models a large increase of the examining corps would be required. Upon this point I have made inquiries at the Patent Office, and the examiners are of the opinion that the absence of models would very largely increase their labors, *ergo*, it would necessitate an additional number of examiners.

The work of the office is not materially interrupted, because the examination calls up past inventions which the officers studied *while the models were in existence*, and the new cases have their models as before.

In reference to foreign systems, I can only say that the tendency is to assimilate their practices to ours. The new German law requires models as stringently as ours. In reference to the drawing in British patents, I can only say that some bear the marks of having been prepared from working machines, and those which do not are generally so indefinite and crude that no one could, with any certainty, reproduce the invention in machinery.

It is altogether a mistake to characterize as worthless that which, though obsolete, still marks a step in the history of art. Very many of the destroyed models represent distinctive inventions useful to-day. Very few of them represent inventions which were not useful advances in their time, and very many of them still continue their usefulness in other forms and new connections.

It would indeed be unworthy of a great nation like ours to plead want of space for the storage and exhibition of models, however numerous. The inventors of the United States have supported the Patent Office. They have supplied material for more than one *steal* of fair proportions, and they have in the treasury to their credit now about one million of dollars. Under such circumstances, the plea of *lack of space* is rather small. The inventors are willing to supply all funds needed to enlarge the space as fast as required. The Patent Office is the only bureau of the Government which *pays its own way*, and has never called upon Congress for a cent. It is time Congress should cease treating it as a pauper.

R. D. O. SMITH.

EDITORS OF THE POLYTECHNIC REVIEW:

Gentlemen—I am under obligations to you for advance sheets of a communication from a Washington Solicitor, in reply to my article on Patent Office models published in your last issue, and for permission to answer the communication in question, on perusing which my attention was first attracted to the italicized word *sufficient* in the following sentence:

"Secondly, the cost of reproducing the drawings (described as '*fully studied drawings*') for use in the Patent Office would be vastly in excess of the cost of *sufficient* drawings made from the model."

What meaning is to be attached to the word *sufficient* in the above connection?

Viewed in the light afforded by other parts of the paper, the author's meaning must be this, that a comparatively cheap and incomplete drawing, which in connection with a model, will *suffice* to illustrate an invention and, in connection with the specfication, will be *sufficient* to instruct the Examiner, will not *suffice* for their purposes without the aid of a model, in the absence of which more expensive and "fully studied" drawings would be required. There could be no more forcible argument than this in favor of abandoning the model system.

The law requires that the specification of which the drawing forms a part, shall be sufficiently clear and exact to enable those skilled in the art to make the invention. The model is a matter totally apart from the patent, which must not contain any reference to the model, and in this connection it must be remembered that the law makes the requiring of a model optional with the Commissioner.

If a patent cannot be interpreted without the aid of the model deposited with the application, it will be an invalid patent. If an attorney files an application the drawings of which are so far from being "well studied" that the patent cannot be understood without the aid of the model, that attorney is imposing on his client.

Two reasons are advanced in the communication in favor of the continuance of the model system. One is that the models afford to attorneys facilities for preparing applications; the other is that they enable the Examiners to perform their duties efficiently and promptly.

Let me attend to the second reason first.

It is stated by the author of the communication that he has conferred with the Examiners, who are of opinion that the absence of models *would very largely increase their labors.* For

several years past, I have from time to time consulted Examiners on the subject, and in almost every instance they have stated that if *attorneys would file more complete drawings there would be less use for models.*

The two statements do not contradict each other, but go to show that with better drawings than usual, Examiners could dispense with models.

Any one who has had dealings with these officers must have noted their aptitude for readily understanding drawings; there are several Examiners who never look at the models. Of course the younger officers have this accomplishment to learn, but they acquire it in a very short time if they have any taste for the subject. All competent Attornies, as well as Examiners, invariably prefer to make examinations from drawings.

It would be unfair in a few exceptional cases to ask Examiners to dispense with models, but I will venture to say that in twenty-nine cases out of thirty an Examiner never wants a model if proper drawings "fully studied" are presented.

The other reason is that models afford facilities to Attorneys for the preparation of applications.

It is stated rather flippantly that "the solicitor who from sketches and such crude drawings as inventors usually are able to furnish can venture to construct *working* drawings of a machine about which he never heard until yesterday, must have unbounded intuition or unbounded cheek."

It is a little curious to note how persistently the author of the communication declares that *working* drawings will be required in the absence of models. Patents are not interpreted by reference to the models, but by the drawings attached to the patents, and if working drawings are essential to a proper interpretation of the patent, they are essential whether a model has been deposited or not. It is not true that *working* drawings are required; what examiners want is perspective with explanatory detached views and sections affording a full unmistakeable display of the invention.

The drawings must be sufficient to enable a skilled draughtsman to make from them working drawings for the construction of the machine, and to enable Examiners to readily understand the invention; and these requirements should be complied with, whether there is a model or not.

It is as absurd to say that working drawings must be attached to a patent in the absence of a model, as to say that an inferior drawing may be filed when a model is used.

The Patent Offices of European countries do not require models; they rely on good drawings. It is a mistake of the Washington Solicitor to say that the German Empire under the new laws demands a model with every application.

As to the increased cost of reproducing drawings which it is stated would be incurred in the absence of models, I have only to say that it costs no more to reproduce a good drawing than a bad one, by the photo-lithographic process.

It would seem that the Washington Solicitor cannot understand how proper drawings can be made from sketches such as inventors usually furnish; nevertheless the thing is done every day.

In different parts of the country attornies and their assistants are in the constant habit of making drawings from crude sketches; and even from verbal descriptions. I know young men scarcely of age who can make the most complete drawings from the roughest diagrams, and who after examining a working machine can make a correct drawing of it by the aid of a few simple memoranda.

An attorney who could not perform duties like this in manufacturing communities would be considered unfit for his profession.

It may not be generally true as regards Washington practice, but it is nevertheless a fact that hosts of models are made under the instruction of attorneys and from drawings furnished by them—drawings made from the roughest sketches.

In answer to the statement that "a very large proportion of inventors are not mechanics," I have to say it is the duty of an attorney to help these men by putting their inventions into proper shape, a duty which is constantly performed by attorneys or those employed by attorneys.

It is also stated that "a large proportion of those inventors who are mechanics, and who are fully able to read drawings, are utterly incapable of constructing *working* drawings. As a practical engineer who has worked among and has had charge of mechanics and has been engaged in mechanical pursuits for nearly forty years, I can say that there are very few mechanics who cannot make an accurate representation of an invention, rough perhaps, but simply sufficient to instruct a competent attorney.

Twenty or thirty years ago draughtsmen were scarce, and this scarcity might have afforded some excuse at that time for the use of models; but both mechanical and free-hand drawing have for several years past been taught in our schools, colleges, lyceums, workshops, &c., and now good draughtsmen are so plentiful that there is no difficulty in finding those who can make accurate well studied drawings from the most crude sketches.

The following quotation from the paper is worthy of especial notice:

"Unfortunately there are solicitors who only desire the highest attainable fee for the amount of service rendered. Abolition of models would enable them (as it would compel us all) to enlarge their charges."

This is a gratuitous insinuation that attorneys who want to abolish models are actuated solely by the selfish motive of looking for increased fees. As far as I am personally concerned, I will reply to this charge by saying, that as soon as models are abolished; as soon as I am relieved from the duty of instructing model makers; as soon as the delay consequent upon making models ceases, I shall be willing to reduce my charges.

"The abolition of models, says the Washington Solicitor, "would compel *us all* to enlarge our charges."

If it should compel attorneys to file more complete drawings, to abandon the practice of rushing through the office cases based on slovenly papers, the sooner models are abandoned the better will it be for the Patent Office, inventors and the public.

If the inventor is not taxed with the cost of a model, he can afford to pay a reasonable price for carefully performed duties.

If an increased charge, however, is to be made by attorneys on account of the abandonment of models, it will be very like a tacit admission that the duties were not thoroughly performed when models were used.

Those who are opposed to the continuance of the model system do not wish to prevent inventors from making models and sending them to attorneys who cannot perform their duties without them; on the other hand, they do not wish the furnishing of models to the Patent Office to be compulsory in all cases, they do not wish to see whole armies of inventors taxed for the accommodation of a small regiment of attorneys, with its awkward squad.

That the abolition or partial abolition of models would have a salutary effect, I feel confident it would, with other advantages, result in elevating the standard of mechanical, technical and scientific attainments, and a little more of these qualifications both inside the office and among attorneys would be of advantage to inventors who have much more at stake in this matter than all others.

Models, as I have stated in a previous paper, may be necessary in a few cases; perhaps one case in thirty may demand a model; in appeal cases they may be desirable, and in contested cases may be essential in the ready elucidation of difficult questions, but the terms of the statute show that the demand for models was not contemplated in every instance. Custom, however, has made the demand universal.

It is discretionary with the Commissioner whether a model shall be furnished or not with each application, but legislation will no doubt be necessary to enable him to make such ample and liberal provisions in the way of accessible drawings for the accommodation of inventors, as the abandonment of models will necessitate.

The public should have ready means of acquiring information relating to Patents, and the model halls of the Patent Office afforded in a measure this opportunity.

Drawings of many of the classes have been already reproduced, and there is no reason why drawings of all patents should not be bound in classes for the ready perusal of inventors and attorneys. If this should be done, an examination of models would be rendered unnecessary, for the drawings afford a much readier means of acquiring information about patents than models.

This suggests another important question: if copies of all patents are made by photo-lithography it would cost but a trifle to so increase the number that the largest city of each State in the Union could be furnished with a complete set.

Public policy and justice to inventors suggest the propriety of making accessible in different cities and large towns, copies of patents, not bound in monthly volumes, as is now the practice, but in classes.

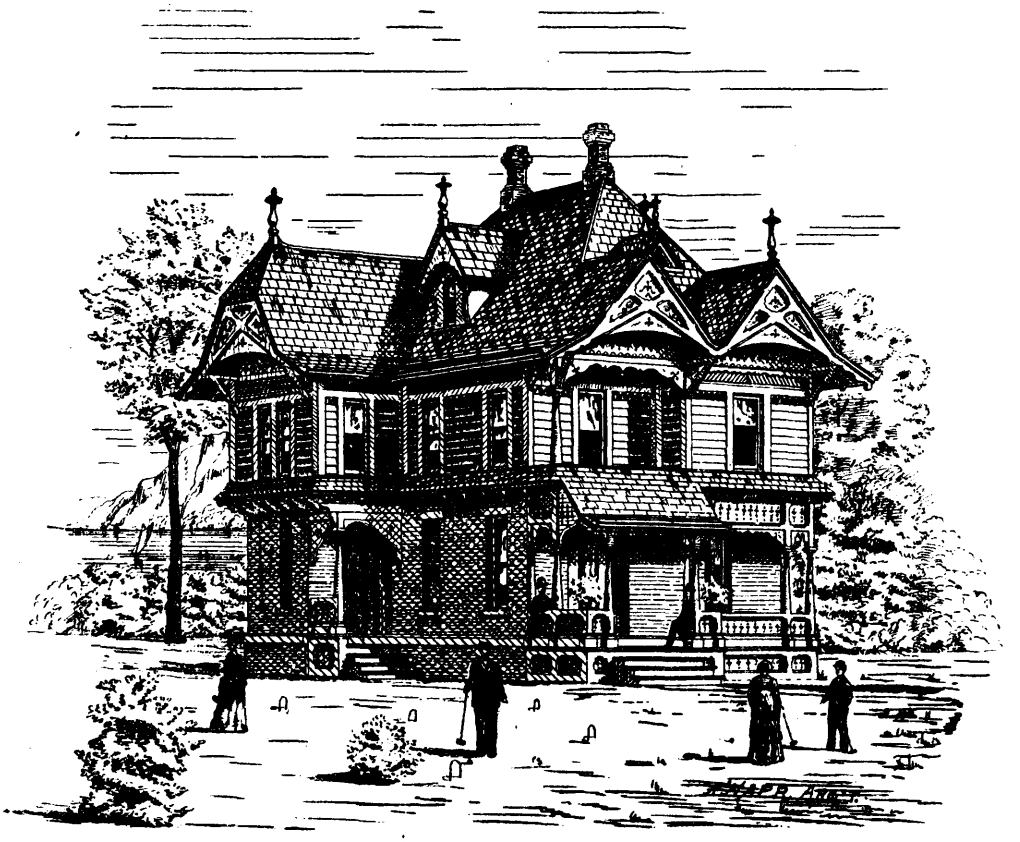
If the present model system be abolished and there is room to spare in the Patent Office, let it be devoted to such highly finished complete and accurate models of patented inventions as the makers are willing to deposit, and in a short time we shall have a national industrial museum, instructive exhibits in place of a useless accumulation of dummy models.

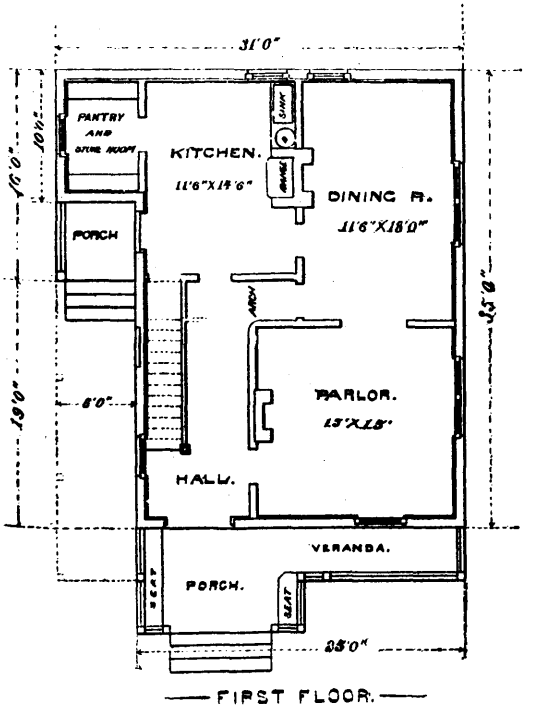
PHILADELPHIA, Nov. 5, 1877. H. HOWSON.

SUBTERRANEAN LONDON.—FIG. 2. KING'S STATION.

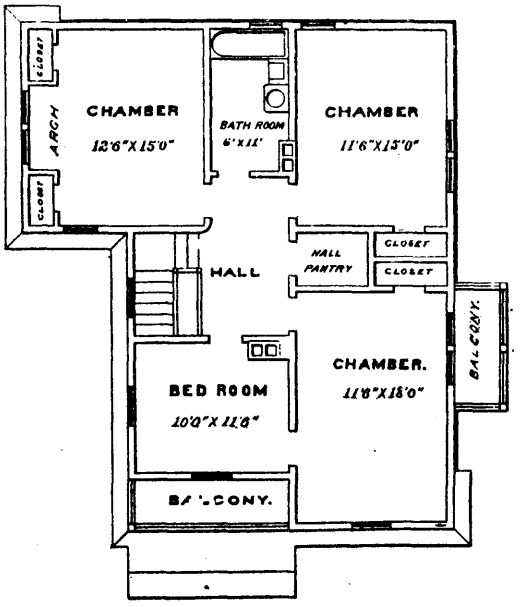
FIG. 4. ENTRANCE TO THE TUNNEL.

JAPANESE INDUSTRIES. — If the news from Yokohama is correct, our Japanese trade is seriously threatened by the ingenuity of Japanese workmen. A letter has been received by a large manufacturing house in Birmingham from its agent at Yokohama, in which he says: "The Japanese are now making a number of articles which I formerly purchased from you at prices beyond the possibility of European competition. In fact quite a number of different classes of merchandise are being made in this country, and Europeans are obliged to discontinue importing in consequence. Since I last wrote you I have been offered a large order for your goods, but at a price at which I should lose about 10 per cent.; yet a factory at Osaka has taken the order and is now making the goods." These Asiatics, the writter says, undersell every labor market which they enter and outdo every civilized artisan at his own trade. The Japanese, he remarks, are always ready to learn, and to outvie everything that the West does, and this they do with less food, less air, and less clothing than any civilised workman. It is the conviction of the agent of this Birmingham firm that the Japanese "will become formidable rivals of all kinds of Western manufactures." It may be added that in Japan the import duties are only 5 per cent. *ad valorem* on the class of merchandise to which this letter refers.—*The Engineer.*





FIRST FLOOR.



SECOND FLOOR.

COTTAGE DESIGN.

COTTAGE DESIGN.

(See page 361.)

On another page we present our readers with a beautiful design for a suburban residence, by our well-known contributor, Mr. Horace G. Knapp, architect, of Nyack, N. Y., who has a branch office in New York city at 62 West 14th street.

A brief examination of the floor plans and perspective will show the admirable arrangement of the interior and the beauty and excellence of the design. The rooms are all spacious and of easy access and communication, and the closet and storage conveniences are very complete. On the first floor are parlor, dining-room, and kitchen; on the second floor are four chambers and a bath-room. Every room is accessible direct from the hall. The second-story hall pantry eontains the stairs to the attic, where a couple of bedrooms could be finished off if desired. A cellar, 7 feet in the clear, extends under the entire building.

The general exterior finish is shown by the perspective sketch. The brick walls are carried up to the second-floor beams, where a simple and effective belt cornice divides the brick-work from the frame superstructure. The façade, with its porch, veranda, balcony, and gable work is very unique and striking, and the design can be carried out for about $3,000.

Modification.—In view of the extensive adoption with which this design will doubtless meet throughout the country, and also considering the varied requirements among those wishing to adopt it, attention is invited to the following modification by which additional spaciousness to the first floor is secured without materially affecting the cost of the building.

Substitute frame construction for the brick walls of the first story; continue the veranda around the side of the building, as shown by dotted lines of first-floor plan, and extend the hall window to the floor. Use the present kitchen for dining-room, utilizing the space now devoted to store-room and porch in enlarging the dimensions of the room, and communicate the dining-room with veranda by long window. Use the present dining-room for library, back parlor, or chamber. Build a one-story rear extension for kitchen, with porch, store-room, and pantry. This arrangement does not necessitate an additional chimney, as connection can be made with the present kitchen chimney, and a good draught thereby insured.

For the benefit of our patrons, we have made a special arrangement with the architect whereby we can furnish the full working drawings and specifications of the cottage as herein presented, or embodying the modification above mentioned, for the very small sum of twenty-five dollars. This is certainly a great offer, which we trust will be embraced and appreciated by those adopting the design. Send all remittances to the office of the MANUFACTURER AND BUILDER, communicating full instructions to architect, and being particular to give destination of drawings fully and correctly.

The following is a concise specification adapted to the modification mentionned:

Carpenter's Work.—The timber for the frame to be of hemlock, pine, or spruce, except where otherwise specified; free from all defects, and put up in the best manner; the frame thoroughly braced and bridged throughout. The timbers to be of the following sizes: Sills, 4x6 inches; girders under main partitions, 4x8 inches, supported on locust posts not over 5 feet apart, and on firm foundations; beams for first and second floors, 2x10 inches, 16 inches on the centers; kitchen extension floor beams, 2x9 in. 2 feet apart, properly supported on intermediate girder; ceiling joists and rafters to kitchen, 2x5 inches. All joists and studding which are to receive lath and plaster to be spaced 16 inches on centers. All carriage beams and headers, 4 inches thick; door and window studs, 3x4 inches, the door studs doubled; plates, 4x6 inches; attic beams, 3x8 inches; posts, 4x6 inches. Portico sills, 3x6 inches; cross sills, 2x6 inches; floor joists, 2x5 inches; 2 feet apart; rafters, 2x5 inches, pine, planed, cut, and molded as per details. Main rafters, 2x6 inches, 2 feet apart; hip and valley rafters, 3x7 inches; rafter ends, 2x5 inches, pine, cut and planed as per detail drawings.

The frame covered with rough hemlock, sheathed with sheathing felt, and then sided up with clapboards and vertical battoned siding as shown. Outside casings, bands, corner boards, etc., 1¼x6 inches. The main roof sheathed with hemlock boards, and tarred felt, and covered with Chapman roofing slates. The portico cornice and front porch roof covered with slates; the deck roof of portico and roofs of rear extension and pantry and porch projection to be covered with best I. C. char-coal roofing tin. Line all gutters and valleys, and flash all ridges with tin. Tin conductors of proper sizes as required. Floors of porticos, etc., laid with narrow 1½-inch pine flooring. Inside floors with 1-inch pine of medium width.

Stairs built as shown on plans; the principal flight to have sawed balustrade, with newels and rail of black walnut. A recess arched off under main stairs. A close flight of stairs from the kitchen to cellar, and a stair from second story to attic.

Windows made and placed as shown on plans, all properly hung and provided with approved fastenings. All the windows of first and second stories to have 1¼-inch outside rolling slat-blinds, in two witdhs, with best blind hinges and fastenings. Sash for first story and for long windows of second story, 1½-inches thick; all other sash glazed with the best first quality French sheet glass.

