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CANADIAN MECHANIC MAGAZINE AND PATENT OFFICE RECORD

Vol. 5. JULY, 1877. No. 7.

TECHNICAL EDUCATION.

THE necessity of adopting a system of technical education in our public schools, particularly for the industrial masses, is now becoming widely recognized, and a movement only requires to be set on foot by the manufacturing interests of the Dominion to induce our Boards of Education to adopt measures for the formation of classes, in all schools, for the acquirement of technical education; and it is to be hoped that the day is not far distant when the Government will see the necessity of establishing two or more Technical Universities, with ample funds for affording a complete education for architects, engineers—civil and mechanical—and artisans generally. Thoughtful men are beginning to be convinced that in order to develop the resources of our country, much more attention must be given in all of our schools to the technical education of those who are likely to be engaged in manufactures, who, having put their hands to the work, will carry it on in the manner that might be expected, and that the time has come to institute a better order of things and to encourage the exhibition of skill and invention in handicraft. We should have, at least, two Technical Universities, affiliated with technical classes in all our public schools, in which special branches of industry should be taught. The importance of such universities and schools to the rising generation of artizans and mechanics who may wish to avail themselves of the theory and practice therein taught and exemplified, cannot be over estimated, not only for the advantage of themselves, but for the country they live in. There can be no doubt but that technical education should begin at school, and at an early age, at least so much of it as will enable the pupils to display a faculty or a taste for certain handicraft. The more intelligent would naturally find their way to the Technical University, and thence to the workshops, ultimately to become master-minds in the industries of the country. It is a matter that cannot be too soon taken in hand, so that the whole industrial population may be educated to a higher technical point than at present. We would then have more skilful workers, and their skill would be guided by greater intelligence.

In a former article that appeared in this Magazine, we strongly advocated the formation of workshops in our largest cities, so that the teaching received of those natural sciences which bear upon practice, should be exemplified in workshops, which is a better school for acquiring skill in handicraft than any laboratory. Of what value would be the study of anatomy and physics to the physician without practice in the dissecting-room and the walking of students through the hospitals?—And so with technical education—however high the standard of knowledge obtained in a Technical University, the practice in the field and in the workshop is absolutely necessary, and actual practice as well as theory should, as far as possible, be introduced into the curriculum of practical training.

Although great perfection has been arrived at in Great Britain in arts, science and manufactures, the people are by no means satisfied to remain at their present standard of excellence. She knows full well the necessity of keeping that standard always at the highest point, if she would maintain her foremost place among the nations of the world.

The trade guilds of the city of London are about to take the initiative for a great movement in this direction, and contemplate expending a portion of their large revenues to the advancement of technical education to the people and to the greater progress of those industries, whence centuries ago they derived their origin. The Turners' Company has already set the example to others, which, though tardily followed, is leading to good results. The Drapers and Cloth-workers' Company have resolved to establish a Technical University with a promise of $10,000 per annum for the assistance of each, with such further assistance as may be needed. Other companies, such as the Goldsmiths, the Ironmongers, the Merchant Tailors, the Mercers, and the Dyers, have given their adhesion to the scheme, and it is supposed that the city guilds will, one and all, unite in furtherance of this good object without considering too critically the advantages to be gained by their respective trades. The Society of Arts has fairly started the desire for technical education

among the masses of workers, and it is fully expected that the rising generation of artizans and mechanics will avail themselves of it in numbers. The leading men in the iron trade are fully alive to the importance of the question, and as the representatives of the various industries are prepared to second any feasible proposal, it is expected that some practical scheme will soon be adopted.

The council of the Institution of Naval Architects, in their recent report, lament that they have been unable to mature any scheme providing for the systematic education of private students of naval architecture, and are looking forward with no little anxiety to the establishment of Technical Universities.

If the representatives of the various industries of Great Britain and the great guilds of the city of London are so impressed with the necessity of affording more opportunity to the masses of the workers to obtain, in early life, a sound technical education, as a matter in which the prosperity of the country is concerned, ought not the Government and Manufacturers of the Dominion be equally anxious about affording some practical and systematic scheme for the technical education of children in our public schools, afterwards to be perfected in universities endowed specially for that purpose? It is a question of more importance to this country than has yet been attached to it by our statesmen, and which now requires their immediate attention, as we have to compete with a highly intelligent people on one side, and also with the talent and experience of older countries for a share in the prosperity that must ever fall to the lot of that country which carries excellence in arts, science, and manufactures to the greatest perfection; or else be content to see our industries driven out of the market by the superiority and cheapness of the manufactures of other countries, which then no protective tariff can keep out of the bounds of successful competition.

EGYPT MORTGAGED TO ENGLAND.

Egypt is undergoing a species of Anglification. The chief offices in the cabinet, beneath the rank of Minister, are in the hands of Englishmen, who are all liberally, I may say munificently, paid. The Postmaster General is an Englishman, with a salary of £2,000 a year; his nephew, who acts as deputy, gets £1,000 a year; and another Englishman £800. The director of the railway system is an Englishman, with the handsome salary of £3,000; the vice-director, a fellow-countryman, gets £2,000. It is estimated that the total salaries paid to English employés of the Khedive is about $500,000, and the cry is still they come. Hardly a steamer arrives there that does not bring capable Englishmen sent for by the Khedive, or in quest of employment as engineers, architects, naval or military men, and organizers of some branch or other of the public service. The important affairs of the country, the Khedive finds, cannot safely be intrusted to the natives, lacking as they are in intelligence, honesty and industrial habits. Egypt is, as it were, mortgaged to British capitalists, and the Khedive seems disposed to allow them to manage an estate of which he is now little more than a trustee. In the general break-up that threatens to take place in the Turkish Empire, Egypt will naturally fall to England asher share of the spoils.

M. DERBAY states that silver ingots are often found with a fineness of ·950 or ·999, which work badly with those of ·950, giving surfaces with gray spots which can hardly be removed by polishing and which always reappear under gilding. This property, according to the *Journal of the Franklin Institute*, is due to the presence of selenium in the sulphuric acid which is made from pyrites, and refiners should, therefore, be careful in the selection of their acid. As the selenium oxidises easily it may be seperated by melting the silver precipitated by the copper, in an oxidising atmosphere, or in the presence of nitrate of potash or soda.