Doors, all four panels each, made and placed as shown on plans. The principal doors throughout 1½ inches thick; closet doors, 1¼ inches thick. All the principal doors double faced with rafted moldings, and provided with best mortise locks; closet doors to have rim locks on inside, all with white porcelain knobs and trimmings. All doors hinged on loose-joint butts of suitable sizes. Hard wood knobs screwed to base-boards back of all doors where required to protect the plastering. Architraves around doors and windows in first story 8 inches wide, including a casing and two other bold members, as per detail drawings. In second story same design diminished. Base-boards of first story 7 inches high, and necking and molding on top; second story 6 inches base, with necking and molding.

An iron sink to be cased in kitchen, and in the bath-room a water-closet, wash-basin, and bath-tub to be cased up with black walnut and white ash. The kitchen wainscoted 3 feet from the floor on all sides; black walnut borders around all hearths. A bell-knob at front door, with wire connecting with bell in kitchen. All lumber used for both inside and outside purposes, except where otherwise specified, to be clear white pine lumber, free from all defects, and well seasoned and dry when used.

Mason's Work.—Do all necessary excavating for cellar and foundation walls, piers areas, chimney, cistern, etc. Build all walls, piers, areas, chimney, cistern, etc., up with hard burnt brick, laid solid in lime and sand mortar. The cellar walls to be 12 inches thick below the surface of the ground, and 8 inches thick above. Blue stone coping to area walls, and blue stone sills to all cellar windows. Brown stone linton over kitchen fireplace. Lath all walls, ceilings, etc., throughout first and second stories, and plaster with scratch, brown, and hard white finish. Plaster cornices in angles of ceilings in halls, parlor, dining-room, and library. Plaster centre pieces in above ceilings. A cistern 8 feet in diameter in the clear by 8 feet deep, laid up, arched and paved with hard bricks, and cimented two coats.

Plumber's Work.—Fit up in kitchen a cast iron sink and 40 gallon copper cylinder boiler, also range with water-back, etc., complete; all proper connections to be made. Fit up in bath-room a patent pan closet, with 4-inch cast-lead trap and 4-inch cast-iron soil pipe; also a 6-foot copper tinned and planished seamless bath-tub; also marble slab and wash-basin, all properly fitted up and connected complete. Gas-pipes distributed throughout.

Painting.—Two coats, with artistic combinations and contrasts.—*Manufacturer and Builder.*

VAMPIRE WOMEN.—"Vampire women" is the suggestive title of an article in a recent number of the New York *Tribune*, which is devoted to "the lean, bloodless, miserable girl or wife, flabby and unable in flesh and mind, whose disease takes, in the family, the vague name of debility, or nervous exhaustion, or spinal disorder." The majority of young girls, the writer proceeds to say, are born tired. It is not affectation which makes them thin of blood and morbid in brain at the age when the current of life should run fullest and reddest. They are called "vampires" not merely because their own existence is unhealthy, but because they sap the energies of those about them. A regimen of iron, exercise, change of air, etc., which may quicken the pulse in the patient's veins for the time, neither reddens her blood nor rounds her cheeks permanently. The system of cure for patients of this description adopted at the hospital for nervous diseases in Philadelphia is the only one that has thus far been found effective. Absolute rest in bed for six weeks or two months is enjoyed. A milk diet is ordered, and the lack of exercise is supplied by treatment known as wassage, or kneading every muscle and square inch of flesh in the body and by electricity. Reading, sewing or any other occupation is absolutely prohibited. It is said that nervous and debilitated women, who have been subjected to this treatment, have come out of the hospital at the end of the time fixed perfectly restored in mind and body, and without a trace of dyspepsia, hysterics, or anæmia.

CONCRETE BUILDINGS.

SIR,—A correspondent asks some questions relative to concrete buildings. If timbers are of large dimensions it would be better—at any rate in most cases—to leave cavities for their insertion afterwards; if this cannot well be done, then immerse their ends in water, so that they may expand previously to being built in. In timbers of small scantling no precautions are, as a rule, necessary, and the walls must certainly be stronger than when left full of holes. The ballast should be screened if any portion would not pass through a 3-in. mesh sieve or screen, and for thin walls a smaller mesh is preferable.

For concrete in the proportion of seven of ballast to one of cement, by measure, a fair price would be from 10s. to 13s. per cubic yard, depending on the local price of labor, and of cement delivered on works; also if the contractor has to find his own appliances. "Concrete and its Use in Building" (Spon & Co., 48 Charing-cross) treats more fully the different questions asked by "Concrete."

THOMAS POTTER.

LARGE SAWS.

SIR,—My attention has been drawn to the following extract from your valuable paper, which appeared in the gleanings of the Birmingham *Daily Post*, 27th August, 1877:—

"The *Builder* says a saw 54 feet long by 18 inches wide, intended for use on large trees in California, has just been turned out of Beaver Falls Steelworks."

Now, sir, this may either be a mistake, or else another specimen of American "tall-talk;" but as some of your readers who are unacquainted with the saw trade may be misled by it, and knowing how anxious you are that no misstatements should appear in your journal, I take the liberty of correcting the article. I am myself warmly interested in the manufacture of these band or endless saws, and know from experience that a saw 54 feet by 18 inches wide would be positively useless, even if made from one piece and properly hardened; and provided that an American firm has "turned out" such a saw, it certainly was never intended for work. I am, however, strongly inclined to doubt the statement that this is the case, for, as far as my knowledge of American saw manufacture goes, I am almost certain that no one of their houses could produce such a large piece of work. Of course, any steel roller could make a number of small pieces, and then weld them into one big sheet; but up to the present, the largest saws rolled from one single piece which have ever been made were manufactured by the most celebrated French house in the trade for the American market, and though these saws (measuring 45 feet by 12 inches by 8 W. G.) were simply perfect, yet on being tried it was conclusively proved that such gigantic tools were not by any means so useful as smaller ones of about the dimensions of 54 feet by 4½-6 in. by 12-16 W. G. These narrower saws, I will guarantee, are capable of cutting more easily through as large trees as any 18 in. saw, such saws having only twelve more inches of steel in width, which not only does no work, but into the bargain hinders the play of the machinery. I have visited contractors and engineers in New York, Chicago, Philadelphia, Cincinnati, Quebec, Ottawa, &c., and every one has agreed with me that with saws of a comparatively small size a larger amount of work can be got through in the time than with the largest tools. Therefore if an American house has by dint of employing all its energy and skill succeeded in producing a saw of such dimensions as those you state, it has simply wasted its time, for, profiting by the experience acquired by older houses from a long series of experiments, it should first endeavor to successfully compete with those older firms in articles fit for use, and not to bring forth an article fit only for exhibition in a show-room. They would then, perhaps, take away part of the trade I am carrying on with their own conntry in band and handsaws, which I alone send over to them in hundreds and tons respectively.

AD. ARBENZ.

*** Mr. Arbenz's opinions may be quite correct, but they by no means prove that our paragraph was a misstatement.—*The Builder*.

TO PRESERVE FRUIT WITHOUT SUGAR.—Pick any kind of fruit not dead-ripe, and put it into wide-mouthed bottles; set the bottles in kettle, with cold water up to their necks, place them over the fire, and when the fruits begin to sink, take off the kettle: when cold, fill up each bottle with boiled spring water, cold; cork the bottles and lay them on their sides, or set them with the corks downwards in a rack. Or the fruit in the bottles may be set in an oven after the bread is drawn, and let stand till shrunk a quarter part, when the bottles should be corked closely.

SCIENCE AND THE SEA SERPENT.

Professor Proctor, the well-known English astronomer, has an inclination toward a belief in the sea serpent, which has taxed people's credulity for so long a time. In the *St. Nicholas* he writes:—

I think it may interest your readers to jot down a few facts—some of which are not commonly known, I believe, while others are commonly overlooked or forgotten.

1. A great number of foolish stories have been told about the sea serpent by anonymous hoaxers; so that,

2. Persons of known name are apt to be ashamed, rather than otherwise, to describe any sea creature (or appearance) which they suppose to be the sea serpent. Yet,

3. In 1817, eleven Massachusetts witnesses of good repute gave evidence on oath before magistrates (one of whom corroborated the evidence from his own observation) about a serpentine sea creature 70 or 80 feet long, seen in some cases within a few yards. It presented all the features afterward described by the officers of the *Dædalus*.

4. In 1833, five British officers recorded a similar experience.

5. In 1848, the captain of a British frigate sent to the Admiralty an official description of such a creature, seen (by himself and his officers) travelling past his ship, close by, so that he "could have recognized the features" of a human person at the distance "with the naked eye."

6. Captain Harrington and his officers saw such a creature in 1858, under such circumstances that he says: "I could no more be deceived than (as a seaman) I could mistake a porpoise for a whale."

7. The story last related, marvellous though it is (rejected on that account, when first received, as a probable hoax), has been deposed to on oath by all who were on board the *Pauline* at the time. The captain of the *Pauline* writes me that, instead of being anxious to tell the story, he and his officers and crew were in twenty minds to keep it to themselves, knowing that they would be exposed to ridicule and worse.

8. It is certain that creatures of the kind—*i.e.* not sea serpents, which few believe in, but sea saurians, were formerly numerous.

9. Of other creatures numerous at the same time, occasional living specimens are still found.

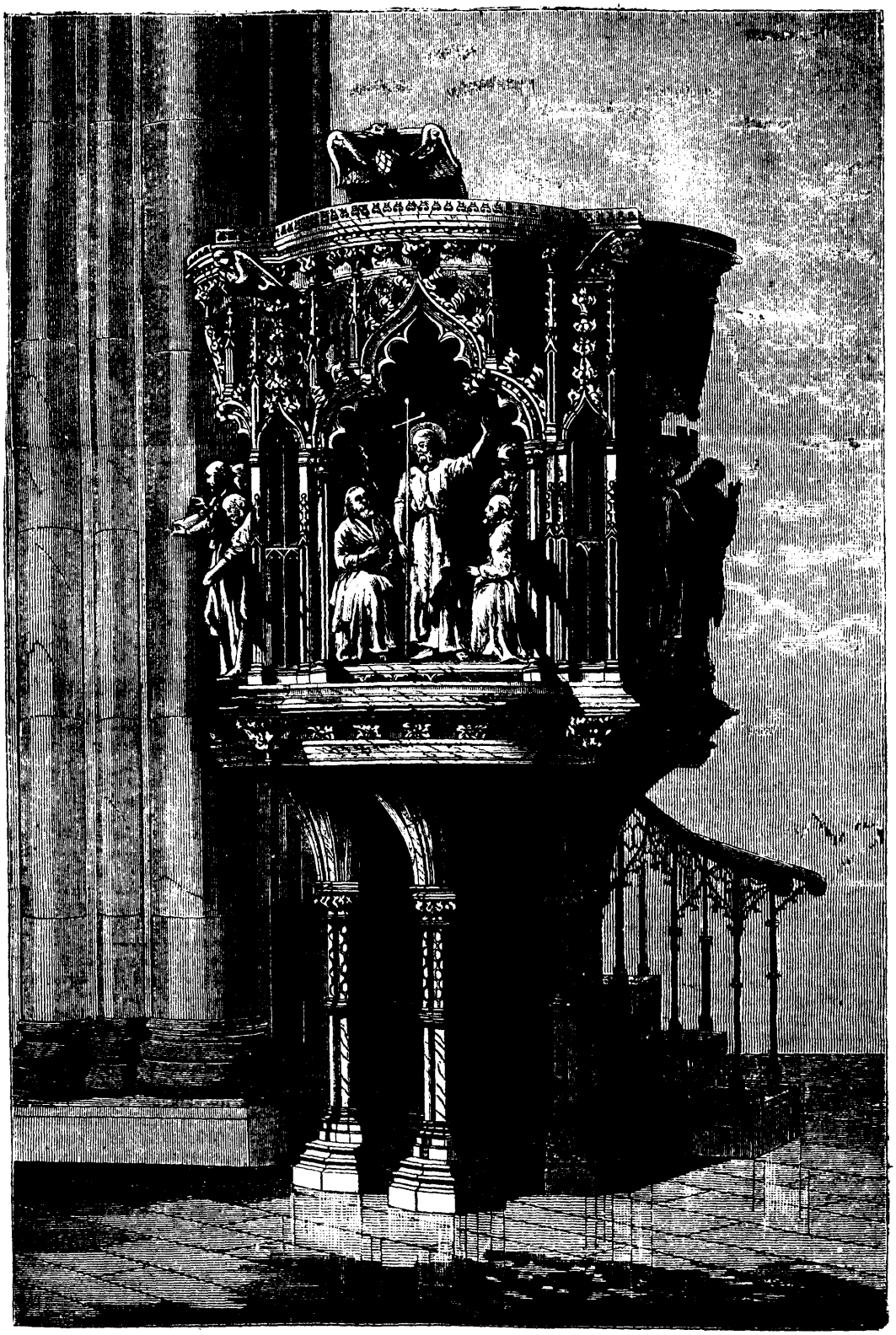
10. Agassiz states that it would be in precise conformity with analogy that such an animal as the enaliosaur should exist still in the American seas.

11. Of several existant sea creatures only very few specimens have ever been seen (in some cases only one.)

With these and like facts before us, we may believe that the above mentioned observers were deceived, and doubt whether any enaliosaurs continue to exist. But there is no scientific reason for denying the possibility of their existing and being occasionally seen. The foolish stories told by hoaxers have no bearing on the case one way or another. At least, they *should* have no bearing with those that can reason aright.

ABOUT TEA.—Twenty years ago China was practically the only tea-growing country, but to-day she has two formidable rivals looming up—India with black, and Japan with green teas—and it is said that the Indian article is preferred to that of China in England, and Japan tea is to China green in some sections of our own country. The whole production of India is taken by England, while the entire product of Japan is taken by the United States. The area of cultivation of the tea plant is said to be rapidly extending, both in China and India, while the consumption outside the sources of supply, is chiefly confined to the Saxon and Anglo-Saxon races, the Latin race using very little. The changes in the means of transportation in late years are indicated by the fact that no less than 80,000,000 pounds of the whole 103,000,000 shipped from China to England and the United States last year was by steam against only 15,000,000 by sail, whereas twenty years ago the carriage was confined to sailing vessels. From present indications there is another year of cheap tea before us, private cables having already noted the fact both the China and Japan markets for new crop have opened lower, while general trade the world over continues in a more or less depressed condition. Indeed, if the production of tea shall continue in excess of the consumption, it would seem that prices are destined to continue permanently low.

ATHLETIC SPORTS FOR LADIES.—1. Jumping at conclusions; 2. Walking round a subject; 3. Running through a novel; 4. Skipping dull descriptions; 5. Throwing the hatchet; and during the holidays; 6. Boxing the ears of troublesome young brothers.



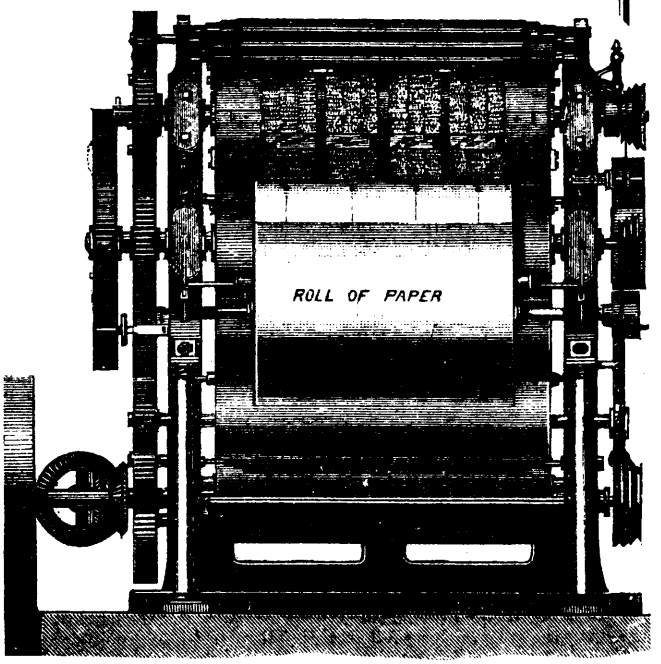
PULPIT, CHESTER CATHEDRAL.

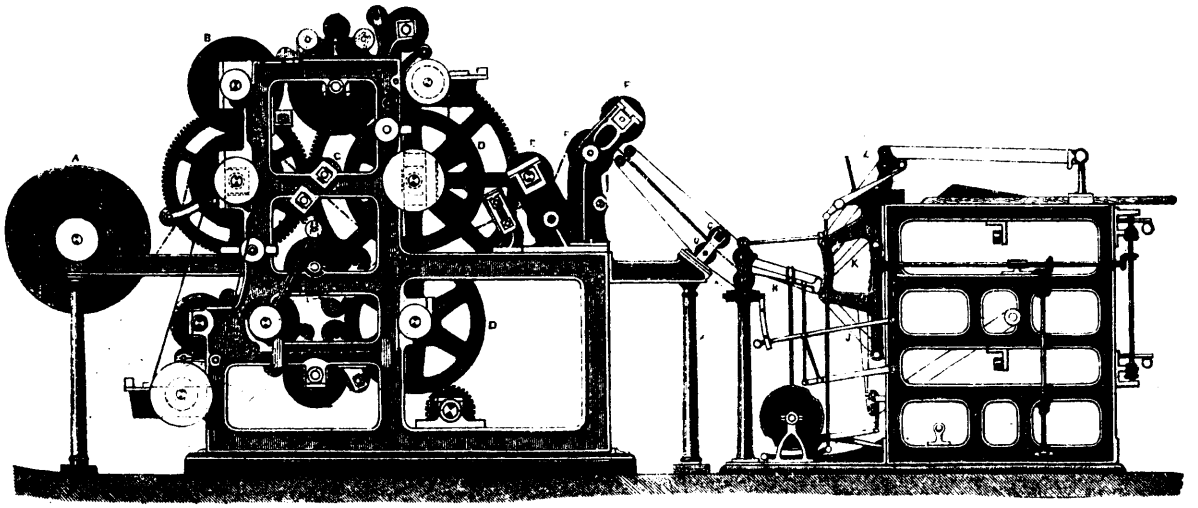
We copy from the *Builder* an illustration of a design by Sir Gilbert Scott, R.A., for a new pulpit for Chester Cathedral. It is composed of oak; the panels represent St. John preaching in the Wilderness, the Vision of St. John, and the building of Solomon's Temple. It is the handsome gift of the Freemasons.

THE INGRAM PRINTING MACHINE.

(USED BY THE "ILLUSTRATED LONDON NEWS.")

WE copy an illustration from the *Engineer* of a press which has been specially designed for printing the *Illustrated London News*. It has been invented by Mr. W. J. Ingram, M.P., who argued that as type is printed from circular forms, engravings could be dealt with in the same way. The machine has been patented, and we cannot better describe the machine than by reproducing the following passage from Mr. Ingram's specification :—It has been found in practice that cuts or engravings require much more careful inking than the letter-press, and that the ordinary inking arrangements, which are found to answer very well for printing letterpress, will give but very imperfect work from engravings or cuts. It has also been well-nigh impossible to obtain satisfactory impressions from cuts or engraved plates bent to the sharp curve required to correspond to printing cylinders of the ordinary size. In order to overcome these difficulties, I considerably decreased the diameter of the printing cylinder to which the cuts or engraved plates are to be adapted, so that the curves to which these cuts or engraved plates are to be bent may be gentler and of longer radius than the curved surface of the other printing cylinder. By this means I am also enabled to place on the same printing cylinder two, three, or more copies of the cuts or engravings, so that while the surface speed of the large and small printing cylinders is the same, the small cylinder if it contains only one set of stereotype plates for the letterpress, will rotate two, three, or more times for every revolution of the large cylinder. The impression cylinder, which acts in conjunction with the large printing cylinder, is also correspondingly increased in size, and rotates at the same surface speed. If desired, the type cylinder may be increased in size so as to be capable of receiving a duplicate set of stereotype plates for the letterpress, while the





large cylinder will have a triplicate or other suitable number of sets of cuts for the engravings. The large printing cylinders will therefore perform two-thirds of a revolution while the smaller or type cylinder is making one complete revolution. My next improvement relates to the inking apparatus, which is used in conjunction with the large printing cylinder, and consists in the use of an increased number of inking rollers and distributing rollers, so that the engravings may be more perfectly inked than heretofore. The ink, as is usual, is transferred by a vibrating roller and a ductor or fountain roller to the first distributing cylinder, from which it is taken by two rollers, and is deposited on a second distributing cylinder, to which an endway motion is given by means of any suitable mechanism. The ink is thereby evenly distributed over the surface of the second cylinder, from which it is transferred by other rollers to two other distributing cylinders, in contact with which four inking rollers rotate and take therefrom the ink, which they transfer to the printing surface. In this manner the cuts or engravings are plentifully and evenly supplied with ink, and good impressions are obtained therefrom."

In our engraving A is the roll of paper, containing a length of about two or three miles. B the type and impression cylinder for printing the inner forms, or type side of the paper. C C calendering or smoothing rolls to remove the indentations produced by the impression of B, so that a smooth surface is preserved to receive the outer form, or illustrated side of the paper, which is printed by D D. E E are cylinders, one provided with a saw-toothed knife, and the other with a corresponding indentation, to perforate the paper between each impression. F F are rolls for holding the paper securely, to resist the effect of G G, which are called snatching rolls, and, being driven at a higher surface speed than the holding rolls, snatch or break the paper at the places where it has been perforated, and form it into separate sheets. As it is found that machinery for folding newspapers works much better at a moderate speed, in this case it has been arranged in duplicate, so that each folder only works at half the speed of the printing machine. The vibrating arm H delivers the sheet alternately to K and J, which are carrying tapes leading to the two folding machines. If the sheets are wanted unfolded, the arm H is moved to its highest position and there fixed ; it then delivers the sheets to another roller, and by means of a blast of air and a flyer, they are laid in a pile on a table provided for them. This change can be made without stopping the machine.

It was to Mr. James Brister, manager of the machine department of the *Illustrated London News* for the past seventeen years, that Mr. Ingram intrusted the carrying out of his design. Working from the plans and instructions of Mr. Brister, Messrs. Middleton & Co., of Southwark, finished the machine in little more than two years, whereas, we believe, previous improvements in rotary machines had not been accomplished in less than five years. The machine prints and folds 6500 copies per hour. The second week it was in use for printing a large issue its average work exceeded that of four of the fastest "two-feeders"—a rapidity which may be realized all the more forcibly when we add that whereas the new machine printed both sides of the paper, cut each sheet, and delivered it folded, the old machines simply printed one form in the same time, and did not fold the sheets. There was thus a considerable saving of manual labor, only four men being engaged on the rotary machine, whilst twenty-four men were engaged on the four machines. Let it be added that the "Ingram" machine only occupies the space of an ordinary perfecting machine, and little more needs to be said to prove that it bids fair to effect as great a revolution in the printing of illustrated newspapers as the latest Walter and Hoe rotary machines have effected in the printing of daily newspapers.

THE SUPPOSED MERCURIAL POISONING BY COLORED VULCANITE.—An impression has long prevailed that it was possible for the salts of mercury, used to color red valcanite, to exert a poisonous influence where red rubber plates were worn in the mouth; and the attention of the Odontological Society having been strongly drawn to the subject by Dr. Bathurst Woodman's papers (see *Trans. Odont. Soc.*, 1875), relating cases of supposed mercurial poisoning from this cause, a committee was appointed to collect evidence and report upon the subject. Their inquiries have, however, utterly failed to establish the existence of a single case of unquestionable, or even probable, mercurial poisoning due to the use of red vulcanite plates. The committee requested Professor Attfield to make "an investigation of the influence, if any, of saliva and the other fluids of the human body on the pink and red varieties of vulcanite used by dentists in making artificial teeth-plates, gums, and palates." These tinted varieties of vulcanite are made by heating pink or red "dental rubber," under pressure, to a temperature of 310° to 315° Fah. (154° to 157° C.), the "dental rubber" being prepared by incorporating sulphur and vermilion with pure india-rubber. The following are the results of Dr. Attfield's investigation—1. So far as any action on man is concerned, vermillion is a harmless substance. 2. So far as any effect or influence of the vermillion is concerned, the mixture of vermillion, sulphur, and india-rubber, commonly termed "dental rubber," is also a perfectly innocuous substance. 3. Pink or red dental vulcanite, even when placed under the severest conditions of experiment, does not yield any trace of mercury to saliva, or, indeed, to other far more powerful solvents. 4. The metallic pins and braces in dental vulcanite do not displace mercury, or induce the formation of any compound of mercury soluble in saliva or in more powerful solvents. Dr. Attfield is therefore of opinion that vermillion vulcanite teeth-plates are practically unaffected by saliva, or by any substance which ever gains access to the mouth; and, in short, that the pink and red valcanite artificial gums and palates now so generally worn are absolutely harmless.—*Chem. News*, XXXV, 265.

ON FILE MANUFACTURE.—Files are made of bars of steel, rendered doubly hard by a process called *double conversion*, drawn the required size at the tilt hammer, and then shaped, the square and flat ones by the hammer and common anvil only, but those of round, half-round, and three-angled forms, by means of bosses and dies made in the above shapes, which fit into a groove left for them in the anvil. The steel blanks having been thus formed, are next *annealed*, or softened, to render them capable of being cut, by placing a number of them together in a brick oven, rendered air-tight by filling up all the interstices with sand (to prevent the oxidation of the steel, to which it is very liable, if air be admitted), and then making a fire play as equally as possible all round until they are red hot, when the heat is discontinued, and the steel allowed to cool gradually before it is uncovered. The surface to contain the teeth is now rendered as smooth as possible by grinding or filling; the teeth are then cut with a carefully ground chisel, each incision being made separately. The next and last process, that of hardening, is performed in various ways by different makers; the ordinary method, however, is to cover the files with a kind of composition or protecting varnish to prevent oxidation and scalding of the steel when heated; and, lastly, they are plunged in cold, fresh water to cool them as quickly as possible. Some file-makers coat their files, before tempering, with a composition of cow-dung or pig-flour, which not only protects the sharp angles of the cuttings from the action of the fire, but furnish a highly azotized substance, which conduces greatly to still further harden and steelify the finished work. I know several file manufacturers who make use of a bath of melted lead for tempering purposes. The files are first coated with a greasy composition to prevent any oxide adhering, then introduced for a short time into melted lead, or the "metallic bath" as it is called, and then plunged into the tapering liquid. The melted lead may be kept covered with charcoal, or other suitable ingredient, to prevent oxidation. In some manufactories a charcoal fire is kept burning on the surface of the melted lead.

STAINS FOR WOOD.

BLACK STAIN FOR WHITEWOOD.

Take 1 gallon of water, 1 lb. of logwood chips, ½ lb. of black copperas, ½ lb. of extract of logwood, ½ lb. of indigo blue, 2 oz. of lampblack. Put these into an iron pot and boil them over a slow fire. When the mixture is cool, strain it through a cloth, add ¼ oz. of nut-gal. It is then ready for use. This is a good black for all kinds of cheap work.

EBONIZING BLACK.

Take one gallon of strong vinegar, 2 lb. of extract of logwood, ½ lb. of green copperas, ¼ lb. of China blue, and 2 oz. of nut-gall. Put these in an iron pot and boil them over a slow fire, till they are well dissolved. When cool the mixture is ready for use. Add to the above ½ pint of iron rust, which may be obtained by scraping rusty hoops, or preferably by steeping iron filings in a solution of acetic acid or strong vinegar.

WALNUT STAIN FOR WHITEWOOD.

Take one gallon of very thin sized shellac; add 1 lb. of dry burnt umber, 1 lb. of dry burnt sienna, and ¼ lb. of lampblack. Put these articles into a jug and shake frequently until they are mixed. Apply one coat with a brush. When the work is dry, rub down with fine paper, and apply one coat of shellac or cheap varnish. It will then be a good imitation of solid walnut, and will be adapted for the black boards of mirror-frames, for the back and inside of case-work, and for similar work.

STAIN FOR THE SAP OF BLACK WALNUT.

Take one gallon of strong vinegar, 1 lb. dry burnt umber, ½ lb. dry burnt vandyke brown. Put into a jug and mix well; let the mixture stand one day and it will then be ready for use. Apply this stain to the sap with a piece of fine sponge; it will dry in half an hour. The whole piece is then ready for the filling process. When the work is completed, the stained part cannot be detected even by those who have performed the job. By means of this receipt wood of poor quality and mostly of sap can be used with good effect.

CRIMSON SPIRIT STAIN.

Take 1 quart of alcohol, 3 oz. of Brazil wood, ½ oz. of dragon's blood, ½ oz. of cochineal, 1 oz. of saffron. Steep to full strength and strain. It is a beautiful stain for violins, work-boxes, and fancy articles.

BRIGHT ROSEWOOD STAIN.

Take 1 gallon of alcohol, 1½ lb. of cam wood, ½ lb. of red sanders, 1 lb. of extract of logwood, 2 oz. of aquafortis. When dissolved, it is ready for use. It should be applied in three coats over the whole surface. When dry, rub down to a smooth surface, using for the purpose of very fine paper. The graining is done with iron dust, and the shading with asphaltum, thinned with spirits of turpentine. When the shading is dry, apply a thin coat of shellac, and when that is dry, rub down with fine paper. The work is then ready for varnishing.

SATINWOOD STAIN.

Take 1 quart of alcohol, 3 oz. of ground turmeric, 1½ oz. of powdered gamboge. When steeped to its full strength, strain through fine muslin. It is then ready for use. Apply with a piece of fine sponge, giving the work two coats. When dry, sandpaper down very fine. It is then ready for polish or varnish and is a good imitation of satinwood.

FOR A PURPLE STAIN.

Take 1 lb. of logwood chips, ¾ gallon of water, 4 oz. perlash, 2 oz. powdered indigo. Boil the logwood in the water till the full strength is obtained, then add the pearlash and indigo, and when the ingredients are dissolved, the mixture is ready for use, either warm or cold. This gives a beautiful purple.

Furniture Polish.

Household furniture is readily cleaned by washing it with a little warm ale, the polish being brought up subsequently by means of a cloth damped with paraffin oil. The following has been strongly recommended for renovating old furniture and bringing up a good polish :—Take of olive oil 1 lb., of rectified oil of amber 1 lb., spirits of turpentine 1 lb., oil of lavender 1 oz., tincture of alkanet root ½ oz. Saturate a piece of cotton batting with this polish, apply it to the wood, then, with soft and dry cotton rags, rub well and wipe off dry. Keep the polish in a stoppered bottle.

Manufacture of Eburine.—Eburine is a composition formed from the dust of ivory or bone cemented together with gum tragacanth or albumen, and colored at pleasure. In some cases pressure and heat render the addition of any glutinous matter unnecessary.

Cough Mixture.—The following is a very simple and useful remedy :—Take an ordinary white turnip, peel it, cut it in slices rather thin, lay on a dish, covering each slice with moist sugar : this will extract the oil from the turnip in about 3 hours. Take a teaspoonful when the cough is troublesome. I never knew this fail when taken in time.

Noble Ancestry.—Francis I. having asked Castelan, Bishop of Orleans, whether he was of noble extraction, "Sire," replied he, "Noah had three sons with him in the Ark ; I cannot say from which of them I am descended."

French Polish.—The article to be polished must be well cleansed and smooth, and if the grain of the wood is not close, you will have to give the wood one coat of boiled linseed oil, but it is not necessary. You must use wadding to apply the polish with, and use very little, rubbing it well in, the way of the grain; it will stand wet and all kinds of weather. Take 4 oz. rectified naphtha, 1 oz. gum shellac, ½ oz. oil of linseed. To polish different colors, use the following powders : for a mahogany stain, sandrach ; for black, lamp black. For other colors use different kinds of ochres.

Remedy for Burns.—It is not often that an inventor has such an implicit faith in his invention, or the nerve to demonstrate the fact, as Dr. Waters, of Salem, recently showed before the Massachusetts Dental Society. He stated that bi-carbonate of soda, such as is used for cooking purposes, or other alkali in neutral form, would afford instantaneous cessation of pain from the severest burns and scalds, and would cure such injuries in a few hours. Deliberately dipping a sponge into boiling water, the Doctor squeezed it over his right wrist, producing a severe scald around his arm, and some two inches in width. Then, despite the sufferings occasioned, he applied the scalding water to his wrist for half a minute. Bi-carbonate of soda was at once dusted over the surface, a wet cloth applied, and the pain, the experimenter stated, was almost instantly deadened, although the flesh on the wrist was literally cooked down to the sweat glands, and the wound was of a nature to be open and painful for a considerable time. On the day following the single application of soda the less injured portion was practically healed, only a slight discoloration of the flesh being perceptible. The severer wound, in a few days, with no other treatment than a wet cloth kept over it, showed every sign of rapid healing.

Improving Kerosene.—As a sediment chokes up the wick, it is injurious in kerosene, and if present should be removed by settling or filtration, and thus the oil improved. In regard to the explosive qualities, they will also be somewhat improved, as during the process of filtration, especially when performed in a draft of air, a certain amount of volatile and therefore dangerous constituents will be evaporated. But the evaporation may be just as well or better accomplished by placing the kerosene in a shallow vessel in the sunshine ; this is the way some distillers treat the kerosene, having large shallow tanks constructed for that purpose, covered with white muslin to keep out dust, and being exposed to sunlight, they claim that it also bleaches the oil.

The Longest Bridge in the World.—It is claimed by the English that last year they completed the longest bridge in the world, in their East Indian possessions. The building of it occupied four years. It consists of 64 spans of 142 feet each, thus 9,300 feet, or more than 1¾ miles long. It is all built of brick and iron ; the masonry amounts to 5,000,000 cubic feet, while the iron girders weigh 6,000 tons. The Philadelphians claim that in the Girard avenue bridge over the Skuylkill river, they possess the widest bridge in the world, it being 100 feet wide.

PHOTOGRAPHY IN DISEASE.

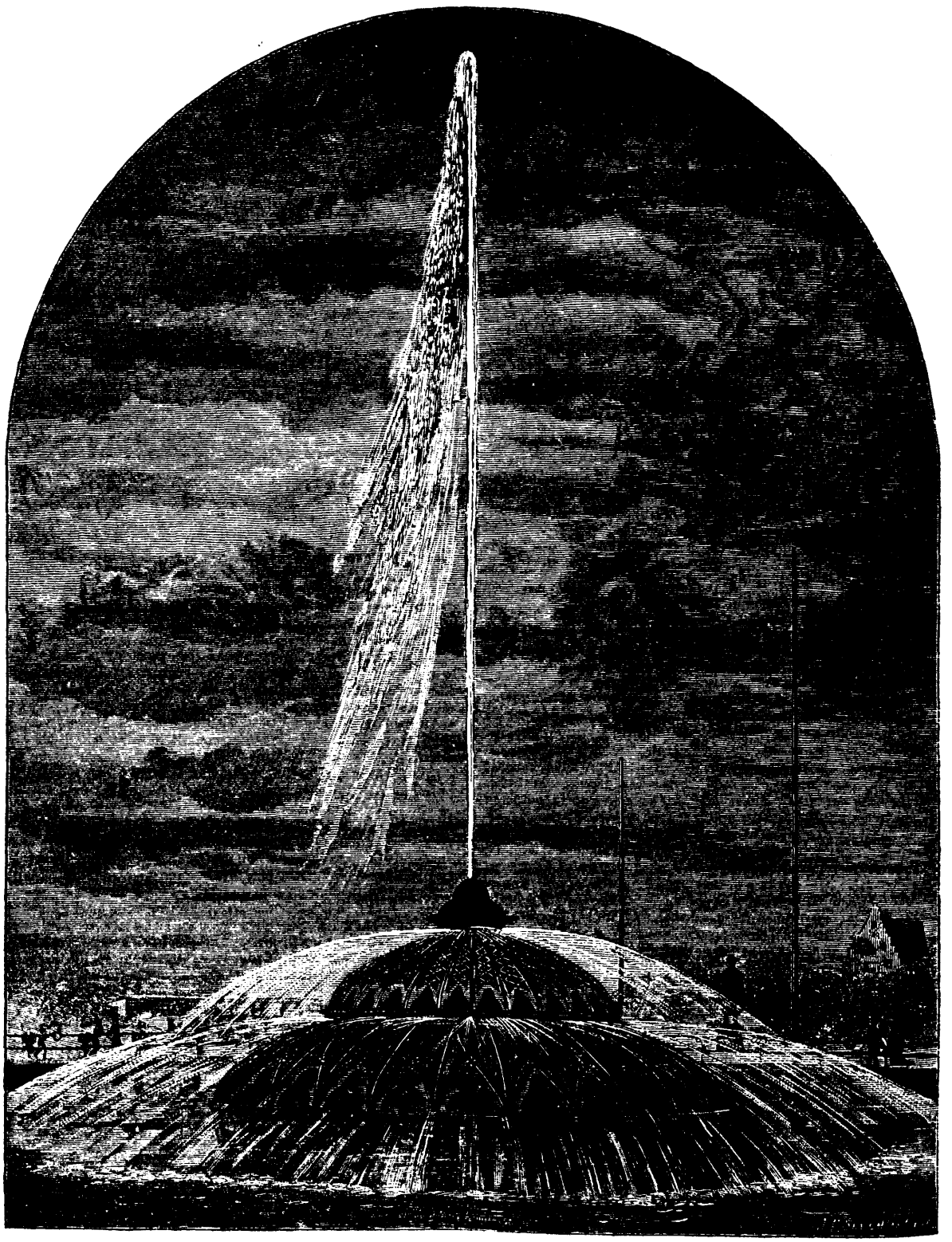
We have in photography an excellent means of determining the condition of the blood. According to its quality, the blood deposits more or less impure material in all the cellular tissues. Such deposits occur also in the sebaceous glands of the skin, which secrete a natural fat and deposit it in the mucus layer between the true skin and epidermis. Although the color of the mucus layer is visible through the epidermis, its finer shades are not seen in this manner, yet they appear in the photographic negative with such sharpness that the slightest impurities are here apparent as dark specks.

This phenomena is due to what may be called the photography of the invisible—that is, to that remarkable property of light by virtue of which the chemical action of color rays falling upon the plate varies with the rapidity of their transmission to it. It is interesting to observe the accuracy with which the condition of the skin is thus shown, varying as the shade upon the plate does, from the utmost delicacy and purity to a peculiar sieve-like character—that is, appearing as if punctured with innumerable little holes ; these in the worst cases being irregularly united, so as to present a more or less ragged and unsightly appearance. After a person has taken fat, beer, tobacco, and other like injurious substances into the system, even for a little time, the negative exhibits this punctured appearance ; while in the case of those whose manner of life is wholly corrupt, these defects are often magnified into such blotches as are seen upon the face itself in skin diseases. — *From Schlickeysen's "Fruit and Bread," translated by Dr. Holbrook.*

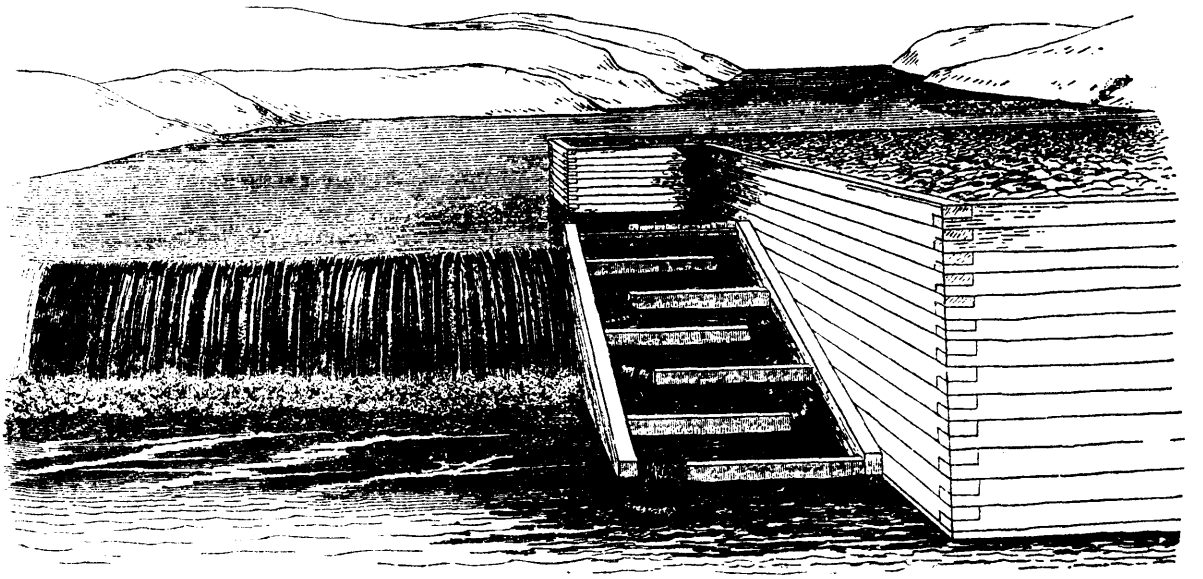
The Way Gold Changes Color.—It is well known, says the *Jeweler*, that the human body contains humors and acids, similar in action to, and having a like tendency towards, baser metals, as nitric and sulphuric acid have, viz., to tarnish and dissolve them, varying in quantity in different persons ; and of which theory we have abundant proof in the effects which the wearing of jewelry produces on different persons. Thousands wear continually, without any ill effect, the cheaper class of jewelry with brass ear-wires, whilst if others wore the same article for a few days, they would be troubled with sore ears ; or, in other words, the acids contained in the system would so act on the brass as to produce ill results. Instances have occurred in which articles of jewelry of any grade below 18 carat have been tarnished in a few days, merely from the above-named cause. True, these instances are not very frequent ; nevertheless it is as well to know them, and they are sufficient to prove that it is not in every case the fault of the goods not wearing well—as it is generally called —but the result of the particular constitution by which they are worn.