ECONOMICAL USE OF FUEL.

(See page 197).

Considering the enormous quantities of coal used yearly, in furnaces of all kinds, and for all purposes, it is to be wondered that the *thorough* understanding of the subject of "combustion"—of the theories involved, and the form of apparatus required to allow of its taking place under the most advantageous conditions—should have been confined, almost exclusively, to scientific circles, and never (or, excepting in rare instances) reduced to a practical basis. Placing at 75 (which is a high estimate) the percentage of heat resulting from the combustion of the various coals, which, in the best form of furnaces, we are able to utilize, we still have remaining 25 per cent. of absolute waste. This does not mean that we realize 75 per cent. of the actual *value of the fuel*, in units of heat; for, although different authorities have obtained different results as to the amount, it is safe to assume that *twenty-five* per cent. is a high estimate.

For instance—to follow out the above figures—in order to realize 25 per cent. of the *value* of the fuel, where there is wasted 25 per cent. of the amount of heat generated, the latter must be 33⅓ per cent. of the former—in other words, from that quantity of coal which has a power of 100 units of heat, the imperfect combustion developes but 33⅓ units, and of this amount, from faulty construction and other causes, we are enabled to *utilize* but 25 units or 75 per cent. of 33⅓.

This great waste is something enormous, and appears inexcusable, as it is really unnecessary. It is not owing to any want of ability, that the subject has been so completely ignored.

In the laboratory of the chemist, we find apparatus for effecting an approximately perfect combustion, on an experimental scale, and the requirements of the process are well understood. Why not, therefore, profit by this knowledge, and by effecting the necessary modifications, adapt some such form of apparatus to a practical use? It is not impossible, nor even difficult, provided we start with a proper knowledge of the requirements of the case, without which the matter were better let alone. This is a subject which cannot be worked out by "rule of thumb," as a mere mechanical question may be. A knowledge of the *theory* of combustion is absolutely essential, and a solution will never be reached without it.

For instance—suppose we ask the average engineer how many equivalents of oxygen are necessary for the combustion of one equivalent of carbon; and what quantity of air is required to supply it. Nine out of ten—or ninety-nine out of a hundred would be nearer the truth—would be unable to answer this question; and yet these men are engaged in the designing and construction of boiler and other furnaces, in which the acknowledged desideratum is economy of fuel.

As an illustration of the economy possible by the use of an efficient form of apparatus, for insuring the complete combustion of the vaporous and gaseous portions of the fuel generated from the grate or fire-bed of the furnace, we may mention as the best that has come under our notice, the "Jarvis Patent Furnace" which was originally designed for use under stationary boilers, although applicable to heating furnaces of all kinds using natural draught. In the case of the invention of this furnace, we have an illustration of the acquisition by the inventor, of the necessary *theoretical* knowledge of combustion, for the express purpose of enabling him to *start* with a correct appreciation of the requirements necessary to insure success; in short, to guide and direct, in a sure channel, his ingenuity and undoubted *practical* ability, instead of groping in the dark for that which he would otherwise have been unable to see was close to his hands. The motive in this case was the preventive of the smoke nuisance, but was still more urgent, as upon the result hung the stoppage, or continuance, of an extensive manufacturing business; an injunction having been granted by the local court, on account of the smoke and cinders from the boiler furnaces of the establishment. Certainly the inducement was a strong one and calculated to urge Mr. Jarvis to use his best efforts, and the result was so eminently satisfactory, that the invention was secured by letters patent: and the introduction of the furnaces commenced in September last. Since then, over one hundred and fifty have been put in operation in some of the largest manfacturing establishments in the country, several of which, after having had *one* of their boilers set, for the purpose of testing the merits of the apparatus, have given the second and third orders; in one establishment alone, there are *thirty-three* in successful operation, the average saving in *cost* of fuel being 25 per cent., and an increase of evaporating capacity of 30 per cent. Not only is the saving of fuel a matter of quantity, but also of quality, as it enables the use of inferior grades, such

as anthracite screenings, in proportion of five to one with bituminous coal without a blast.

The above results appear to be about a fair average of the work done by all of these furnaces in use.

The air is admitted, in quantity, and position of openings, as shown by calculation and experiment, to be requisite ; but before entering upon its important duty of supporting combustion, it is *heated* to a high temperature, by utilizing heat which would otherwise be, to some extent, of no service for evaporation, owing to the difficulty of radiation to the boiler, from those parts of the furnace by which it was absorbed. It may be said (and if we are not mistaken it has been), that this idea of heating the air is like cutting a piece off one end of a string and tying it to the other to make the string longer ; *we lose the knot.* In other words, that the only result in using any of the heat to raise the temperature of the air, must be to leave so much the less to be absorbed by the boiler and its contents.

Now this involves two points, which require to be considered separately, as they are radically of different natures. First, as above stated, in all furnaces, excepting those having the entire fire-box and ash pit surrounded, or formed by, parts of the boiler which presents an evaporating surface to the radiation of heat from the fire-bed ; which form of boiler (excepting for the smaller sizes), is rare ; in those constructed for stationary use exclusively, there is considerable surface which, owing to its position, cannot, to any appreciable extent, assist evaporation by radiation of the heat absorbed by it. As a natural consequence, the desideratum, in the construction of these parts of the furnace, is, the best non-conducting material ; to reduce the absorption, and consequent exterior radiation to a minimum. But, in spite of the utmost care and skill in construction, and the selection of material, there is always a considerable waste of heat from this cause ; and this heat forms a large proportion of that which is used for raising the temperature of the air supply, by passing the latter through ducts or passages in the thickness of the walls and other parts. Of course the absorption of heat by the walls is slightly increased, by reason of its being, in turn, absorbed by the current of air passing through them, as the latter is always at a lower temperature. So we see—and experience has proved—that the heat absorbed by the air is *not* so much taken from the boiler, but that, to a great extent, it is turning to good account what would otherwise be wasted. It does not at all follow that if this heat were not absorbed by the wall, or the air passing through it, that it would be by the boiler ; the very fact of its being thrown towards a surface which, from its position or other cause, was unable to radiate it back to the boiler, would necessitate more or less of a loss.