How Poisons are Spread. — G. Owen Ross, Consulting Physician to Gny's Hospital, London, has called public attention te some unexpected sources of arsenical poisoning. The green calico lining of bed curtains has been found to have produced, for months, severe symptoms, which were treated as those of natural disease, without benefit to the patients. When the curtains were removed the patients at once recovered their health. The beautiful pale-green muslin, largely used for ladies' dresses, has been found to contain not less than 60 grains of the arsenical compound known as Scheele's green in every square yard. He suggests that, in order to prevent much of the nausea, vomitting, headache, inflammation of the eyes, etc., from which so many suffer, there be a prohibition of the manufacture of such deleterious fabrics. Red, scarlet, and mauved-colored fabrics are not always free from arsenic. He held that the agitation of skirts in dancing discharge arsenical poison, which probably causes some of the pallor and languor almost always wholly attributed to ill-ventilated and crowded rooms and bad champagne.

Colored Borax Varnishes. — It is well known that an aqueous solution of borax is able to dissolve shellac, forming a kind of varnish, to which any desired color can be imparted by mixing with pigments. Major Dr. Kahl of Dresden has communicated to the Dresden branch of the Saxon Society of Engineers the results of a large series of experiments made with these varnishes. He reports that they are very cheap and dry very quickly, but they scale off from wood too easily. When this varnish is colored black with india ink and applied to paper, it possesses a fine gloss, but other colors, especially carmine, when mixed with this solution acquire an impure shade, and many pigments cement together in this solution, forming a hard and totally useless mass. The black shoe polish sold for ladies' boots is often made by adding some black pigment to this shellac solution. For bronze boots, rosanilin may be dissolved in any alcohol varnish.



FOUNTAIN BUILT OF BETON, AND ERECTED AT THE FLATBUSH ENTRANCE TO PROSPECT PARK, BROOKLYN, N.Y.



THE CONSTRUCTION OF FISH-WAYS.

Every State in the Union has, or should have, laws for the protection, preservation, and propagation of food-fishes. In no State where these laws have been enacted, commissioners of fisheries appointed, and appropriations made for stocking streams, have they been abandoned, after a fair trial, but encouraging reports come from all quarters.

The first and most important principle necessary to the success of fish-culture in any State, is to give the fish freedom to go to their natural spawning grounds, the head-waters of streams. Prevented from doing this by impassible dams or other obstructions thrown across streams, they become wasteful, and in time will disappear below as well as above the obstruction. It is as natural for fish to ascend a stream to deposit their spawn, as for birds to seek the tree-top, in which to rear their young. With these facts before us the importance of constructing dams which will permit fish to ascend the streams, is quite apparent. In this work of constructing fish-ways, the State of Kansas has not been behind. The late report of the Hon. D. B. Long, Commissioner of Fisheries, to the Kansas Board of Agriculture, is accompanied by a plan of fish-way, which we take pleasure in presenting to our readers.

A fish-way is but an artificial imitation of the means by which river fish pass up rapids, in their yearly migrations. The fish in their upward course reach the foot of the rapids; here they rest awhile, and then shoot up a slight distance, and again rest behind some rock, where they gather strength to make another leap and continue in this manner until the fall is passed.

To construct a fish-way, take a long box, fasten one end to the top of the dam, and extend the other end to the centre of the pool below the dam. Supposing the box to be sixteen feet long, four feet wide, and two feet high on the inside of the box, pieces of plank, called riffles, are placed transversely, about three feet apart, as shown in the engraving. Each riffle is about a foot high, and extends about two-thirds of the way across. If the first riffle is fastened to the right side of the box, and at right angle with the side of the box, the next, three feet above, will be fastened to the left side, and extend thirty inches across it, and so on alternately until the top is reached. The water entering the top of this box, is diverted from right to left in its course, forming eddies, or resting-places for the fish in their upward course. These ways can be constructed of stone as well as timber, being, of course, in the former case, more durable. As a general thing, millers, manufacturers, and men owning water-power are intelligent, progressive men, and when satisfied of the importance of the law requiring the construction of fish-ways, will, as soon as convinced that they will not interfere with their business, and will add much to the general good of the State, construct substantial fish-ways over their dams. Illustrating the necessity of fish-ways, we might mention, that after the construction of the Lawrence dam, fish in the Smoky Hill River and other streams above became very scarce, but after the dam was washed out in May last, fish at once became abundant in the Kaw and its tributaries above Lawrence.

Any mechanic can readily construct a fish-way by referring to the engraving herewith presented. Upon the construction of this aid, more than anything else, depends the success of fish-culture in all our States.

BETON STRUCTURES.

(See page 376.)

Several years ago in this journal we called attention to the excellence of a building material which has since that time slowly but surely been gaining in its well deserved reputation. We refer to the Beton Coignet, also called in France Beton Agloméré, an artificial stone, which, in its valuable properties, surpassed all the other artificial stones, as well in strength and hardness as in durability.

Its manufacture was first introduced into this country in 1869, by Mr. John C. Goodridge, Jr., who has been its only manufacturer here. After seven years of constant experiment, he has invented an improved method of manufacturing Beton, which makes a far stronger stone, and one that is entirely free from the unsightly checks and the efflorescence which would frequently appear in the best made artificial stones. This is accomplished by the removal of all the uncombined lime, clay, and the earthy impurities, as well as the alkaline salts from the cement.

By the Coignet method the highest crushing strength that could be obtained was about 7,000 pounds per square inch. By the Goodridge method a stone can be made that will carry, without crushing, a strain of over 14,000 pounds per square inch. The following list shows a comparison of building material as regards crushing strength. While the strongest granite tested by hydraulic pressure, stands 15,000 pounds per cubic inch; marble, 9,000; the best brick, 4,400; common brick, 2,000, and even less, this material stands a crushing strain of 12,000 per cubit inch. Granite and marble, when under great pressure, explode, flying into powder; Beton gradually crumbles, and gives due notice of the excessive strain. Beton is hardened by water and atmospheric changes, the process of silicatization and crystalization going constantly on.

We give, as an illustration of this class of work, the fountain built in 1873 by Mr. Goodridge on the Plaza at the Flatbush entrance to Prospect Park, Brooklyn. This fountain has a diameter of 113 feet.—*Manufacturer and Builder.*

SPOILING MIRRORS.

It is a fact worth knowing, but which does not seem generally understood, that the amalgam of tinfoil with mercury which is spread on glass plates to make looking-glasses, is very readily crystalized by actinic solar says. A mirror hung up where the sun can shine on it is usually spoiled; it takes a granulated appearance familiar to house-keepers, though they may not be acquainted with its cause. In such a state the article is nearly worthless; the continuity of its surface is destroyed, and it will not reflect outlines with any approach to precision. Care should therefore be exercised in hanging. If any of our readers have mirrors which appear to be spoiling, it would be well to ascertain whether the direct sunlight strikes them. If thus exposed, they can probably be saved from further injury by simply changing their position. The back as well as the front must be protected. A small glass hung in a window, where the rays strike it behind, is peculiarly exposed. The back should always be covered where the beams are likely to touch it.

The greatest danger to looking-glasses, however, is in transporting them. Very expensive ones have been seriously injured by careless handling when merely carried across a street. The men who move furniture are seldom fully aware of these possibilities, and need to be cautioned and watched. Frequently a man or boy may be seen in the street carrying a mirror in such a way that the full glare of noon-day strikes and injures it. Owners of such articles would, as a rule, be able to keep and use them much longer if they would exercise much caution in this regard. To re-silver a pier-glass often costs as much as one-fifth of the original price of the article; while the common glass is seldom worth re-silvering.

It is also well to avoid hanging a mirror near a stove or fireplace, where the heat radiated can reach it. If this precaution is neglected, granulation is likely to occur, even in a comparatively dark room, by the influence of warmth instead of light. A lamp or gas jet, if placed too close while burning, though it may not crack the glass, will often bring about the same injurious crystalization, and will even sometime cause the amalgam to melt and run off.—*Crockery and Glass Journal.*

A MOUNTAIN DISMEMBERED.

An interesting account of the recent falling of a mountain in Tarentaise, Savoy, causing disaster to two flourishing villages, has been communicated to the *Courrier des Alpes*, by Mr. Berard. The phenomenon has been incorrectly reported as instantaneous and the destructive effect complete; whereas the case is that of a mountain, which, for 20 days without cessation, has been dismembering itself, and literally falling night and day into the valley below, filling it with piled-up blocks and stones, extinguishing all sounds by its incessant thunder, and covering the distant horizon with a thick cloud of yellowish dust. The entire mass comprised in the slope forms a mutilated cone 200 meters broad at the top, and 600 at the base (the slope being about 50°). This is composed of blocks of hard schist, lying close together, but no longer united; and it is united to the body of the mountain only by a vertical mass 40 to 50 meters thick, which already is fissured and shaken. Periods of repose occur, lasting only a few seconds or a minute at most; then the movement recommences, and continues about 500 hours. Blocks of 40 cubic meters become displaced with no apparent cause, traverse the 1,800 meters of descent in 30 seconds, leaping 400 or 500 meters at a time, and finally get dashed to pieces in the bed of the torrent or launch their shattered fragments into the opposite forest, mowing down gigantic pines as if they were so many thistles. One such block was seen to strike a fine fir tree before reaching the bridge between the villages. The tree was not simply broken or overthrown, but was crushed to dust (*volatilisé*). Trunk and branches disappeared in the air like a burning match. Rocks are hurled together and broken into fragments, that are thrown across the valley like swallows in a whirlwind. Then follow showers of smaller fragments, and one hears the whistling sound of thousands of pebbles as they pass. Mr. Berard reached the edge of the rock (2,460 meters high) on one of the sides of the falling cone and ventured along it, obtaining a good view of the "terrifying" spectacle. He reaffirms his conviction that the phenomenon is inexplicable by any of the usual reasons that account for Alpine disturbances—such as penetration of water, or melting of snows, or inferior strata in motion; nor does the declivity of the slope explain it.

It is stated that the addition of from 10 to 12 per cent. of chloride of ammonium to melted zinc will give it a considerable increase of hardness.

HOW THE FRENCH WORKMAN LIVES.

The French laborer probably gets more for his wages than any other. His food is cheaper and more nourishing. His bouillon is the liquid essence of beef at a penny per bowl. His bread at the restaurant is thrown in without any charge, and is the best bread in the world. His hot coffee and milk is peddled about the streets in the morning at a sou per cup. It is coffee, not slops. His half bottle of claret is thrown in at a meal costing twelve cents. For a few cents he may enjoy an evening's amusement at one of the many minor theatres, with his coffee free. Sixpence pays for a nicely cushioned seat at the theatre. No gallery gods, no peanuts, pipe, smoke, drunkenness, yelling, or howling. The Jardin des Plantes, the vast galleries and museums of the Louvre, Hotel Cluny, palace of the Luxembourg and Versailles are free for him to enter. Art and science hold out to him their choicest treasures at small cost, or no cost at all. French economy and frugality do not mean that constant retrenchment and self-denial which would deprive life of everything which makes it worth living for. Economy in France, more than in any other country, means a utilization of what America throws away, but it does not mean a pinching process of reducing life to a barren existence of work and bread and water.—St. Louis *Republican.*

GLASS AND BARS FOR ROOF GLAZING.

We lately saw a defectively glazed glass roof under treatment toward restoring broken panes and stopping leaks. Counted by the acre, the surface of such glazing is enormous in American cities, and would be increased were the immunity from leakage and breakage nearly assured. The system of glazing used on the roof of the Royal Aquarium, London, is held up as a model of this sort of protection and convenience; it consists of a series of zinc bars of pot hook section, with a return bend, the bars being screwed on the purlins. The top is simply a pothook or hanger section, at the bottom of the same section reversed. The glass rests in the groove of the lower bars and back groove of the intermediate upper one, in which it has full vertical play. The panes of glass lap each other; and the theory is, that no water can find its way inside the building covered by a roof glazed on this principle. The advantages of this system appear to be the diminution of breakage of glass from vibration, and expansion and contraction and other causes due to rigid fixing in the ordinary system, and the facility with which glass can be fixed or a damaged pane removed and replaced. The grooves carrying off water from the inside as well as from the outside is of course another advantage, for unless the roof be a very flat angle, indeed, water will not leave the glass, but will run down into the outside groove. Condensed water and vapors are, therefore, thus well got rid of.

Belgian Patents' Rules.—The Belgian Government has issued new rules for the applicants for patents of invention, which came into force on the first of the present month. The following are the principal points of interest:—The specification must be written on paper measuring 34c. in height by 21c. to 22c. in width—14in. by 8$\frac{2}{5}$in. to 8in.—with a margin of 4c. to 5c.—1$\frac{3}{5}$in. to 2in.—and must terminate with a complete *résumé* of its contents, describing the principal features of the invention without the use of drawings. The drawings which accompany the specification are to be made on linen paper of the same size as the paper on which the specification is written. They must be drawn according to rule, on a given scale, with black ink, excepting those parts which particularly characterise the invention, and which should be in another colour.

Liquid Glue.—Three parts of glue, broken into small pieces, should be covered with eight parts of water, and left to stand for some hours. One-half of chlorhydric acid and three-fourths of sulphide of zinc must then be added, and the whole exposed to a temperature of from 81 to 80 deg. Cent. during ten or twelve hours. The compound thus obtained does not gelatinise. It only needs to be allowed to settle, and will be found a most useful agent for joining purposes.

Another.—If a decoction of ordinary glue be repeatedly melted, say ten or twelve times, it will, provided it be not too thick, no longer gelatinise on cooling. The same result may be obtained at once, by boiling the ordinary thick glue, with about six drops of nitric acid, to each ounce of glue. The acid may be afterwards neutralised by lime. But the glue is much weaker after this operation. The best liquid glue is made by dissolving shellac in wood spirit.

AGE OF THE SUN AND EARTH.

There has been a long dispute between physicists and mathematicians on the one hand and the geologists and biologists on the other, as to the age of the earth, or rather, since that is equally involved, the age of the sun. Dr. Croll, the distinguished Scotch geologist, has recently offered a theory which is not altogether new, but admits of some novel arguments, which may serve all parties to the dispute. Beginning with a review of the different theories as to the sun's heat, he rejects the combustion theory as totally inadequate, since if the sun were all a mass of burning coal, it would not last over 5,000 years; the chemical theory does not prolong the duration sufficiently; the meteoric theory will not serve; the only remaining explanation is the gravitation or consideration theory. This supposes that the materials of the solar system were originally a nebula, extending through a space many times greater than the orbit of Neptune. The falling together, the condensation of this amount of matter, it can be mathematically shown, would supply enough heat to keep the sun at its present temperature for 20,000,000 years. Unfortunately, that period is not sufficient for the geologist. He demands at least 100,000,000 years for the changes of the earth's surface, and would prefer twice that length of time. The arguments of the geologists are almost unanswerable; those of the biologist who believes in evolution tend to the same point so far as they go. Professor Croll says that there is a way out of this difficulty, by supposing that the nebula was not cold but hot. If you suppose it hot enough to start with, you will have heat enough to carry you through. Obviously it is just as easy to suppose a hot nebula as a cold one. But Professor Croll proposes to provide for this original heat. If the solar system had originally consisted of two masses, each of half the density of the whole, at some immeasurable distance apart, and they fell foul of each other owing to the mutual gravitation, they would strike with a speed of 274 miles per second. If their motion was stopped by the concussion, an amount of heat would be developed sufficient to convert the whole into a nebula that would take 50,000,000 years to cool. This is decidedly an improvement on the cold nebula. But this supposes that the component halves, before they started on their way to a collision, had no motion. Let us suppose they were moving beforehand at the rate of 202 miles per second, and that this speed was added to what they got by gravitating towards each other; then we get, when they struck, a nebula extending beyond Neptune, and with heat enough for a sun of 100,000,000 years' duration. If you insist upon 200,000,000, you must give the original masses a speed of 676 miles per second, beforehand. It will be objected that no such motion has been observed in space. Even the planets do not make such fast time; the earth, for instance, going only a thousand miles in a minute. The fixed stars whose motion has been ascertained travel very much slower. But Professor Croll says the fixed stars are those that have gone through the collision process, and have lost their motion. The new hypothesis goes behind the ordinary nebular theory in point of time, giving an explanation for the formation of the nebula. But it presupposes that there may be vast, cold, invisible masses of matter rushing through space with such velocity that their mere touch would convert our globe into red hot gases and distribute it through infinite space. The conception is not incompatible with the sudden flaming out of a new star and its conversion into a nebula, as seems to have been the case with the Schmidt star in Cygnus; but the facts in that remarkable case were probably not known to Prof. Croll at the time his essay was written.—*N. Y. Tribune.*

The Petroleum Industry in Russia.—The Russian capitalists who are working the petroleum wells are now laying down iron pipes from the wells to the Black Sea coast, where ships may be loaded by pneumatic pumps. It was recently reported that an American company had petitioned the government for a concession to work all the petroleum wells in Asiatic Russia. It was pointed out to the authorities, however, that the Americans are aware that Russian petroleum will enter into serious competition with American, and that this was an effort to paralyze the trade. —*Am. Manufacturer.*

Professor Barrf's Process for Preventing Corrosion of Iron is looked upon by the Warden of the Standards as likely to prevent the oxidation of standard weights made of iron. Prof. Barrf has undertaken to submit some specimens of iron weights to this process, and it is intended to place these weights in the hands of some local inspector of weights and measures, so that it may be ascertained whether iron standard weights thus protected could safely be used in place of the expensive bronze or brass standard weights at present used.—*Engineer*, xliv, 261.

Deceit and falsehood, whatever conveniences they may for a time promise or produce, are, in the sum of life, obstacles to happiness.

How to make a preparation to coat paper moulds so that a mixture of glue and molasses will not adhere to the paper.—Dip the moulds in melted paraffin, and when cold cover them uniformly with a thick oil.

Cement upon Iron or Stone.—A cement made of glycerine and litharge hardens rapidly, and makes a durable cement upon iron and stone. It is insoluble, and is not attacked by acids.—*American Builder*, xiii, 252.

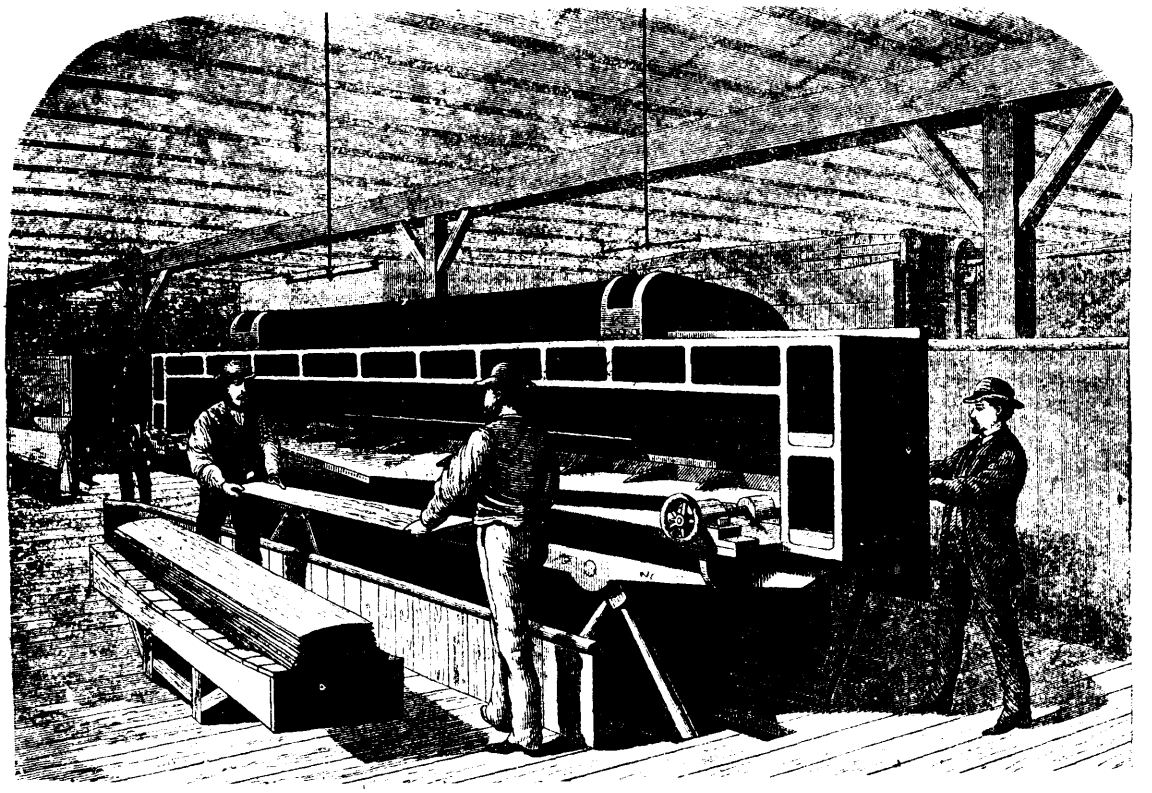
Putty used by Carriage Painters.—Take dry white lead and mix with 1 part brown Japan and 1 part carriage rubbing varnish. A common wagon putty is made by using whitening in the place of dry white lead and adding a small quantity of white lead in oil, from the keg. This putty should be kept in water when not in use, to prevent drying.