We do not say that none of the heat absorbed by the air is taken from the boiler ; but we do say that a comparatively large proportion of it, if not utilized in this way, would be wasted, and is, therefore, a positive gain, as all that is so absorbed is returned again to the furnace and combustion chambers. But this point is of very trifling importance, in comparison with the second one of the two before mentioned. Even were *all* the heat contained by the air, clear gain, it is not the effect of this elevated temperature (in addition to that of the furnace), upon the *boiler*, but upon the *combustion of the fuel*, that renders it of such great value.

The use of the hot blast for smelting furnaces has come into general use during the past few years, and its value in the reduction of metallic ores is due solely to its effect upon the combustion which it is required to support. But the Jarvis is the first boiler furnace which, so far as our knowledge goes, has successfully modified the hot blast to a *hot draught*, and by its use obtained all the beneficial effect on combustion which the former insures in the blast furnace.

The following description—reference being made to the accompanying illustration—will explain the construction, and principle of operation of the apparatus. The cut shows the boiler, and vertical longitudinal section of furnace and setting ; the former, in this instance, being of the return tubular type. The air is admitted to the fire-bed D from the ash pit F ; entering the latter through the doors, in the usual manner, but in just sufficient quantity to insure a moderate and economical rate of combustion of the solid portions of the fuel. (In this feature we have a marked difference from the ordinary forms of furnace in which *all* of the required supply of air passes through the fire). In the front wall of the furnace at P, below the line of the fire-doors, and opposite each of the side walls, there is a square opening, communicating with a series of winding ducts or passages throughout the whole thickness of the latter, and terminating in a square opening (A) into the furnace, slightly in advance and above the line of the bridge wall G. In each side wall and back of the bridge wall is an opening, similar to those in front, which admits air to another series of ducts, extending to the back end, where they each communicate with pipes of a peculiar form in the flame bed B. These pipes are terminated by curved nozzles, opening downwards into a hot-air chamber or pit C, which is covered by the perforated plate O. The three doors L are for the removal of any accumulation of ash dust which may occur, as it, being a non-conductor, would greatly impair the working of the furnace. They are provided with mica sight-holes, through which the combustion may be readily observed.

The function of these ducts and pipes is to heat the air supplied to the furnace, and the operation is briefly as follows : The draught causes the air to enter the openings in the front wall, and carries it through the first series of ducts in each side wall, from which it absorbs sufficient heat to raise it to a very high temperature, by the time it escapes through the openings. The effect of this fresh supply of heated oxygen is very marked—an immense volume of clear blue flame, caused by the combustion iofthe gases, can be seen, although surrounded by flame of less vsiblecharacter, far beyond the bridge wall

The second series of ducts convey the air through the hot walls, and the pipes B, (the latter being exposed to a solid volume of flame nearly the whole of their length) into the pit C, which is simply a reservoir to effect an even distribution throughout the whole perforated surface of the plate O. All the above mentioned ducts are gradually widened from the entrance to the discharge opening, to allow for the expansion due to increased temperature of the volume of air. This second supply of air is the last that is required, as it is sufficient to insure the complete combustion of all the inflammable elements, as is shown by the flame, passing the back connection, or uptake to the return flues, at which point it is almost invisible.

A very noticeable feature in burning anthracite coal is that, as the flame passes over the perforated plate, carrying with it minute particles of the fuel, the latter, immediately upon coming in contact with the heated oxygen, are instantaneously consumed with a brilliant scintillating flash, equal to those evolved in the experiment of burning steel in a jar of oxygen ; keeping up a constant pyrotechnic display at this point.

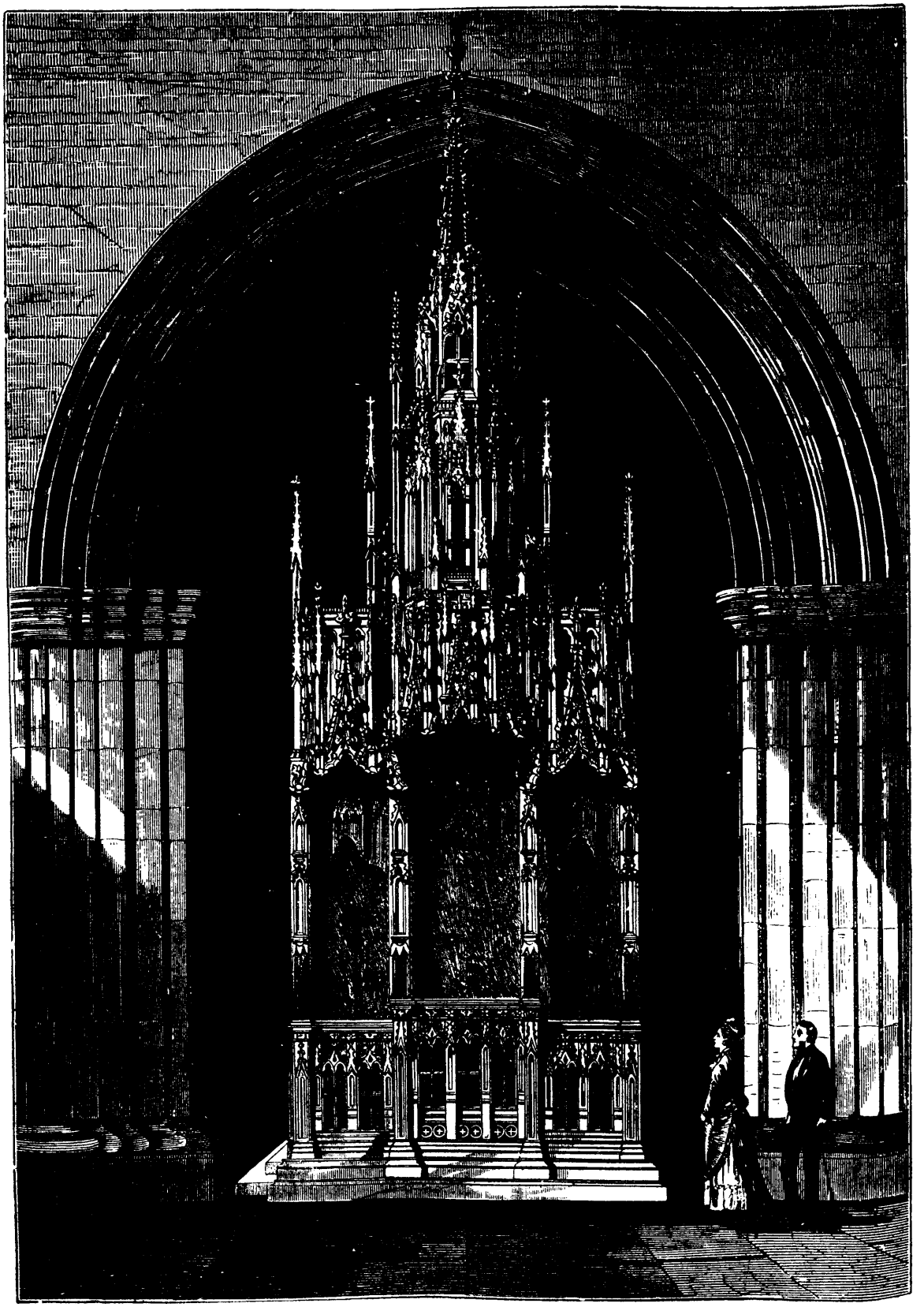
It has been the practice, in substituting the Jarvis for other settings, to make thorough tests of old and new under the supervision of experts, for the purpose of enabling the parties to make a comparison of the various points. The following data, from tests made in Philadelphia, were selected as being about a fair average of those made, up to the present time :