Saw-set for Ribbon Saws.—The Chemnitz tool factory, Chemnitz, Saxony, makes a mechanical saw-setter which acts as follows: On turning a hand-wheel motion is given to two levers, standing opposite each other and perpendicular to the saw, the steel point of one lever taking a tooth on the right side of the saw and the point of the second lever a tooth immediately in advance of the other, to the left. These two levers being lifted off, a third, acting parallel to the length of the saw, takes it a couple of teeth further on. This action is repeated on each revolution of the wheel and results in a very uniform setting of the teeth of the saw.

Bells.—The invention of bells is attributed to Polonius, Bishop of Nola, Campania, about the year 400. They were first introduced into churches as a defence against thunder and lightning; they were first put up in Croyland Abbey, Lincolnshire, in 945. In the eleventh century, and later, it was the custom to baptize them in the churches before they were used. The Curfew bell was established in 1078. It was rung at eight in the evening, when people were obliged to put out their fires and candles. The custom was abolished in 1100. Bellmen were appointed in London in 1556, to ring the bells at night, and cry out, "Take care of your fire and candle; be charitable to the poor, and pray for the dead."

Fish as Brain Food.—The belief that fish is specially adapted to feed the brain, and that fish-eaters are therefore more intellectual than the average, does not find much favor with Dr. Beard. He says that this "delusion is so utterly opposed to chemistry, to physiology, to history, and to common observation, that it is very naturally almost universally accepted by the American people. It was started," he adds, "by the late Professor Agassiz, who impulsively, and without previous consideration, apparently, as was his wont at times, made a statement to that effect before a committee on fisheries of the Massachusetts Legislature. The statement was so novel, so one-sided, and so untrue, that it spread like the blue-glass delusion, and has become the accepted creed of the nation.—*Popular Science Monthly*, lxvii, 127.

Various Practical Uses of Asbestos.—The uses to which asbestos can be employed are multiplying steadily; it is not only in the United States that this movement is going on, but also in many foreign countries. At the head of all stands Italy, which country making is now giant strides in the road of progress, practically as well as purely scientifically. Its practical industrial progress was lately shown in an interesting exposition of asbestos, which was recently held in Rome, the material being exhibited under all forms, from the crude state as mined to its highest industrial preparations. There were samples of thread made from the mineral which were stronger than the best English cotton; cloth, from coarse bagging to a fabric as fine as linen; paper for writing, printing, and sheathing building, and pasteboard. The asbestos paper is made at Tivoli, and costs about 40 cents per pound. It is especially useful for important documents which it is desired to preserve from fire. To test the fire-proof qualities of the pasteboard, a case made therefrom was filled with ordinary paper, another case of pasteboard, not containing asbestos, but otherwise exactly similar, was iikewise filled, and both were thrown into a fire. In the space of five minutes the unprepared pasteboard box and its contents were wholly consumed, while to that period the asbestos box remained uninjured. Much of the asbestos mined in Italy finds a market in the United States, where, thus far, only asbestos of short fiber, and unfit for spinning, has been found.



IMPROVED MACHINE FOR CUTTING BOARDS.

IMPORTANT IMPROVEMENT IN CUTTING BOARDS.

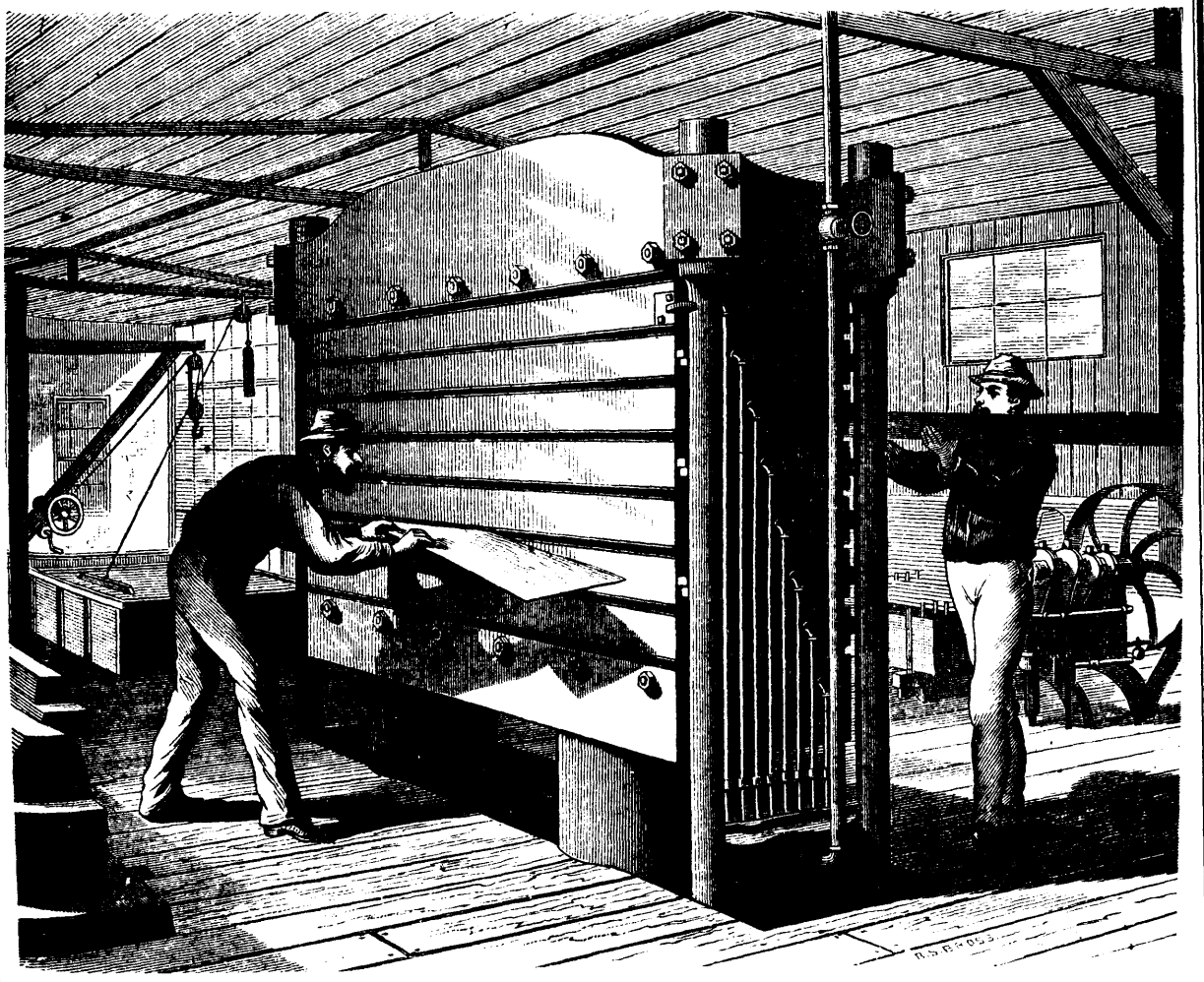
The old way of cutting veneer and other very thin boards, was the same as that of cutting heavy planks, namely, with the saw, and this of course required scraping or planing afterward. Later this was improved upon in the case of veneer-cutting, and a machine produced, which is now in general use, with which the veneer was cut by means of a large descending knife. These machines had the defect that the knife, as it worked by pressure only, tended to crush the fibers of the wood, and the sheets produced were often badly splintered. Then of course the machine was entirely unfit to cut boards any heavier than the mere thin veneer films.

Mr. H. T. Bartlett conceived the fortunate idea of making the knife movable also in a sideward direction, so as not to merely press downward, but also to obtain the sideward sliding motion, which we see any housewife apply when cutting bread. The old machine operated in the same manner as if we would cut bread by merely pressing the knife through the bread, and not cutting it; it was, in fact, not a cutting, but only a crushing motion. Mr. Bartlett's machine, the only one which really cuts the wood, and thus removes all danger of crushing the fibers, is represented in Fig. 1, as it appears in successful operation at the factory of Geo. W. Read & Co., 186 to 200 Lewis Street, New York. The drawing stroke of the knife is effected by a vertical and horizontal movement of the frame to which it is attached by means of a crank and radial pole, with their driving mechanism situated beneath the floor, entirely out of the way. Power is applied by a single 12-inch belt giving the main driving wheels 20 to 25 revolutions and cutting a corresponding number of boards per minute. There are several ingenious devices for holding the log, also an automatic feed during the operation of cutting, which possesses much merit. The machine is constructed to cut logs square or rounds 8 feet 4 inches long, 28 inches thick and 36 inches wide.

The variable drawing motion of 16 to 40 inches of the knife enables the machine to accommodate itself to all the variations in the texture of the material. There is no dead point during the cut, which is continuous, so that the work is done with comparatively little friction, and with economy of power. Another valuable feature in the machine is the adjustability of the cutting table to any height so as to bring narrow logs into the first or longest part of the drawing stroke. With three men to attend the machine and one or two to prepare logs, the machine, running 10 hours per day, produces 280,000 feet of veneer. But it is not only veneer it can produce; it was found that this drawing motion of the knife enabled the machine to cut also boards of $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, and $\frac{7}{8}$ of inch in thickness, while the most remarkable and beautiful result is that the boards come out smooth, and need no planing, while the cutting makes no sawdust—an enormous saving of material, as nothing is lost, which is a most important feature, especially when cutting expensive woods.

When we visited the factory of Messrs. Read & Co., mahogany was being cut for segar-boxes, which at once came out as smooth as if planed, the surface being firm and unbroken.

POPULATION OF THE WORLD.—The number of persons on earth is 1,423,917,000, or 28 persons for every square mile. Europe numbers 309,178,300 souls; Asia, 824,548,500; Africa, 199,921,600; Australia, 4,748,600; America, 85,519,800. The combined population of 1876 exceed those of 1875 about 20 millions. The inhabitants of various States of Europe are divided as follows: Germany, 42,723,000; Austria-Hungary, 37,700,000; Switzerland, 2,669,147; Holland, 3,809,527; Belgium, 5,336,634; Luxemburg, 205,153; Russia, 71,730,980; Sweden, 4,383,291; Norway, 1,802,882; Denmark, 1,903,000; France, 28,102,921; Great Britain, 35,450,000; Spain, 16,551,647; Portugal, 4,298,881; Italy, 27,472,174; Monaco, 5,741; the Republic of Andorra, 12,000; Turkey, in Europe, 8,500,000; Roumania, 5,073,000; Servia, 1,377,078; Montenegro, 190,000; Greece, 1,457,894. The population of Turkey in Europe, Asia and Africa reaches 47,600,000, of whom 20,500,000 are divided between Egypt, Tripoli and Tunis, and 13,000,000 in Asia. The population of Russia is estimated at 86,586,000, or 900,000 over the population of 1875. The population of the British Indies numbers 289,000,000, that of China, 405,000,000, and that of Japan, 33,299,012. London has 3,488,428 souls; Paris, 1,851,792; New York and Brooklyn, 1,535,622; Berlin, 1,045,000.



STEAM LUMBER-SEASONING PRESS.

We herewith present an illustration and description of a machine which belongs to the class of those calculated to work revolutions in the manufactures to which they belong. It is a machine in the use of which the dry kiln is obviated, and by means of which thin lumber of all kinds can be thoroughly seasoned in from two to twenty minutes. The ordinary mode of air drying is expensive at best, and after accomplished, often leaves the timber warped or checked. By this system space for air drying becomes unnecessary, and green lumber can be seasoned and used in the manufacture of furniture within a few hours after coming from the press.

The new steam drying press, which accomplishes this work, consists of a series of steam-heated chambers; the steam being introduced by a pipe at one end of each chamber, and passing out at the other; thus keeping up a constant circulation of hot steam. Valves are arranged to govern the entrance and exit of the steam as may be desired, as also a trap to receive the condensation. The chambers are so adjusted that when separated, apertures are left between each, of an inch or more, for the insertion of the lumbor to be seasoned. After placing the boards the chambers are forced together, either by hydraulic or steam-power. The heat of the chambers vaporizes the sap in the wood, which passes off through vents or channels in the opposing face of each chamber, or through perforations in the faces of the lining plates leading to grooves or channels in the sides.

The rapid action of the machine may be judged by the fact that a cedar board 11¾ inches wide, ¾ inch thick, after being placed in the press for five minutes, was found to have shrunk ¼ of an inch in width, and to have lost one and one-half pounds in weight. The same principle is applied to curved plates, and in this manner lumber may be shaped and seasoned in one operation. The remarkable saving of time over the old method is too plain to need further comment.

This press is the invention of Phillip Bfeffer, and is certainly one of the highest importance to the wood-working trade. Further information concerning the machine may be obtained of Messrs. Geo. W. Read & Co., 186 to 200 Lewis Street, foot of 5th to 6th Streets, East River, New York City, to whom all inquiries should be addressed.

DESSICATING EGGS.—The egg traffic of this country has risen to an importance which few comprehend. The aggregate transactions in New York City alone must amount to fully $8,000,000 per annum, and in the United States to $18,000,000, the perishable nature of eggs has naturally detracted from their value as a standard article of diet. The peculiar excellence of eggs depends on their freshness. But lately the process of dessicating has been resorted to, and by this process the natural egg is converted into a vitreous substance of a delicate amber tint, in which form it is reduced seven-eighths in bulk compared with barreled eggs, and retains its properties for years unimpaired in any climate. In this form, eggs may be transported without injury, either to the Equator or to the Poles, and at any time can be restored to their original condition, by simply adding the water which has been artificially taken away. The chief egg dessicating companies are in St. Louis and New York. No salts or other extraneous matters are introduced in the process of dessicating, the product being simply a consolidated mixture of the yolk and albumen. Immense quantities of eggs are prepared in the spring of the year by liming. Thus treated, they are good for every purpose except boiling. It is a common fraud for some dealers to palm off eggs so treated as fresh, so that imposition is easily practised. In the dessicating process, however, the difference becomes apparent, as from four to five more limed eggs are required to make a pound of eggs dessicated than when fresh are used.—*Druggist's Circular.*

PAINTING ON GLASS AND PORCELAIN.

One of the most important materials used for painting on glass and porcelain is manganese, a substance rarely seen in its matallic state; but its oxids are largely employed in the arts, especially for decorating porcelain and staining glass. At Sèvres it is used in the composition of violets and blacks, and replaces advantageously the oxid of cobalt, and with the oxid of iron it is used for obtaining fine browns. This oxid is now more extensively used in pottery than before. The native oxid of maganese is sometimes combined with the oxid of lead as a glaze for the purpose of imparting a peculiar brown to many descriptions of porcelain. It is advisable to employ the oxid of maganese prepared as recently as possible from its solution in hydrochloric acid by precipitation with ammonia or potash dissolved in a large quantity of water. The precipitate, which is the dentoxid of maganese, is well washed, and being dried, carefully calcined. The salts of maganese appear not to be available to the artist in oil or water colors. In glass manufacture the peroxid of maganese forms a very important substance, it is largely used in the making of flint, crown, and plate glass, the principal use being to prevent the peroxidation of the iron which enters into the composition, and thus to preserve the whiteness of the glass. If the quantity employed slightly exceeds that which is necessary to prevent the peroxidation of the iron, or if the glass has been exposed to long-continued or too great a heat, it assumes a fine pink or rose-color. Indeed where glass contains an excess of maganese, although it may preserve its desired whiteness, it will, under the influence of sunshine, slowly change, as observed in the windows of old mansions; and it is not an uncommon occurrence that a ship proceeding to a tropical climate with white glass in her cabin windows, returns home with glass of a fine rose tint. Common cast flint glass is often distinguished by this peculiar color, produced by excess of oxid of manganese.

The colors used for painting glass, porcelain, and earthenware are all metallic proparations; they do not afford any shades for the palette of the artist, unless under some peculiar circumstance; still the enamel-painter uses all those colors as well as the potter. It should be remembered that all these metallic oxids, used either for glass or porcelain, or for the higher art of the enamel-painter, are mixed with silicious matter, with which, in the heat of the furnace, they combine and form a hard glass.

We will now give some formulas for the composition of colors with several metals:

Ruby Red.—6 cwt. of batch (the technical name for the mixture used for making flint-glass) with about 4 ounces of oxid of gold.

Amethyst, or Purple.—6 cwt. of batch with 20 pounds of manganese.

Common Orange.—6 cwt. of batch with 12 pounds of iron ore and 4 pounds of manganese.

Gold Topaz Color.—6 cwt. of batch with 3 pounds of oxid of uranium.

TAKING IMPRESSIONS OF LEAVES, &c.

The following item is now being copied in the newspapers: "Mr. Bertot, of the Paris Academy of Science, has just made known a simple method of taking impressions of plants, requiring only a large sheet of paper, some olive or other oil, black lead, ashes and resin (or colophony.) The paper is first lightly oiled on one side, then folded in four thicknesses so that the oil may filter through the pores, and the plant may not come into direct contact with the liquid. The plant is placed between the leaves of the second folding, and in this condition pressed (through other paper) all over with the hand, so as to make a small quantity of oil adhere to its surface. Then it is taken out and placed carefully on white paper; another sheet is placed over it (since two impressions can be taken), and the plant is pressed as before. On removing it an invisible image remains on the paper. By sprinkling over this a quantity of black lead or ashes, and distributing it in all directions, as in applying sand to writing, the image then appears in all its parts. With an assortment of colors, the natural colors of plants may be reproduced. To obtain fixity, resin is added to the black lead (previously) in equal quantity; the impression is fixed by exposure to a heat sufficient to melt the resin."

This is only a variation of an old device, which appears to us superior because much simpler. Rub a thin and even layer of thick oil-paint on the surface of a sheet of paper, so that when touching it with the finger it will leave a colored spot on the finger, then lay the leaf on this paper, lay another paper over it, and rub over the surface; then the color will adhere to all the projections of the leaf, and the leaf can be used to print from by simply placing it on a sheet of clean white paper, placing another clean paper over it, and rubbing again, taking care not to allow it to slide sideways; the paper will then show a perfect impression of the leaf, and be its perfect image in case a proper shade of green is used. It is clear that any color can be employed, and in order to prevent the first mentioned paper from drying too rapidly, some castor-oil may be mixed with the paint, then the same paper may be used for charging the leaves with color for several days or weeks.

CONSIDERABLE interest has been manifested by the people of Canada as to who would get the furnishing of the Windsor Hotel in Montreal, the largest hotel in the Dominion. We copied from the Toronto *Mail* in our issue of Nov. 10th, that the whole of the contract was awarded to the Bowmanville Co. We now insert another item from the same paper which will speak for itself. The New York firm referred to, we believe, is Pottier & Stymus.

"It may be of no great interest to the general public to be informed who the parties are that have contracted for the furnishing of the Windsor Hotel, Montreal; but as so many misstatements have already been made on the subject, you will probably think it no more than right that these falsehoods should be exposed. I regret to say that the lion's share of the entire contract has been handed over to the Yankees, notwithstanding the often repeated declarations of the Syndicate that everything that could be made in the country, in the shape of furniture, would be of Canadian workmanship. The result is, however, that a good deal more than half is contracted for by a New York firm, only forty sets of bedroom furniture by the Bowmanville Furniture Company, and all the bedding and all the mantel mirrors, and about one hundred and thirty sets of bedroom furniture by R. Hay & Co., of Toronto. The latter firm, I believe, tendered for the entire furnishings, and it is stated that theirs was the lowest tender, but on account of the delay in leasing the hotel it was found that no one establishment was able to complete it in time to enable the lessee to open for business by the first of February 1878. Yours, &c., PROTECTION."

Another Canadian correspondent says:—

"The contracts for furnishing the Windsor Hotel have been awarded as follows: Barry & Campbell, Montreal, all the carpeting. Pottier & Stymus, New York, the two main floors, which includes the parlors, dining room, ladies' ordinary, and the suits of rooms, amounting to about thirty thousand dollars. The Upper Canada Furniture Company of Bowmanville, Ontario, all the rooms on the next floor amounting to eight thousand dollars. The three remaining floors to R. Hay & Co., of Toronto. The bedding contract has not been decided yet. The gasaliers and fittings to Mitchell, Vance & Co., and Archer, Paucet & Co., of New York. The house has been leased by Mr. James Worthington, contractor, who has engaged Mr. Henry Southgate as manager.

LEMONADE.—It is not in vain that nature has given us a taste for lemon juice, and that some persons have often a craving for it; this indicates a want of the system. Ships going on long voyages now take lemon juice on board as the best antidote against scurvy, that dread of the mariner, and the result of the privation of vegetable food or fruit, for which lemon juice is a general substitute.