	Old Setting.	Jarvis Setting.
Duration of test, in hours	8	8
Pressure of steam	57	56
Pounds of water evaporated	26,039	30,175
Temperature of water	182°	189°
Pounds of pea coal burned	3,344	2,777
Pounds of ashes and coal at end of test	412	437½
Pounds of combustible	2,392	2,339½
Pounds of coal per hour per sq. foot of grate	13.06	10.84
Pounds of water evaporated per pound of coal	7.78	10.86
Lbs. of water evaporated per pound of combustible	8.88	12,89
Lbs. of water evaporated per lb. of coal, water 21° F.	8.02	11.08
Lbs. of water evaporated per pound combustible water 21 ° F	9.14	13.19
Temperature ot fire room	55°	55°
Temperature of atmosphere	48°	50°
Gain favor of Jarvis		44.31.105pc

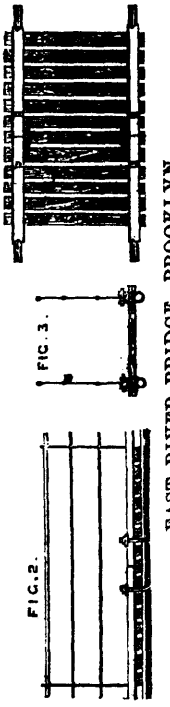
Two boilers in one furnace. Tested first on old setting, and then reset with the Jarvis and tested again. Dimensions of each boiler, 4 by 16 feet.

These furnaces are now being introduced in Pittsburg, and other cities in the West, and are very successful on the soft coal. The patents are owned by the Jarvis Furnace Co., represented by A. F. Upton, as general agent, No. 239 Congress street, Boston, Mass., and in Canada by Jas. R. Annett, No. 456 St. Paul street, Montreal, Que.

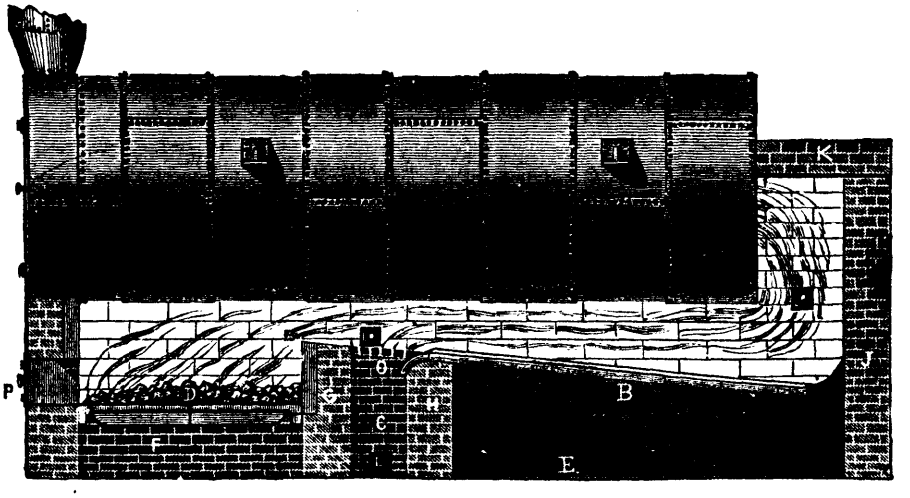
BRASS EAGLES IN CHURCHES.—The unhappy dispute in the Established Church of England in regard to legal embellishments of the interior of sacred edifices is likely to lead to an attempt to remove the brass eagles that have, of late years, been introduced into several of our churches in lieu of the wooden reading-desks. The eagle destined for a first attack is, it appears, one at the church of St. Barnabas, Pimlico, and, so far as can be learnt, the "objectors" contend that it is a symbol of Popery, being used in heraldry, spread, to represent a prince of the Roman empire,—*i.e.*, the Pope. Others, however, only see in it the symbol of St. John, long used in the English Church. Thus it is that extreme claims on one side ever lead to extreme objections on the other.



THE BISHOP'S THRONE, CHESTER CATHEDRAL.



EAST RIVER BRIDGE, BROOKLYN.



ECONOMICAL USE OF FUEL.

DUNBAR AND RUSTON'S "STEAM NAVVY."

(See pages 200 and 201.)

We illustrate on page 200 an engraving of Messrs. Dunbar and Ruston's "steam navvy," the perspective view showing the arrangement of working it with the wagon roads on each side.

As the machine advances excavating its own gullet it fills alternately, first on the one side and then on the other, one of the empty wagons in position for being filled, The lines of rails are arranged for the wagons se that there is always a train of empty wagons standing on a central road behind the "navvy," and from whence they are drawn over a short jump road into position on the side roads for filling, while the filled wagons run back from the machine on the side roads. The "navvy" illustrated is capable of excavating and filling into wagons at the rate of 60 cubide yards per hour, two men and one boy being required to work it.

This machine, as will be seen on reference to the detailed drawings, is constructed mainly of wrought iron, so as to withstand the heavy work that it has to encounter. The mode of working it may be briefly described as follows. The engine-driver, who has the control of all the moving parts, is directed by the man who has charge of the scoop, and who stands on the circular platform at foot of the jib in front of the machine. When the jib is swung to the position required, the scoop is lowered till the mouth of it rests upon the ground. The man on the circular platform by means of a foot-brake and gear holds the scoop in that position, so fixing the length of the scoop handle from a pivot or point on the jib. The scoop is now drawn forward by means of a chain and winding drum, thereby cutting all before it, recording to the radius described by the length of the scoop handle. As soon as the scoop is filled, the man who has charge of it eases the foot-brake, allowing it to come out of its cut. When lifted high enough, the jib is then swung round until the scoop is brought over the wagon to be filled; the attendant now by means of a trigger line draws the spring catch bolt, allowing the hinged bottom to drop down, discharging its contents into the wagon. The jib is then swung round again, the scoop lowered, and the operation repeated.

After the machine has excavated all that is within its reach, the anchor screws are slackened off, extra sleepers with a short lenght of rails are then laid down in front of it, and by means of the propelling gear it is moved forward the required distance. The anchor screws are then screwed down in order to prevent the machine from slipping back when at work.

The construction of the whole machine is so clearly shown in the illustrations that its arrangements will be readily understood.

In conclusion, we may state that Messrs. Ruston, Proctor, and Co., of Lincoln, are the sole makers of these machines; they have already constructed and set to work in Great Britain, three eight and fourteen of ten horse power.—"*Engineer*."

A CRIMINAL lately gave to a reporter of the New York *Herald* the following mode of introducing powder within a safe for the purpose of blowing open the doors: "What tools did you use in drilling the holes?" asked the reporter. "Good cracksmen don't use tools," answered the burglar. "I'll show you how to blow open any safe in New York without any tools. Just take me to a safe." There happened to be a safe in Judge Kilbreth's private room, and the writer acquainted the magistrate with the prisoner's proposal. "By all means," said he, "let us learn;" and in a moment the room was filled with spectators. The prisoner knelt beside the safe, which was locked. "Look," said he, "at this door. It fits so tightly that no instrument can be introduced in the cracks and powder cannot be inserted. So far so good. The burglar," continued he, "simply sticks putty all along the cracks except in two places, one at the top of the door and one at the bottom, where he leaves about an inch of space uncovered by the putty. At the lower place he puts a quantity of powder and he sucks out the air from the upper place, either by a suction pump, which is the better way, or by his mouth. The vacuum created in the safe draws in the powder in the small crack below. The entire work does not occupy more than five minutes."

THE scheme for supplying Simla with water from the springs at Mahasso has received the sanction of Government, and the necessary public works surveys are already being made. This project will entail the laying down of iron piping for a distance of over fourteen miles, and as several hill ridges will have to be crossed, the expenditure will amount to a considerable sum.

THE EAST RIVER BRIDGE.

(See page 197.)

The engravings which we publish on page 33, will give an idea of the progress of the work upon the East River Bridge, New York. After the first cables had been laid across from tower to tower, stages or cradles 48 ft. long were attached to them in such a position, that when the main cables are being laid, they will be within easy reach of the men employed in arranging the wires. The cradles are of oak, braced with wire, and are made as open as possible so as to offer less resistance to the wind. Access to the stages is obtained by means of the temporary foot bridge shown in the engraving. This platform is constructed as in Figs. 2, 3, and 4, of oak strips 3 in. wide and 1½ in. thick, laid directly upon the cables, and held together by oak longitudinals 3 in. wide by 1½ in. At intervals bent bolts pass through the longitudinals, and round the cables, being secured by nuts to cross top plates as shown. This structure was laid in 12 ft. lengths. Besides its attachment to the cables, it is secured by wind ties as shown, a very necessary precaution to check its oscillation in the exposed situation it occupies, 210 ft. above the river. The chief span is 1620 ft.

ENGLISH PATENT-OFFICE DRAWINGS.—The Commisioners of Patents have just announced that for legal or other purposes they are willing to supply, at the undermentioned rates, full-size copies of drawings belonging to specifications printed under she new system by the process of photo-lithography:—

In cases where from the use of colour or other causes a satisfactory photograph cannot be obtained from the original drawing, an extra charge will be made to cover the expense of taking a tracing. There will also be a small additional charge for colouring the copies of colored original drawings. Applications, stating the number of copies required and accompanied by a remittance sufficient to cover the cost, should be addressed to the clerk of the commissioners.

THE GERMAN PATENT LAW.—The bill for the amendment of the German Patent Law has at length passed the German Parliament. It is a great improvement upon that hitherto in force. As matters now stand, patents will be granted for fifteen years, the longest theoretical period for which a grant could be made under the former Prussian law. We say "theoretical" period, because, as is well known, it was not the practice to grant a patent for more than two or three years. An applicant will now obtain an equivalent for our provisional protection, upon making his application and giving discovery to the authorities of his invention. The subject matter of the application will then be referred to a board of examiners, by whom it must be admitted to be new. The examiners will at first make their own examination, after which, if necessary, they may be assisted by the inventor, who will have an opportunity of bringing evidence upon the subject. Thus, it will be seen, it is intended to afford an inventor all possible facility for carrying his point. If the examination prove satisfactory, a patent will be granted, which will be subject to a condition that the invention must be carried into operation within three years. It is pleasant to find the principle of reward for invention so fully approved in a country which not long ago pronounced so strongly against it.

"AN AUTOMATON DOCTOR."—We have been rather amused at this title, which has been given to a neat little cabinet intended to be used in private houses as a Turkish or hot-air bath. Such a thing will undoubtedly be very much appreciated, for it is not every one who can afford the expense of the public Turkish baths, if, indeed, they live within reach of them. This ingenious apparatus stands in the corner of a bedroom, and can be wheeled on castors to any convenient place and used at a few minutes' notice, at the cost of a few pence. In many serious cases of illness it will be invaluable, and we believe nothing will tend more to keep a person in good health than a regular use of this bath.