We notice an item of the effectiveness of lemon juice to another form of impurity of blood, of which carbuncle is a symptom and an outlet of the same time. Dr. Gibbons, having been a sufferer from carbuncle, relates his own case, in which lemon juice (for which he felt a desire) seemed to have a most beneficial effect. Wine, whiskey, tonics, and all the usual remedies gave him no relief, and did not help digestion. As soon as he took lemon juice digestion improved, as well as the local symptoms; and the effect was such that he intends to treat his patients in the same way. We have found in other diseases lemon juice a most grateful remedy, especially where (as Dr. Gibbons mentions in his own case) there is a desire for acid drinks and vegetables.

RECIPE FOR MAKING HARD SOAP.—7 lbs. common yellow soap, 4 lbs. sal soda, 1 oz. hartshorn, 2 oz. borax, ¼ lb. rosin, to be dissolved in 22 quarts water, and boiled about 20 minutes. It hardens sufficient on cooling to be cut in bars, but after a short time it becomes greasy, with particles of soda appearing in it. Use a larger proportion of sal soda and boil with the rosin and borax some time before adding the soap. It should be kept in a dry place for a time after cutting.

MISCELLANEA.

BREAKAGE OF GLASS.—Will one of "ours" say why glass plates, &c., break without pressure or without being touched? They really explode and split in the middle and crack in several directions!—GLASS.

ACCORDING to new experiments by Munchhausen, of Moscow, the specific heat of water taken at unity at 32 deg. is at 212 deg. Fah. 1·0302, as against 1·013 found by Régnault, and 1·11 de-2 termined by Jamin.

L. AND N. W. ENGINES.—Would some one give the dimensions of the L. and N. W. engines—"Courier," "Caithness," "Leviathan," "Monarch," and "Greyhound," or of others of the same description?—TAMERLANE.

THE official report from the Royal Observatory, Greenwich, shows that the greatest pressure of wind during the heavy gale which prevailed last Sunday night was recorded at 25 minutes past 11, when it was 32·6 lb. on the square foot.

THE bakers and pastry cooks of Paris using brick ovens, have been forbidden to burn in their ovens wood which has been painted or impregnated with any metallic salt, as it is believed that the articles of food may be rendered deleterious through the agency of the same.

A GOOD PLASTIC MATERIAL.—Five parts of sifted whiting mixed with a solution of one part glue, together with a little Venice turpentine to obviate the brittleness, makes a good plastic material, which may be kneaded into figures of any desired shape. It should be kept warm while being worked. It becomes as hard as stone when dry.

BY tbe use of circular oblique theophores, with a special clockwork for each, E. Requier has succeeded in making an electric lamp which will operate for twenty-four hours. He thinks that the instantaneous obedience of the automatic theophore to its solenoid will enable him to devide a sufficiently intense electric current so as to supply a large number of his lamps.

THE removal of tin from copper vessels coated therewith can be easily accomplished, according to Professor Bottger, by immersing the vessel in a concentrated solution of sesqui-chloride of lime. In a very few moments the tin is removed from the copper, and nothing remains to be done but scour the latter with moistened sand and dilute hydrochloric acid to obtain a perfectly clean surface.

AT a recent meeting of the French Academy of Sciences, M. Duplessis called attention to the infection of grain through the agency of floods in water courses. A case was noted of a field of rye which became partially infected with smut, owing to a river having overflowed its banks and covered a field further up stream, which was already infected. The flood has been the means of communicating the disease or fungus.

RELAXED BOWELS.—I often find diet recommended such as brown bread, &c., to prevent constipation and its attendants, as if all the danger lay in that direction. I shall be glad if one of "ours" will help me on the other side of the question, and recommend diet suitable for one who is naturally relaxed. I tried many things, but the only thing that has done good service for any length of time is Guinness's stout: this has always been effectual. Will some one explain how it is that stout has served such a purpose?—DIET.

MOLDS FOR PLASTER CASTING.—Make a good stiff glue, and add to it its own weight of treacle. If, as sometimes happens, this is too sticky, add more water, and less treacle; if too hard add more water only. Oil the mold before pouring in the plaster. About 2oz. of rosin to 1lb. of beeswax is ample. What are you casting your caps with, wax or metal? If the former, allow the mold to stand in water (not reaching to the surface of the mold) until you see the face is damp. I never knew of metals adhering to plaster. If you are casting with gelatine from plaster molds oil the molds lightly.

USE OF THE TELEPHONE.—During a recent visite to Cleveland, says the *American Manufacturer*, we found the telephone in use in a number of offices, and conversation being carried on between them and their manufactories at distances varying from one to seven miles, this, too, in an ordinary voice, with no particular effort except for distinct pronunciation. The Cleveland Paper Company has fairly domesticated this new discovery in their offices in connection with their different mills. It is also in use by the Standard Oil Company, Union Iron Works, Cleveland Transfer Company, Cleveland Iron Company, Leader Printing Company, Rhodes & Co., and other firms, while orders are being filled as fast as it is found convenient to the work.

WOOD PRESERVATIVE.—A new cheap coating for wood, which is very adherent even when exposed to the weather, consists in simply brushing the surface with a solution of persulphate of iron of 2° to 2½° Beaume. The blue-grey tint which this acquires on drying changes to an agreeable brown when linseed oil varnish is applied.

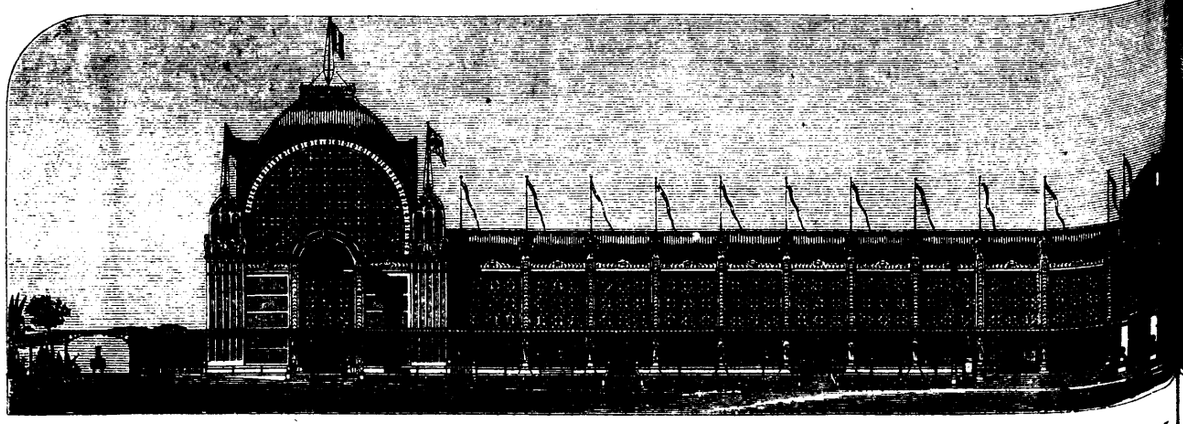
RECLAMATION OF THE ZUYDER ZEE.—Active preparations are going on for the commencement of the long-projected work of draining the Zuyder Zee. A dam nearly 25 miles long is to be carried across the gulf, and upon this pumping machines of 10,000 horse-power are to be placed, capable of discharging 6,500,000 cubic meters of water daily from the inclosed sea. It is estimated that the work will occupy 16 years, and that it will cost 335,000,000 francs. The scheme, if completed, will form one of the greatest engineering feats of the world.—*Engineering News.*

LEMONADE.—Loaf sugar 2lb., tartaric acid ½oz., essence of lemon 30 drops; essence of almonds, 20 drops. Dissolve the tartaric acid in two pints of hot water, add the sugar, and lastly the lemon and almond; stir well, cover with a cloth, and leave until cold; put two tablespoonfuls into a tumbler, and fill up with cold water. This drink, it is said, will be found much more refreshing and more palatable than either ginger-beer or lemonade, and costs only 30 cents for ten pints. The addition of a very little bicarbonate of potash to each tumblerful just before drinking will give a wholesome effervescing drink.

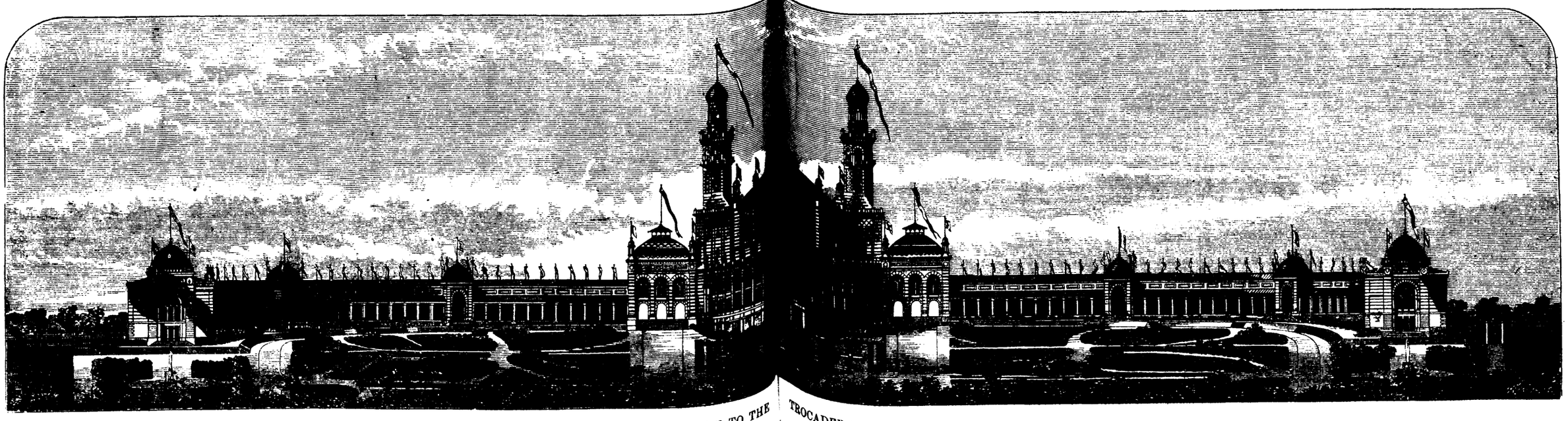
ENGLISH ROADS.—The English, at all events, says a letter-writer, know how to make roads. Their wood pavements are magnificent. London has set the fashion of wood, and Liverpool is beginning to follow it; but there are no pavements in the States to touch these wooden roads of England. They are laid on foundations which in some cases have been solidifying since the days of the Romans. On these foundations they lay macadam and cement several feet deep, and then come blocks of pine, laid with mosaic-like accuracy. There is a piece of wood pavement of this kind in Oxford street, London, which has not been repaired for over two years, and it looks as substantial and perfect as when it was first laid down. The average price of this kind of pavement is about $4 per square yard, and the companies keep it in order for two years without charge, and then guarantee it for 15 years at an annual charge of 25 cents per square yard for maintenance, which enables the pavers to relay the road, if necessary, after eight or ten years.

PRESERVATION OF FOOD IN TINS.—The following extract from the "Report on Food Preservation," prepared by order of the Council of the Society of Arts, and to be found in the journal of the Society for 1873, may be of service to "Dr. S. !"—"We now come to the fourth process of preserving mentioned—viz., the expulsion of atmospheric air. This is effected by the application of heat to the substances to be preserved when placed in tins or other receptacles. Without entering into a scientific controversy as to whether the true theory of this process of preservation by applied heat may not be that the 'microscopic germs' which are alleged to cause putrefaction are destroyed, we shall take it for granted that the oxygen gas is entirely expelled by the heat, not only from the receptacle itself, but also from the substance placed within it. That this is the case may be deduced from the fact that the tins containing the preserved food show a concave depression on top and bottom, and some even collapsed sides—an evidence that a perfect vacuum has been obtained, as is also the audible rush of external air into the tins when the opening knife is first inserted. The breakages also of earthenware and glass jars, the former of which were formerly extensively used in this process, tend to establish the same conclusion. But, however this may be, it really matters not. It is certain that the preservation of both animal and vegetable substances in a cooked state by this process is perfect, the only objection being that, in the majority of instances, an over-cooking seems almost inevitable or unavoidable. The process may be thus briefly described:—The meat, fish, poultry, or vegetables are put into tins of various sizes and then placed in 'baths,' which are raised to a temperature considerably above that of boiling water by having chloride of calcium dissolved in them. A small orifice is left in the upper cover of the tin to permit the escape of steam, air, &c., or being hermetically closed, they are entirely immersed in the baths, being let down into them by means of iron frames or 'gridirons' supported and lowered or raised by cranes. In some cases only common salt is added to the water in the baths instead of calcium chloride: or, lastly, steam ovens may be employed. But the object and the result are in all these cases the same."

THE PARIS UNIVERSAL EXHIBITION OF 1878.



ENTRANCE TO THE MAIN VESTIBULE OF EXHIBITION BUILDINGS.



FACADE TO THE TROCADERO PALACE.

We regret that our limited space will not allow us to supply a description of these partitions of the building, but it would not be of particular importance to the generality of our readers. The illustrations, however, will give an idea of the general appearance of the building and its magnitude, particularly to those who saw the Centennial Exhibition Buildings last year.

European Production of Coal Tar.—The statistics of Great Britain show that the annual production of coal-tar in that country is 130,000 tons, in Belgium 10,000 tons, and in France 35,000, of which Paris alone produces 25,000 tons. In regard to the value of this incidental product, it must be stated that before the invention of the manufactory of aniline colors from coal tar, it was worth from $1.20 to $2 per ton, but at present in France it is worth about ten times that amount, so that a substance formerly an incidental product of little value, has become so valuable as to be now a considerable item in the economy of gas manufacture.

How to Etch on Steel.—The clean plate must be covered with an even film of wax, either applied while the plate is uniformly heated, or dissolved in alcohol and flowed on the warm plate. The etching fluid may be made as follows: Pyroligneous acid, 4 ozs., alcohol 1 oz., nitric acid 1 oz.; by measure. Or use iodine 1 oz., iron filings ½ drachm, water 4 ozs. The lines are cut through the wax with a fine steel point, so as to leave the metal surface bare under the lines. The etching fluid is then poured on, and removed as soon as the metal is sufficiently etched.

Marine Glue.—Dissolve 1 lb. best caoutchouc (gum rubber) in 4 gallons of pure gas naphtha, with frequent agitation. After ten or twelve days add 2½ lbs. of shellac, in finest powder, and allow to stand for about a week in a well stoppered flask. The mixture must then be carefully heated in an iron vessel having a discharge pipe at the bottom, and, when the whole has become liquid, drawn out upon large metal slabs to cool. When required for use it should be heated to 258° Fah. (best in an oil bath), and applied with a brush. It forms, when properly prepared, one of the strongest and most insoluble cements known.

NOTES AND MEMORANDA.

TWELVE thousand sewing machine needles are made daily at the Domestic Needle Works, Middleboro, Mass. Fifteen thousand per month are sent to Australia.

THE American Knife Company, of Thomaston, Conn., which was burned out last spring, has completed probably the finest building of its kind in the United States. It is three stories high, including the basement grinding room, and one hundred and three feet by twenty-six.

BLACK FINISH FOR BRASS.—Make a strong solution of nitrate of silver in one dish and nitrate of copper. Mix the two together and plunge the brass into it. Now heat the brass evenly until the required degree of dead blackness is obtained. This is the method used by French instrument makers to produce the beautiful dead black color so much admired in optical instruments.—*American Manufacturer.*

THE EFFECTS OF CLIMATE.—The ease with which some ready writers can spin theories is curiously illustrated in a recent article in *Reform*, a journal published at Hamburg, in which the effect of climate on the people of the United States is discussed. The theory assumes that we are beginning in this country to resemble the North American Indians. The assumption is first made that our people are chiefly of English descent. Our skins have become dry. Our glandular system has shrunk to a minimum. Our necks are long; our heads small. Our cheek bones project. Our eye cavities are deep. Our under-jaws are full. In all these particulars we are approximating the Indian. Furthermore, the Englishman is heavily bearded, the American lightly, the Indian not at all. Our hair is straightening. Our extremities are lengthening, so that American gloves have to be made with long, slender fingers. But this is not all. The change extends to our manners and customs; for instance, the Lynch law of the border and the polygamy of Utah show the proclivity toward the ways of the aborigines. Even the negroes here, we are told, are yielding to the climate, and are bleaching gradually. What a pity it is that the Indian chiefs failed to hear of all this, when they were recently at Washington. Instead of hoping to be civilized as white men are, they have only to wait and we shall become as they.—*N. Y. Tribune.*

USES OF WATER GLASS.—The uses of silicate of soda are more and more extending, notwithstanding that the business of its manufacture is still in its infancy. The greatest demand is for soap making. It is better than the addition of resin, and its alkalinity adds to the cleansing power. It retains water, keeps the soap from shrinking, and prevents great loss of weight. It can scarcely be called an adulteration. It is used as paint, and mixes with all mineral colors; there are even now factories which make paints of mixtures of oil-paints and water-glass. It makes the paint more durable, and gives it a gloss-like varnish. It is also indispensable as a mordant for calico-print works, and at present, therefore, extensively used as such. It makes an excellent fire-proof cement for stove and iron foundries, especially in putting up iron fronts for buildings. It is the main ingredient in several methods of making artificial stone. For instance, in the Ransome process, which in England consumes thousands of tons yearly, it makes an excellent adhesive mucilage, and is used in a cheap mixture to mend china, glass and wood. Being perfectly fire-proof, it will give its quality to wood or paper when this has been soaked in it; and being when dry also water and damp-proof, it is the best coating for brick vaults, and thus very valuable for beer brewers, sugar refiners, &c. These are not all the praiseworthy qualities of this valuable material.—*Polytechnic Review.*

THE SPONGE FISHERIES. — Returns of the sponge fisheries belonging to Greece show that there are at present 150 boats engaged in this trade, 40 of which have English diving-bells. Twenty-four of these boats belong to the Island of Ægina, and the remainder to the islands of Kalymnos and Simi. Each of the boats, which are supplied with diving-bells, has a crew from 11 to 150; the others are manned by only four sailors, so that the total number of men engaged in fisheries may be put at about 1,000. They took last year more than 240 tons of sponges of different qualities, the total value being $360,000. Sponges of the finest quality are sold upon the spot at from $3.12 to $3.18 a pound, and the second qualities for rather less than $1.50. The fishermen have to pay a tax of 10 per cent. on the gross value of their takes. The cost of a diving apparatus is $1,067, or $24,680 for the forty now in use, and each vessel makes four vogages a year, taking about a ton of fine sponges. The divers remain under the water about six hours a day when they are fishing, and it is said that many of them die of suffocation, and that a great many of them lose their hearing after a few years of this work. The island of Ægina, whose divers are very renowned, is building nine new boats, which will be launched very shortly, and it is stated that the annual profits of the sponge fisheries were nearly $145,500 for that island alone.—*N. Y. Grocer.*

THE ABUSE OF SAWS.—Makers are annoyed by having saws returned to them for repair in such a condition that it is impossible they should go through the wood, from the miserable way in which they have been filed and set—some jammed all to pieces, some not half filed, some not filed true on the face or back, while others are all shapes but the right one in the throat, leaving no chamber room for dust and chips. Some saws have a bad pitch, some no pitch at all; some out of round; some with irregular or long and short teeth, one up and one down. In many cases they are returned broken. Why? Each tooth of a 24-inch circular saw goes through the wood 2,000 times per minute, 120,000 per hour, 1,200,000 times per day, and if not sharp, the saw is strained at she root of the tooth. This frequently not only closes the set, but must eventually break the saw, for although steel is strong, continual straining will make it tender, and it must break. The tooth becomes dull on the side or under the point in proportion to the amount of feed; thus, if the tooth takes one-eighth of an inch hold at each revolution, it will become dull for one-eight inch below the point, or more if feed be greater. A diamond will not cut if dull; why should a saw? A few minutes' filing two or three times a day will save tenfold the amount of time and labor expended in running an imperfect, dull saw, also making a saving in the amount of power consumed, and a heavy percentage in the amount and quality of lumber cut. It is a mistaken idea that there is a saving by not taking time to sharpen a saw.—*N. W. Lumberman.*

THE MANUFACTURE OF MOSAICS.—The modern process of making mosaics now commonly followed at Rome is this: A plate, generally of metal, of the required size is first surrounded by a margin rising about three-quarters of an inch from the surface. A mastic cement, composed of powdered stone, lime and linseed oil, is then spread over as a coating, perhaps a quarter of an inch in thickness. When set, this is again covered with plaster of Paris rising to a level with the margin, upon which is traced a very careful outline of the picture to be copied, and just so much as will admit of the insertion of the small pieces of smalto or glass is removed from time to time with a fine chisel. The workman then selects from the trays, in which are kept thousands of varieties of color, a piece of the tint which he wants, and carefully brings it to the necessary shape. The piece is then moistened with a little cement and bedded in its proper situation, the process being repeated until the picture is finished, when the whole, being ground down to an even face and polished becomes an imperishable work of art. The process is the same for making the small mosaics so much employed at the present day for boxes, covers or articles of jewelry, and this work is sometimes upon almost a miscroscopic scale.