A HEAVY BLAST.—A successful blasting operation has been performed at one of the quarries of the South Cornwall Granite Company, situated near St. Blazey. About 700 tons were thrown down with very little breakage, and one block now standing in the quarry contains 8,000 cubic feet, or nearly 600 tons, without aflaw or joint of any kind or any discolouration. There are several smaller blocks of from 30 tons to 60 tons weight.

A SIXTEEN-WHEEL stateroom sleeping car, called the York," has just been placed upon the Chicago, Burlington, and Quincy road. It is said to be a very elegant vehicle. Sixteen wheel cars were not uncommon some years ago; now there are few of them.

STAINING WOOD.

In most cases the staining of wood may be effected so as to produce very bright colors without any previous preparation, as, generally speaking, the mordants employed have a bleaching action on the wood. But in many cases, in consequence of the quality of the wood under treatment, it must be freed from its natural colors by a preliminary bleaching process. To this end it is saturated as completely as possible with a clear solution of 17½ ozs. chloride of lime and 2 ozs. soda crystals, in 10½ pints of water. In this liquid the wood is steeped for half an hour, if it does not appear to injure its texture. After this bleaching it is immersed in a solution of sulphurous acid to remove all cases of chlorine, and then washed in pure water. The sulphurous acid which may cling to the wood in spite of washing does not appear to injure it, or alter the colors which are applied.

Red.—The wood is plunged first in a solution of 1 oz. of curd soap in 35 fluid ozs. of water, or else is rubbed with the solution, then magenta is applied in a state of sufficient solution to bring out the tone required. All the aniline colors behave very well on wood.

Violet.—The wood is treated in a bath made up with 4½ ozs. olive oil, the same weight of soda ash, and 2½ pints of boiling water, and it is then dyed with magenta, to which a corresponding quality of tin crystals have been added.

Blue.—Prepare as for violet and dye with aniline blue.

Green.—Mordant the wood with red liquor at 1° B. This is prepared by dissolving separately in water 1 part sugar of lead and four parts of alum free from iron; mix the solutions and then add one thirty-second of a part of soda crystals, and let settle over night. The clear liquor is decanted off from the sediment of sulphate of lead and is then diluted with water until it marks 1° B. The wood when mordanted is dyed green with berry liquor and extract of indigo, the relative proportions of which determine the tone of the green.

The wood, mordanted, as above directed, can also be dyed a fine blue with extract of indigo.

Yellow.—Mordant with red liquor and dye with bark liquor and with turmeric.

Besides the aniline colors cochineal gives a very good scarlet red upon wood. Boil 2 ozs. of cochineal, previously reduced to a fine powder, in 35 ozs. of water for three hours, and apply to the wood. When dry, give a coating of dilute chloride of tin, to which is added a little tartaric acid, 1 oz. of chloride of tin, and ½ oz. of tartaric acid in 35 fluid ozs. of water. If instead of water the cochineal is boiled in a decoction of bark (2 ozs. bark to 35 ozs. of water), and the chloride of tin is used as above, an intense scarlet, and all shades of orange, may be produced according to the proportions.

Brown.—Various tones may be produced by mordanting with chromate of potash, and applying then a decoction of fustic, of logwood, or of peach wood.

Gray.—Grays may be produced by boiling 17 ozs. orchil paste for half an hour in 17 pints of water. The wood is first treated with this solution, an then, before it is dry, steeped in a beck of nitrate of iron at 1° B. An excess of iron gives a yellowish tone; otherwise a blue-gray is produced which may be completely converted into blue by means of a little potash.

Black.—Boil 8¾ ozs. of logwood in 70 ozs. of water, add 1 oz. blue stone, and steep the wood for twenty-four hours. Take out, expose to the air for a long time, and then steep for twelve hours in a beck of nitrate of iron at 4° B. If the black is not fine, steep again in logwood liquor.—*Dingler's Polytechnisches Journal.*

Mining in Nova Scotia.—From recently puplished statistics we learn that there was a decrease in the amount of nearly all minerals mined in Nova Scotia last year, as compared with the out-turn during three next preceding years. The product of coal particularly continues to fall off year by year, as also does that of gypsum, each showing a deficit in 1876, as compared with 1873, of 33 per cent. Gold has somewhat increased; 12,000 oz., valued in round figures at $240,000, was taken from the quartz. Iron, too, shows a very considerable increase in 1876 over 1873. Lead in paying quantities was only discovered last year, and the 9 tons exported were merely taken out to test the value of the discovery. Copper mining, also, is yet in its infancy, while the export of manganese has almost ceased. The value of gypsum exported was $83,000, and of freestone $36,000. A good deal of prospecting is being carried on all over Nova Scotia proper and Cape Breton. The value of the mining areas of Nova Scotia alone amounts to a fabulous sum.

NOTES AND MEMORANDA.

As a carbon for electric light, M. Th. du Moncel forms a compressed mass of carbon and magnesia, which is very hard and burns without ash, giving a light which is steadier and 34 per cent. more intense than that of gas carbon.

Berthelot finds that the temperature of combustion of carbonic oxide by oxygen, under constant volume, is comprised between 4000 deg. and 2000 deg.; by air, between 2200 deg. and 1750 deg. Although his experiments furnish no certain evidence relative to the degree, the nature, or even the existence of dissociation, they seem to establish the possibility of producing real temperatures, approaching 3000 deg. C.

India ink of a deep black, which gives neutral tints for half-shades, is very rare. It may be made as follows: Rub thoroughly together 8 parts lampblack, 64 parts water, and 4 parts of finely pulverized indigo. Boil until most of the water is evaporated, then add five parts gum arabic, 2 parts glue, and 1 part extract of chicory. Boil the mass again till it is thickened to a paste, then shape it in wooden moulds which are rubbed with almond or olive oil.

By experiment with reference to the heat conductivity of metals and paper, M. Aymonnet finds: (1) That metals and paper are not, as is generally thought, athermanous; (2) that they are more diathermanous for the obscure radiations from metallic bodies below the temperature of boiling water than for luminous calorific rays; (3) that their absorptive powers are more feeble than those of water; (4) that there is a mathematical relation between the absorbing power of a body and its coefficient of conductibility.