The Florentine mosaic, which is chiefly used for the decorations or altars and tombs, or for cabinets, tops of tables, coffers and the like, is composed of precious materials in small slices or veneers, and by taking advantage of the natural tints and shades which characterize the marble, the agate or the jasper, very admirable effects may be produced in imitation of fruit, flowers or ornaments. The use of this kind of mosaic is extremely restricted, on account of the great value and expense not only of the materials, but of the labor which is spent upon them. None but the hardest stones are used; every separate piece must be backed by thicker slices of slate or marble to obtain additional strength, and every minute portion must be ground until it exactly corresponds with the pattern previously cut.—*Jeweler.*

THE BORAX DEPOSITS OF THE UNITED STATES.—The principal borax deposits in the United States form a kind of band in the ancient volcanic soil which surrounds the Sierra Nevada mountains, and some slight reference to these deposits may not improperly be made since borax is a valuable element in glass-making and the ceramic arts, from the fact that it posseses the property, at a high temperature, of dissolving the metallic oxides and forming transparent glass, the color of which depends upon the metal used. It is also largely employed in the manufacture of enamels, glazings for earthenware and strass. In the large glass and porcelain factories of Europe its utilization has only been limited by the high cost of the product, chiefly obtained in Italy; but the discovery of the immense borax deposits in this country has materially removed this restriction, so that at the present time its employment is rapidly extending, and the export of the salts bids fair to become a very important branch of our commerce.

Some interesting information relative to the mode of working the borax deposits of California and Nevada is given in a report recently made by Mr. Emil Durand, who has had several years' experience in the extraction of the material, to the French Society for the Encouragement of National Industry. A thin steel shovel with a sharp edge for cutting the herbage is used for collecting the salt, which is taken in carts to a platform placed above large wooden vats capable of containing some 3,500 gal. These vessels are filled with water, heated to boiling by the injection of steam. The borax is thrown in by shovelsful until the barometer marks 23° B. This concentration would be too great if only borax were put in, but the impurities (sulphate of soda and rock salt) added, besides the mud and borate of lime in suspension, greatly augment the density. When the above degree is reached the solution is allowed to rest, the herbage which floats on the surface is skimmed off, and the liquid is carried off by long India-rubber tubes into the crystalizing vessels. The latter are large tanks 9 feet 6 inches in length, about 6 feet high and 39 inches wide. The liquid cools slowly to a temperature of 78 °, occupying about 10 days in so doing. A faucet at the lower end of the tank is then opened, and the mother liquor, mud and large borax crystals which are formed by aggregations of small crystals are removed. The crystals are washed with the mother liquor in another vessel, by agitating them to a rake in a long trough filled with water. They are afterward kept for refining. At the bottom of the crystalizing vat is found a deposit of borax, sometimes six inches in thickness, which is broken up with the pickaxe. The salt is then left to dry on the platforms for four or five days, and finally is packed in coffee sacks, the bag filled weighing 165 pounds.

The cost per pound in San Francisco is about 8½ cents. The monthly production of borax in California and Nevada is estimated at 200 tons.

INK WHICH COSTS NOTHING.

We read in the Cumberland *Alleganian* that the water from the ruins above Cumberland is impregnated with sulphate of iron, the result of the oxidation of sulphuret of iron in the coal, and flows into Will's Creek. The report goes on to say: "The creek is now very low and but a very small body of water flows down its bed. At the head of the city are two extensive tanneries, and in the tanning of hides large quantities of tannic and gallic acids are poured into the stream. As soon as these acids come in contact with the sulphate of iron the water becomes black, as is now the case in front of our city. There are millions of gallons of ink now lying in the bed of the creek, which needs but bottling and packing to make a salable article for exportation."

We may add to this that the appearance of iron sulphate in springs near coal mines is very common. We noticed several such cases near Mauch Chunk; the least trace of tannic or gallic acids will color the water black.

In this connection we may mention an interesting and instructive lecture-room experiment which we used to give to classes in chemistry, in order to show how the reaction of these substances can be used as a test. A little dust from a paved city street, where horses with iron shoes and carriages with iron wheels are continually passing—for instance, dust of Broadway, New York, or from a street much used for railroad traffic, such as the Bowery, must contain considerable iron. Some of this dust is placed in a test tube and a few drops of nitric acid added, then water, after which it is allowed to settle. Next dust is taken that collects on the floor of a ball-room after a ball has taken place; this dust is mostly the result of the wearing out of the shoe soles, which necessarily must contain, with the leather ingredients, tannin, which transforms gelatin into leather. If now some of the solution of the Broadway dust is added to the ball-room dust, an ink will be formed, showing what the prevailing ingredients are in these two kinds of dust.

Restoring Faded Writing.—Brush it over with a solution of ammonium sulphid.

An Idea in Refrigeration.—Housekeepers who are troubled with moisture in their refrigerators will be glad to learn how it may be prevented. Fresh unslacked lime, in small quantities, say a quart, placed in a refrigerator, will gradually absorb all the moisture in the provision chamber. The consequence will be a dry cold atmospere, in which meat and other articles sensitive to the presence of moisture can be kept sweet for a long time. A little experience will soon enable one to know when to renew the lime and how much to use at a time.

SCIENTIFIC ITEMS.

In the neighborhood of Baku, Transcaucasia, there seems to be an almost endless supply of naphtha. In many cases, naphtha fountains rise in summer 100 ft., and the liquid mostly flows away unutilized, as these large quantities cannot be collected. In the year 1874 there were at Baku 180 works in action, many of the smaller of which, however, have been stopped under the pressure of competition of the American petroleum. With better means of transport the Baku petroleum could readily compete with the American product. The largest manufactories are at Surakh Khana, where the gases, streaming from the earth, are used as fuel.—*English Mechanic.*

Fifty samples of wall-paper recently examined were found to contain arsenic either as arsenic or aceto arsenite of copper. Some papers with green figures were found to be free from arsenic, while, as a rule, the higher-priced qualities contained the poison in the largest quantities. A room of the moderate dimensions of 16 ft. square and 9 ft. high would be covered, if these papers were used, with "ornamental" surfaces containing from 52 grains to more than 8 oz. of poisonous matter.—*English Mechanic.*

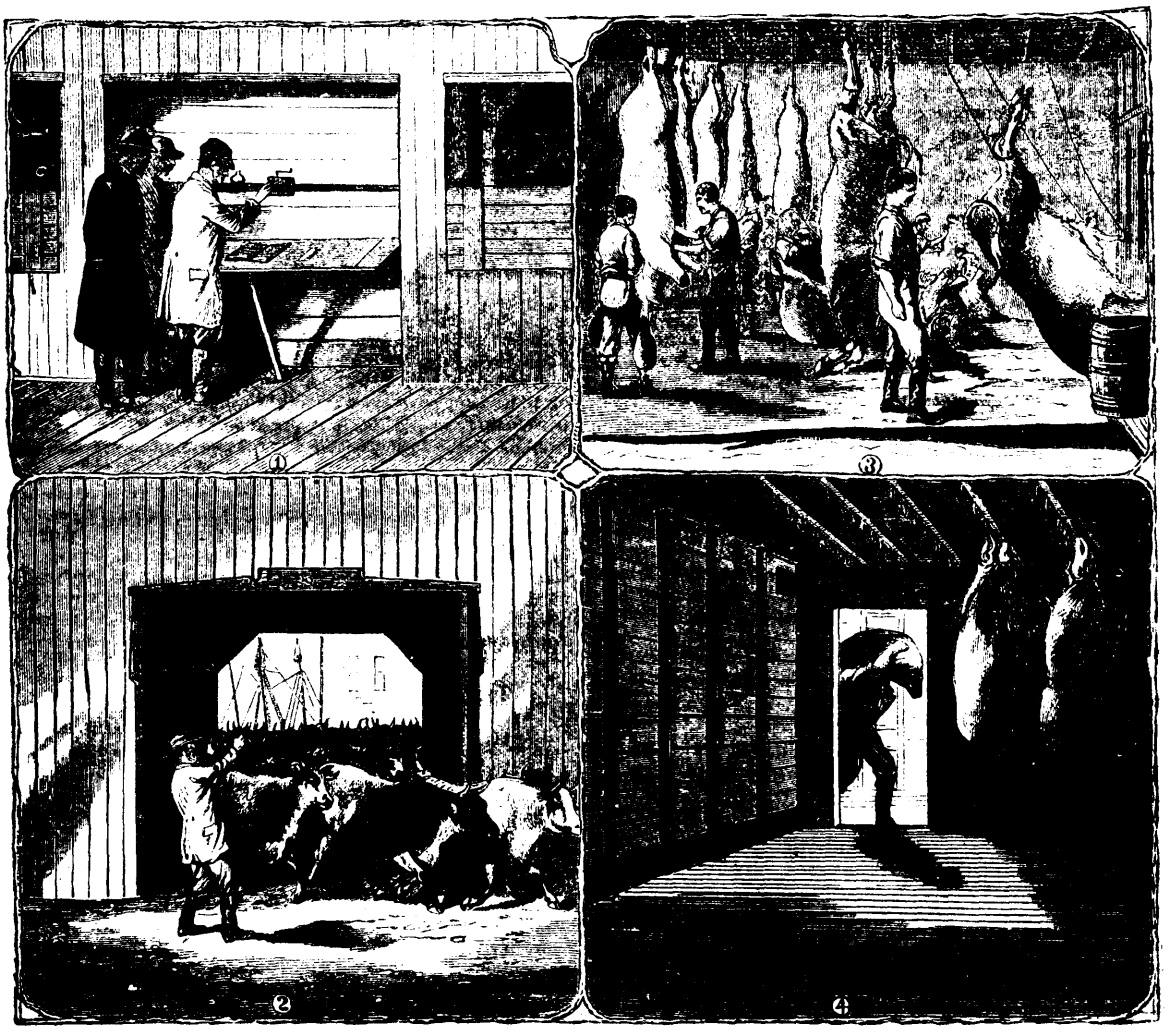
A New Use for Old Corks.—A patent recently issued in France gives the following process for manufacturing cork pasteboard: "Ground cork is thoroughly incorporated in paper pulp by means of mixing-machines and very powerful presses. The board so formed has all the water pressed out and is dried like common paper. Old bottle corks, sole-clippings, and cork in other forms can thus be utilized. The paste-board is springy, light, a poor conductor of heat and sound, as well as possessing other properties given it by the cork."—*Boston Journal of Chemistry.*

Pedestrian Training.—Last month a pedestrian namep Smyth, and appearing under the name of "The American Postman," achevted the task of walking three hundred miles in six days, at Dublin. His regimen during the walk was as follows: He takes a small chop and some cocoa for breakfast. In two hours afterward a raw egg beaten up. His dinner consists of a sago pudding and a small quantity of very raw beef, without drink, and his supper of as much cocoa and bread and butter as he wishes. Each day he is allowed a quart of milk and occasional sips of ginger ale. He takes no alcoholic beverage whatever. —*Medical and Surgical Reporter.*

Wire Rolling Extraordinary in Warrington.—The Pearson and Knowles Coal and Iron Company have of late turned special attention to the rolling of exceptionally long lengths of wire rods for fencing and other purposes, and with this object have adopted Mr. J. J. Beckley's patent four-high wire mill, the results obtained from which, both in length of rods and amount of work turned out, are, we believe, quite without precedent. Last week, in two shifts, of ten hours each, the extraordinary quantity of 40 tons 9 cwt. 2 qrs. of No. 4 finished puddled wire rods were rolled in this mill, the individual rod ranging in weight from 45 lb. to 70 lb. each; and the average production of the mill during the whole week was 18 tons 2 cwt. 2 qrs. of No. 4 iron per shift of ten hours. One distinguishing advantage obtained in this mill is that in consequence of the arrangement of the rolls, only one-half the number of men usually employed in a wire mill is required.—*Warrington Guardian.*

Note on Phosphor Bronze.—We read in a report of the English Polytechnic Society's fair, that the Phosphor Bronze Company obtained a first silver medal for a large collection of exhibits illustrating the various uses to which this invaluable alloy can be and is put. Our readers are aware that phosphor bronze is a compound of tin, copper and phosphorus in certain proportions, according to the special work required. Among the exhibits were several bearings that had been in constant use for long periods without appreciable injury, and a plunger that had been in operation 572 days without giving any evidence that it had been in work at all. Few better illustrations of the wear-resisting properties of phosphor bronze could have been afforded.

A New Use for Old Hoop-Skirts.—As hoop-skirts have suddenly gone out of fashion, manufacturers have on hand immense quantities of crinoline steel which they do not know what to do with. Berthold, of Dresden, Germany, has found that brushes made from this material preserve their sharpness longer than wire brushes, or even coarse files, and are the very best tool to remove slag and iron oxid from iron castings, which are often incrusted when removed from the mold. The usual way of removing them was with the file, but the crinoline steel has proved superior, and its use is now being introduced all over Germany.



THE FOREIGN MEAT TRADE.

We have frequently referred to this new business of exporting beef and mutton, which promises to have a most important influence on our system of agriculture. That our readers may have some idea how this business is carried on, we have prepared the accompanying engravings, to illustrate the methods of preparing the meat. In figure 1 is shown the scales where the cattle are weighed, not singly, but in a drove of 40 or 50 at once. This scale has a capacity of 100,000 lbs., which is equal to the weight of 50 head of 2,000 lbs. each. None but the best cattle are taken for this trade, and most of them will go over 1,500 lbs. each. When weighed, the drove is taken to the slaughter pens, as shown in figure 2, and when there are very rapidly reduced to beef. The method of preparing the carcasses is shown at figure 3. A steer is hitched by the hind legs to a rope, and is instantly hoisted out of the pen on to the dressing floor, where it is killed, skinned, and halved. The sides of beef are moved to a cool room, to hang for a few hours, and the quarters are then sown up in canvass bags, after which they are removed to the steamship, and hung up in the refrigerator (see fig. 4). The refrigerator (fig. 5) is an air-tight compartment, lined with non conducting felt; in the center of it is an ice-house, seen in the engraving. A current of air is drawn into the ice-house by means of a fan, operated by a steam engine. The air, cooled by passing through the ice, is forced out at the bottom of the ice-chamber, through ventilators (seen in figure 4), and after making the circuit of the room, and cooling the meat, the air-current is drawn out through a door at the upper part of the room (also seen in figure 4), and is again forced through the ice, and then again through the meat-room. Whatever moisture is gathered by the air from the meat, is condensed in the pipes which pass through the ice, and escapes along with the waste water from the ice through the drain, shown in the plan, fig. 5. In this way the air is cooled, dried, and purified, and the meat, kept in the most perfect condition, reaches its destination in far better order than it frequently appears in at the shops in this country. The favor with which this exported meat—mutton as well as beef—is received in England, is a guarantee that the business will increase as long as we can produce the cattle and sheep at the price at which they now sell in the market. It is very certain that the prices of beef would decline rapidly here, if it were not that the surplus is thus exported; as so many as 2,000 head of heavy cattle, taken from our markets in a week, must necessarily have a tendency to lower prices, if they were all to be sold here on an overstocked market. This fact, and that there is a profit now in the business, would show that the trade is likely to continue and increase.

A SIMPLE test for the presence of free acid in machine oils, so the *Montan Zeitung* for September informs us, consists in pouring the oil to be tested over a layer of cuprous oxide contained in a glass. (The ash of the coppersmith answers the purpose, since it contains this oxide.) If the oil contains either free, fatty or resinous acid, the same will attack the oxide and color the oil green in a very short time. Slightly heated accelerates the action, which manifests itself in less than half an hour. This test is said to be very delicate and more satisfactory than any hasty test heretofore devised.

HOW TO MAKE SIZING FOR WALLS. — Size to make paper stick to walls is made by adding 8 ozs. of dissolved glue to a pail full of hot water. Apply the preparation to the wall with a whitewash brush. Be particular to touch every part of the wall, especially the top and bottom. Allow the size to dry a little, and hang the paper with paste as usual.

FIG. 1.

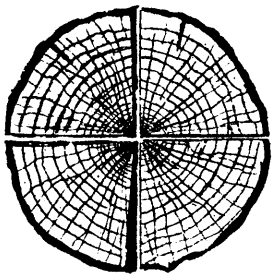


FIG. 2.

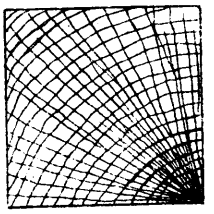


FIG. 3.

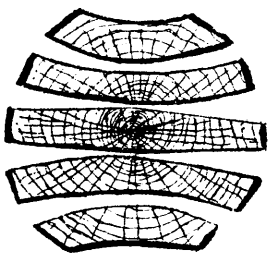


FIG. 4.

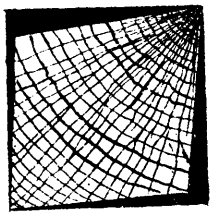


FIG. 5.

FIG. 6.

HOW WOOD SHRINKS.

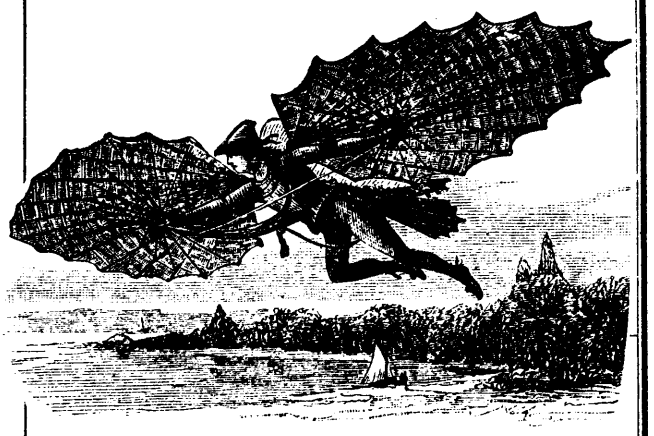
Lengthwise shrinking of timber is very slight, but that transversely is much greater and more peculiar. Our constructive woods, as oak, pine, &c., are built up of fibrous tubes, ranged in irregular circular layers, bound together by radial plates or rays which the carpenter calls the "silver grain" and the botanist the medulary rays. The effect of seasoning depends on these radial plates, because the fibers cannot shrink laterally without tearing them apart, and hence the timber is split lengthwise in radial plates, and the log maintains its full diameter. If the whole mass of tubular fiber were to contract bodily, the "plates" would be crushed and the wood ruined.

Sawing an oak tree lengthwise, into quarters, before it has commenced to split and contract, the straight sides of each quarter would be equal, and at right angles, or "square," to each other, the angle being diminished by the portion shown in black in Fig. 1, and the rays being brought closer together.

If we saw the trunk by six cuts into seven planks, each will behave differently.

We show five of them in Fig. 2. The center plank retains the original thickness in the middle, because the rays resist the thrust; and gets thinner at the edges, because there the rays are parallel with the thrust and hence do not oppose the shrinkage The breadth of this plank is not lessened because shrinkage in that direction is opposed by the rays as braces.

The planks at each side of the centre retain their original thickness in the middle; become a little narrower especially on the outside face, and hence bend from the heart side. The next two are no thinner in the centre, and not much thinner at the edges, but are greatly convex on the heart side, and concave on the outer face.



SIGNOR IGNAZIO'S "FLYING MAN."

If one of these planks were cut into prisms when green, the shape of each of these prisms would depend upon what part of the tree it came from. A square from near the outside (Fig. 3) would contract as in Fig. 4: not shrinking in the radial lines, but contracting partly in a direction perpendicular to them. The end grain will show from what part of the log a plank is cut; thus Fig. 5 shows one from the outside; and we must expect it to shrink in *width*; Fig. 6 shows one from the centre, and it must be expected to get thinner and curved, as shown by the black portions.

In very soft wood these medullary plates or rays are not so strong as to entirely resist crushing, and hence the law is not so strongly carried out, as with the hard wood.

If a mast or spar is formed of the round log it will remain round; if made of a quartering it will become oval.

SIGNOR IGNAZIO'S "FLYING MAN."

Signor Capretti Ignazio, of Milan, has recently added to the list of avatars with which attempts have been made to navigate the air, an apparatus which he designates the "Flying Man." Like his predecessors, he has chosen the wings and tail of a bird as models for his machine. Each wing is composed of sixteen pieces of cane, which are connected by sets of movable fans. The tail resembles the section of an umbrella. The canes in the wings are adjusted to a shell working on a universal joint, which in turn is attached to a framework that is strapped to the body. At the furthest stretch of the arm is a band ring, to which are bound sticks of cane connected to the larger ones on which the fan moves. There is also strapped upon the back of the wearer a large folded bag, which, by a simple movement, can be converted into a sort of parachute in case any portion of the flying gear gets out of order. By the arrangement of a large number of movable fans, the operator is relieved of a great amount of resistance which it would be natural to suppose the air would offer; and the entire apparatus is said to be readily manipulated by a cool-headed adventurer.—*Scientific American.*

STONE SAWING WITH SHOT.—There would seem to be no question as to the superiority of iron shot as a substitute for stone sawing. It is found, in fact, that marble may be cut from three to four times as fast by this means, with the same saws, taking about one-half the power in proportion to the quantity sawed, all the power consumed in uselessly crushing the sand being saved. A blade a quarter of an inch thick is found to be worn away an inch in cutting 48 inches deep in granite, or 250 inches deep in marble. The mud from washing is run into catch pits, and the fine particles of iron thus saved are used for smoothing granite, cutting faster and lasting longer that emery. Hard, sharp sand, in being ground to finest mud, will, it is found, wear away about its own weight of glass; course-grained emery, about twice its weight; iron shot, passed through a No. 70 sieve, will wear away fifty times its weight of glass. It is necessary, however, that all journals and rubbing surfaces of the machinery be carefully protected from the shot, as they cut and tear far worse than sand.—*Jeweler.*

THE LARGEST SAURIAN.