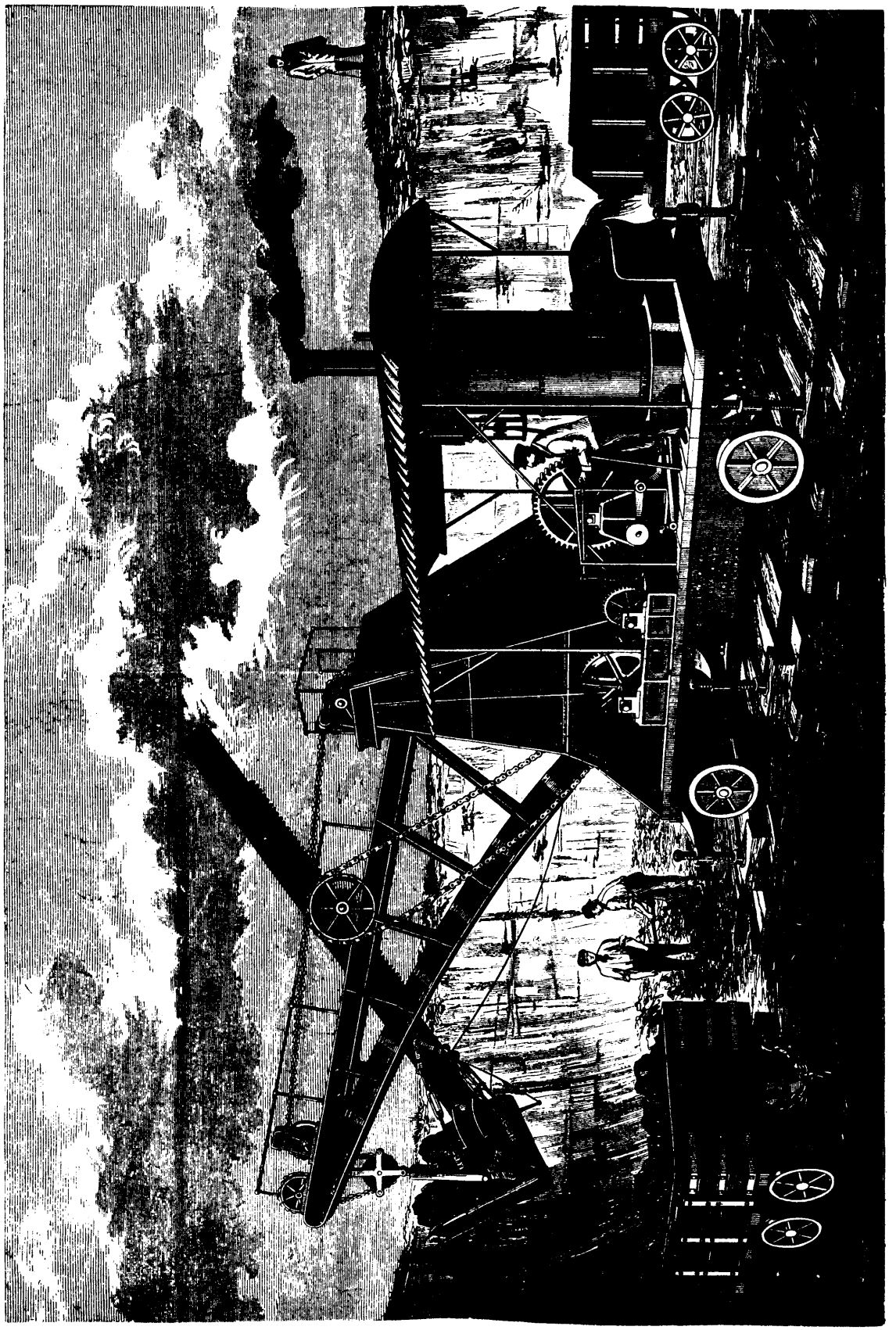
A French authority recommends the use of sawdust instead of hair in mortar to prevent its peeling off. His own house, exposed to prolonged storms on the sea coast, had patches of mortar to be renewed every spring, and after trying without effect a number of substitutes, he found sawdust perfectly satisfactory. It was first thoroughly dried and sifted through an ordinary grain sieve to remove the larger particles. The mortar was made by mixing one part cement, two lime, two sawdust, and five sharp sand, the sawdust being first well mixed dry with the cement and sand.

A form of gas and water geyser is said to exist in the town of Wilcox, Pa. An American report states with reference to a well in that town, that it seems to have an unfailing supply of water and of gas, between which there is a never-ceasing struggle. This is alternately illustrated by the projection of the water from the well to a great height, "followed by a volume of fire." After this, it is said the water runs back into the well to be again projected. It is not stated whether the gas is ignited by heated matter below the surface, but as the phenomenon is but briefly described, it probably is lighted by observers merely to give visible evidence that the gas current is inflammable.