Professor O. C. Marsh has recently received a collection of reptilian remains from the crustaceous deposits of Colorado, among which he has found portions of an enormous dinosaur which he states is larger than any land animal hitherto discovered. The dinosaurs were a tribe of immense saurians, having many mammalian characters, such as a medullary cavity in the long bones, short pachyderm like feet, a sacrum of five united vertebræ, and a lateral motion of the lower jaw. They include the iguanodon, megalosaurus, &c., herbivorous and carnivorous. The alligator belongs to the same order. The reptile discovered by Professor Marsh probably measured from 50 to 60 feet in length. It was herbivorous and seems quite distinct from any species hitherto described. The name *Titanosaurus montanus* has been applied to it.

THE lustre of morocco leather is restored by varnishing with white of egg.

DOUBLE SCREW.—At a recent English exhibition, a novel form of arrangement of the dual engine was shown by Mr. Somerset Mackenzie. Great increase of power is obtained in screw-propellers by using two screws rotating in opposite directions, one taking the water of the other. By the use of hollow shaft and double engines this can very easily be accomplished, but Mr. Mackenzie has discovered how to do it with one cylinder—that is, he gets two reverse rotating motions from the action of one cylinder and piston. How this is managed it is not very easy to explain without the aid of diagrams, but we may state that while one shaft is driven by an ordinary crank the other is driven by a kind of slotted crank, with its head passing round the other shaft as it rotates. This is the arrangement in the vertical engine; that of the horizontal, which is about to be put in a boat recently constructed, is somewhat modified but the same in principle.

LOCKING MINER'S LAMPS.—A very simple and at the same time effective method of locking miner's lamps has been adopted at the Atherton collieries, near Manchester, England. The ordinary locks and keys, which are so easily tampered with, are entirely discarded, and a soft metal bolt supplies their place. Before the lamps are given out from the office each top is secured down by one of these bolts, which, after being pushed through a slot, is flattened and stamped at both ends by means of a machine constructed for the purpose. Once fastened in this manner the lamp cannot be opened without destroying the bolt, which is only extracted when the lamp is again brought up from the mine, and the impressed stamp at either end effectually prevents any other than the one issued from the office being placed in its stead.

WRITING ON GLASS.—A writer to the *English Mechanic* says: Suppose you wish to write some letters in gold on a window, go outside, sketch off your letters with soap or chalk on the outside of glass; that done, take a pinch isinglass between your finger and thumb and dissolve it in a cupful of water; wet the inside of your glass opposite your sketched letter with this, and apply gold leaf with gilder's "tip" immediately; allow the inside of window to get thoroughly dry. The time this takes will depend on the surrounding condition, but it must be dry. Now you make a correct "pounce" of the letters on a piece of paper and hold this steadily against the gold that you roughly laid on the glass, while with some powdered chalk in a small muslin bag you gently beat the paper on the pounced holes. Remove paper, and you have the outline of your letter in chalk on the gold. Point them neatly in with japan gold size and white lead; allow to dry, th n with clean cold water wash off your surplus gold leaf.

WAX POLISHING.—There is no particular art in wax-polishing floors, &c., the principal requirement being plenty of elbow-grease and a go d hard brush. The floor, after being well scrubbed should be allowed to dry. When dry it was painted over with a large, soft whitewash brush dipped in oak stain. This was allowed to dry in 24 hours. The floor was then gone over with thin size, and this was in turn allowed to dry in 24 hours. After this the floor was painted over with a kind of varnish made by dissolving beeswax in spirits of turpentine, the proportions being about a pound of wax to two quarts of turps. The wax was shredded, placed along with the turps in a stone bottle, and the whole placed on the hob and frequently shaken. When this varnish had soaked well in, the whole surface was polished with a rather hard brush until a good surface was obtained. Special brushes, adapted to polishing waxed floors, are sold by oilmen.

TRY TO STOP COUGHING.

A gentleman called upon us recently, says *Hall's Journal of Health*, who actually escaped from the fangs of consumption some years ago; and we are induced to present the circumstances: "You speak of coughing continually. Let me suggest to you the query whether this is not unnecessary and injurious? I have long been satisfied, from experience and observation, that much of the coughing which precedes and attends consumption is voluntary. Several years ago I boarded with a man who was in the incipient stages of consumption. I slept in a chamber over his bedroom, and was obliged to hear him cough continually and distressingly. I endured the annoyance, night after night, till it led me to reflect whether something could not be done to stop it. I watched the sound which the man made, and observed that he evidently made a voluntary effort to cough. After this I made experiments on myself, and found that I could prevent myself from coughing, sneezing, gaping, &c., in case of the strongest propensity to these acts, by a strenuous effort of the will. Then I reflected that coughing must be very irritating and injurious to the delicate organs that are concerned in it, especially when they are in a diseased state. What can be worse for ulcered bronchia, or lungs, than the violent wrenching of a cough? It must be worse than speaking. A sore on any part of the body, if constantly kept open by violent usage, or made raw again by a contusion just when it is healing (and of course begins to itch), will grow worse, and end in death. Certainly, then, a sore on the lungs may be expected to terminate fatally if it is constantly irritated, and never suffered to heal; and this, it seems to me, is just what coughing does for it. On the strength of such considerations as these, I made bold to ask the man if he could not stop coughing. He answered no. I told him what I thought about it, as above. He agreed to make a trial; and, on doing so, he found, to his surprise, that he could suppress his cough almost entirely. The power of the will over it increased as he exercised it, and in a few days he was mostly rid of the disposition to cough. His health, at the time, evidently improved, and when I last saw him, he was in strong hopes of getting out of death's hands."

A PHILADELPHIA firm has six orders on hand for engines and boilers to be shipped to various cities in Germany. They have also received enquiries from Sweden.

HOW TO SOFTEN RESIN.—Melt the resin, and while in a state of fusion add tar. The proper degree of hardness can be ascertained by dropping a small portion of the melted mass into water.

A LEADING house in Sheffield ordered of an American firm in one lot, about two months since, 22,000 dozen of hickory and ash shovel and other kinds of tool handles. These have since been made and shipped, and have arrived at their destination.

THE opening meeting of the Edinburgh and Leith Engineers' Society for the present session, was held a few evenings since, under the presidency of Mr. Robert C. Reid, C.E., when Mr. David N. Westland, C.E., delivered the inaugural address on "A Practical View of Civil Engineering."

THE deepest pit in South Staffordshire, it is worthy to note, is that of the Walsall Wood Colliery Company, who have just completed the sinking of a 15ft. shaft, and, at a depth of 545 yards, have passed into the valuable deep coal of the Cannock Chase district. The aggregate thickness of the several seams passed through is 40ft.

DESTRUCTION OF PHYLLOXERA.—A French and Swiss commission has made experiments with anhydrous sulphurous oxide under the supervision of Prof. Raoul Pictet, of Geneva, and we are informed found extraordinary results. Those who have seen boiling water instantly frozen or fire extinguished in a second by this remarkable agent will not be surprised to learn that it has been found to annihilate the enemy of the grape.

UPWARDS of 250,000 pistols have been made at Norwich, Connecticut, this year, and orders are increasing, compelling the works to run day and night. The Bridgeport cartridge works make some 700,000 cartridges a day. They have supplied Russia with 40,000,000, Turkey with 70,000,000, and have just got an order for 80,000,000 from Italy. The Russian and Turkish inspecting officers have been working side by side in the factory. The Turkish Government are now building a cartridge manufactory upon their own soil, the machinery for which is now being made at the Pacific Ironworks, in Bridgeport, Connecticut.

A CRUEL FLOWER.—THE BLADDER-FLOWER.

(See page 384.)

Every now and then an old plant turns up as new, as is the case with the Bladder-flower, which we had not seen for twenty-five years or more, but last year one or two florists offered it, and we now see that several have it in their catalogues. Firstly, as to its name: it is in the catalogues, and some books, as *Physianthus*, from the Greek words meaning *bladder* and *flower*, and as the plant has not, so far as we can learn, an English name, and as the majority will like it all the better if it has one, we translate the generic name. But here comes the trouble that botanists no longer call it *Physianthus*, because before it received that name, some one else had given it another, and as the oldest published name must be followed, it is properly *Arauja*, which is the name by which it is called by the savages in its South American home. It is often a great bother to fit a plant with an English name, and we cannot see why *Arauja* is not good enough, but as the majority think differently, we comply with their wishes when possible. The plant is a climber from Brazil, which has leaves and flowers of the shape shown in the engraving, the leaves being of a whitish-green or light sage color, and the flowers, which are hardly sufficiently bladder-like to warrant the name referred to, are white and fragrant. The fruit is as large as an orange, or larger; it is quite curious and ornamental, and said to be made, while young, into sweet-meats by the South Americans; the pod being very light and spongy, breaking open and showing the seeds, each of which has a tuft of beautiful silky down, like those of our Milkweeds (*Asclepias*), to the same family with which it belongs. This relationship is further shown by the copious milk-juice which the plant gives off when cut or wounded. It has long been in use as a climber, for covering the rafters of green-houses; it is hardy in the warmer parts of England, and no doubt would be so in Virginia and southward; in the Northern States it proves a useful tender climber, to be set out for the summer, it being of rapid growth, and will cover a large space, if given a rich spot. No doubt, the roots could be preserved in the cellar, though we have not tried it. When the plant grows in the open air, the flowers will be found with numerous insects—butterflies and moths—fastened to them, often a half dozen or more to a single flower. Each insect will be found securely fastened by its proboscis or trunk, in such a manner, that by all its exertions it cannot free itself. The poor things beat themselves against the flower, dusting it with the scales of their wings, and against one another, until from starvation or exhaustion they die a miserable death. We have given accounts of plants which catch insects, and feed upon them, and can see that this seeming cruelty is to a useful end—at least to the plant. Then there are other plants, which make use of insects to fertilize them, as Dr. Gray has clearly and abundantly shown. In this operation both plant and insect are benefitted, though sometimes in doing this an insect fares badly; as the honey-bee, which, in fertilizing the Milkweed, gets its legs so loaded with the mass of pollen, that if it gets to the hive, it is unable to climb up the comb, and dies; yet even here the intention is good, though the bee overdoes his part of the work. But in our *Arauja* we can find no such excuse. The flower is not fertilized by these insects, nor does the plant consume them. The contrivance for catching the moths and butterflies is as effective as if it had been designed for the special purpose, and to all appearances the plant is guilty of an act of unmitigated cruelty—catching and killing—not even that—starving to death, inoffensive insects, just for the fun of it. Certainly appearances are very much against the plant, and *Arauja* being a "barbarous name," is properly applied. When the plant was in flower, we made a sketch of the mechanism of its trap, but it is unfortunately mislaid. Suffice it to say that the anthers are so placed, that their spreading cells form a series of notches WW in a ring around the pistil. The insect, in putting its proboscis down for the honey, must pass it into one of these notches, and in attempting to withdraw it, the end is sure to be caught in a notch—boot-jack fashion, as it were—and the more the insect pulls, the tighter its trunk is drawn towards the point of the notch. Whether the insect is unable to back down its flexible trunk, the only way it can get release, or does not think to do it, we can not say, but the fact that it dosen't is very evident. As it is contrary to the natural order of things for an insect or a plant to do an act without subserving some good end, we do not think this to be an exception. An examination of the flower shows it to be so constructed that it must be fertilized by some insect, evidently by one with a proboscis of a different kind from that of our moths and butterflies. No doubt in its native home the particular insect is abundant, and all goes on well. Human intervention disarranges the whole affair, and we set out the plants where our insects, unused to this style of flower, are attracted by its abundance of honey, and are led to a miserable death, while the plant acquires a reputation for a cruelty, which it cannot avoid. An English writer, a few years ago, wrote of the flower as "diabolical," for trapping insects just "for the fun of covering itself with borrowed plumage." There is one compensation for this evil; a French writer has suggested that the plant may be turned to excellent account by the entomologist, by making it do the "bug-catching;" this is a capital idea, which we commend to our entomological friends, for to judge by the way our plant (sent by Peter Henderson) behaved last summer, we are sure that it would prove a most efficient trap for both day and night flying insects; the flowers held the largest sphinxes, or humming-bird moths, as well as those so small, that their proboscis barely reached the bottom of the flower.

LOMARIA DALGAIRNSLÆ.

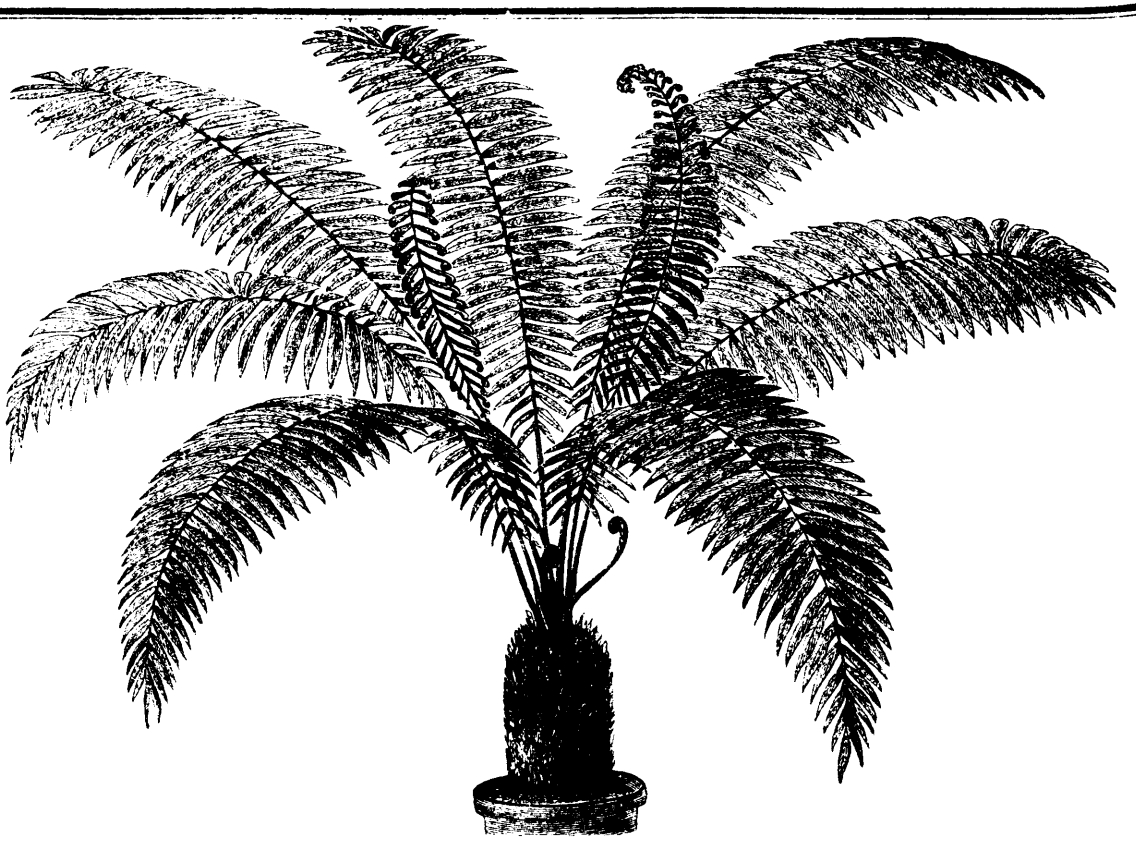
(See page 384.)

This plant is a very fine greenhouse fern of arborescent character, with something the aspect of another arboreseent form of the same species known to cultivators as *lazamioides*. It has a blackish trunk, which is shaggy at the apex, with long subulate dark brown scales. The fronds are but subcoriaceous in texture, pinnate in the lower part, and pinnatified above; the pinnæ lanceolate, acute, the lower ones small, tapered to the base, but scarcely stalked, the upper ones adnate, and the uppermost decurrently confluent. Below the small basal pinnæ each edge of the stipes is set with a row of abortive ones reduced to wart-like excrescences or callosities. The color of the sterile fronds is a dark green on the upper surface, and a paler green beneath. No fertile fronds have yet been produced.

The plants to which the above description applies have been recently imported from South Africa, and are therefore to be classed as greenhouse ferns. As such they are a valuable acquisition, since they prove to be of free-growing habit, not indicating the tendency of other allied forms to dwindle away; but on the contrary, pushing their fronds with remarkable ivgor.

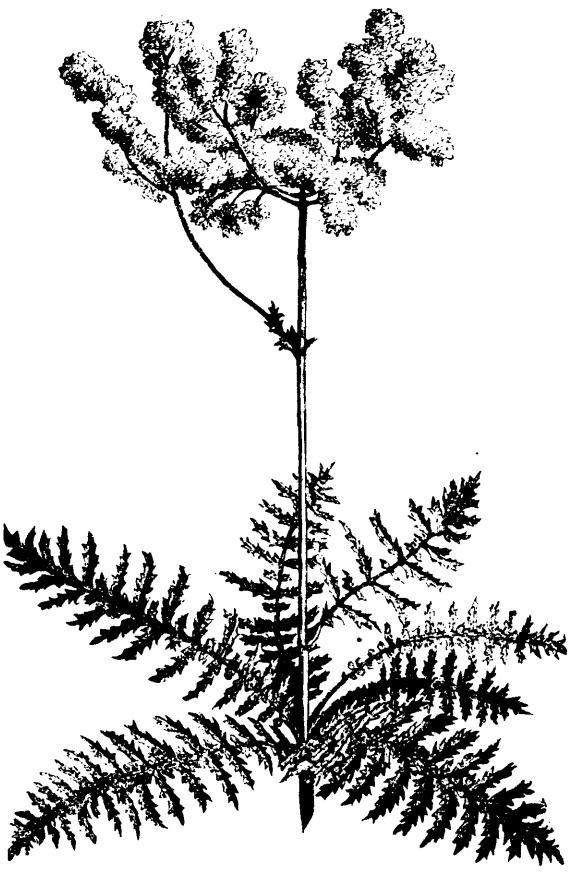
THE QUICKEST PASSAGE ON RECORD BETWEEN ENGLAND AND AUSTRALIA.—The *Melbourne Argus*, Sept. 3rd, says:—The fastest passage on record from London to Melbourne has been made by the Lusitania, of the Orient Line. She arrived on the 8th ult., bringing English papers of three weeks' later date than those of the previous mail. The voyage has been performed in 40 days 6½ hours, inclusive of a detention of one day and seven hours at St. Vincent, where a call was made for coal, and the total time the steamer was under way was 38 days 23 hours and 48 minutes. Some very fast steaming was done, and the average speed per day was 311½ miles, the greatest day's work being 344 miles. The Lusitania brought out 345 passengers, 68 of these being in the saloon. This quick passage of the Lusitania has excited much attention, showing, as it has done, that in the matter of steam communication *via* the Cape the colony may be better served by competition than by the subsidy of any particular line. The Lusitania goes home by the Suez Canal, which route has also been chosen for the homeward voyage of the Wampoa. It is interesting to note that, although the August mail was delivered in Melbourne a week before contract time, the time occupied between London and Melbourne was only one day less than the direct voyage of the Lusitania.

ROCK CRYSTAL seems to be growing more and more in favor amongst technical men on account of the stability of its physical properties. At the August meeting of the Bonn Society of Naturalists it was reported that the directors of the Imperial Mint of Germany have recently ordered of Herr Stern, at Oberstein, several absolutely correct normal weights made of rock crystal, which are to be used for the control of gold coins. These weights have the great advantage that it is unnecessary to determine the specificgravity of every weight, and in the case of measures to find the thermal coefficient of expansion of every measure, as both are as near constant as possible. They have been found the same in all the specimens of rock crystal yet examined, viz., specific gravity at 0° C. = 2,6506 (reduced to water at 4° C.); coefficient of expansion for 1° C., parallel to the axis, 0·00000750 inch, *i.e.*, seventy-five ten-millionths of an inch.—*Nature, xvi.*, 447.



LOMARIA DALGAIMELÆ.

A CRUEL FLOWER.—(*Araujia albens.*)



THE DROPWORT.—(*Spiræa filipendula.*)

The Canadian Mechanics' Magazine and Illustrated Family Friend.

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