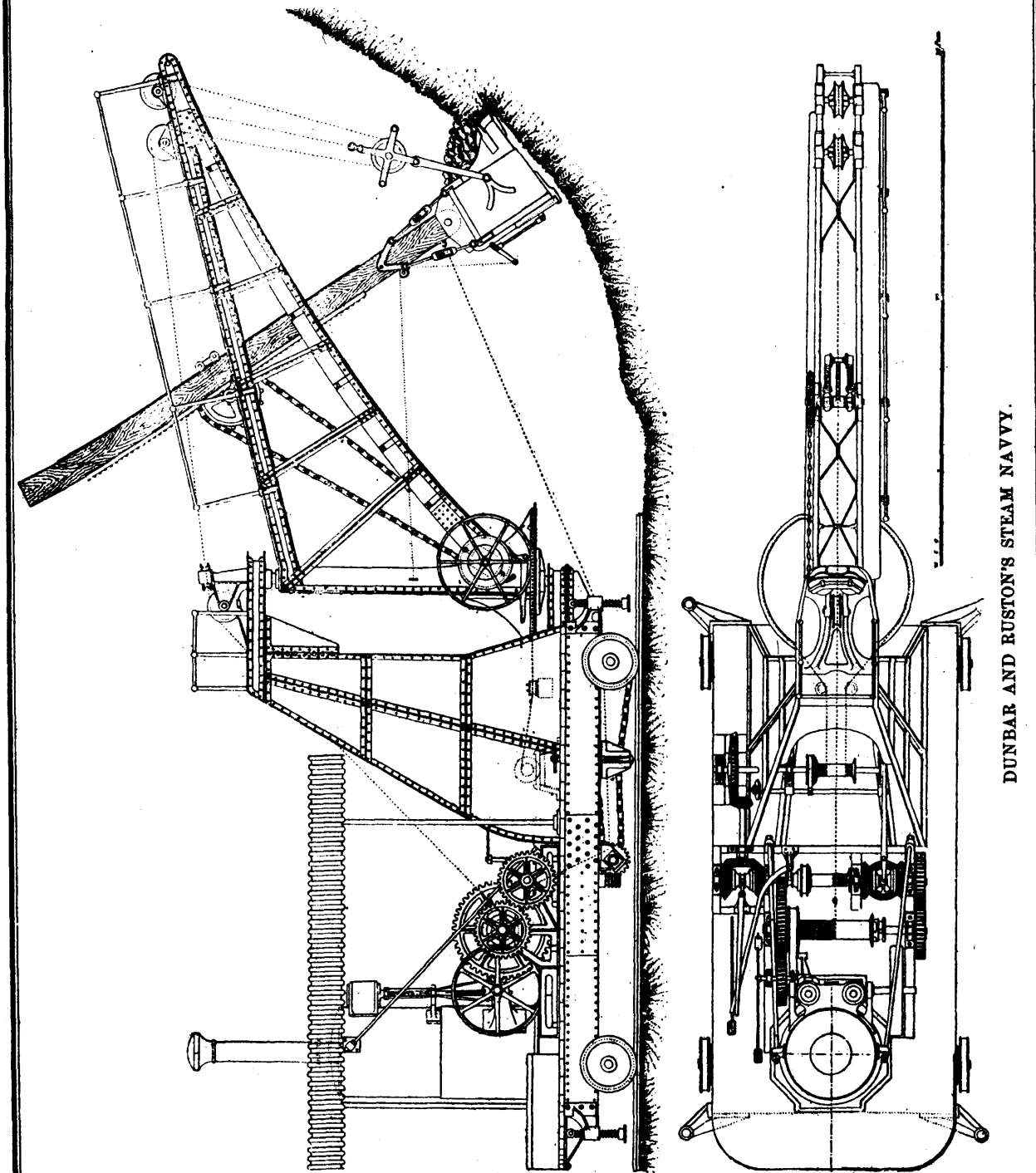
It is maintained, says the *Millstone*, that the inferior quality of certain kinds of wheat and rye flour is frequently due to the action of sunlight on the flour; even when in bags or barrels the gluten experiences a change similar to that occasioned by heating in the mill. The tendency thus imparted to it to become lumpy, and to form dough without toughness, is similar to that of most grain, or of flour when it is too fresh, or made from grain ground too early, or when adulterated with cheaper barley meal. Such flour can be improved by keeping some weeks.

In describing some stone-cutting saws with diamond teeth the *Polytechnic Review* says:—We find a French patent to George Herman, as far back as 1854, for diamond teeth for stone saws, and in 1865 E. R. Drake obtained a United States patent for diamond-toothed circular saws. The Leschet patents for diamond-pointed drills for stone-working proved highly successful and valuable, although the difficulty of losing the diamonds from their setting was early enumerated. It may be well to record here the marked success of Mr. Cyprian Chabot, of Philadelphia, in overcoming this difficulty, and firmly fastening the "borts" or diamonds in the drill-bits.

The *Scientific American* says that an artificial light approaching remarkably near, in agreeableness, to day-light, is produced by a petroleum lamp with a round wick and light blue chimney of twice the usual length, the latter causing so great a draught that the petroleum burns with a nearly white flame. Manufacturers of lamp chimneys and lamps would do well to test the matter, and if the result should prove satisfactory, they would confer a benefit both upon themselves and the world by manufacturing such chimneys and lamps. A good, cheap and agreeable artificial light is one of the leading requirements of the time.



DUNBAR AND RUSTON'S STEAM NAVVY.



DUNBAR AND RUSTON'S STEAM NAVVY.

LYMAN'S ROWING GEAR.

(See page 205.)

Among the minor novelties exhibited at Philadelphia, one attracted considerable attention by being exhibited on the lake in the neighborhood of Machinery Hall; and the appearance presented by an individual *rowing* a boat while he sits with his face towards the bow and goes through the ordinary motions of rowing, is certainly somewhat peculiar. The inventor, Mr. William Lyman, of Middlefield, Conn., has effected this innovation in the manner shown in the accompanying sketch.

Mr. Lyman cuts his oar in two, and secures each part in a separate iron, as represented in the cut. Each iron has a ball-and-socket joint which connects to a button, and each button slips into a slot made in the metal facing of the gunwale, and is there secured by turning a pivoted catch. Lastly the two parts of the oar are connected by a rod hinged to each iron. The advantages claimed for these oars are that the rower is enabled to see in what direction he is going; the weight of his body being thrown aft at the termination of each stroke, instead of forward as in the usual method, the bow of the boat is elevated instead of being depressed. The weight of the oars and levers slightly exceeds that of common oars, but the extra weight is so distributed that at the beginning and end of the stroke it helps to lower and raise the blade. The ball-and-socket joints are exceedingly neat and cheap, the sockets being cast on to the casehardened balls. One objection to this ingenious plan is that although the oars can be readily removed from the boat, they cannot be instantaneously unshipped, nor do they lie *quite* close alongside of the boat, and would be liable to injury in going alongside a wharf or vessel in rough water, but they are well adapted for shooting, fishing, or pleasure excursions in smooth water.

FIREPROOF STRUCTURES.

(*To the Editor of* IRON.)

SIR,—The experiment with fireproof flooring recorded in your issue of 28th April is interesting, inasmuch as it demonstrates the conditions necessary for the successful resistance of fire, and although neither the expert nor the practical man will find therein anything new, at least they obtain a further confirmation of principles already determined. It is well known that solid balks of timber present material resistance to the action of fire, and require considerable time before they become burnt through; indeed, as far back as 1865, the late Mr. Braidwood pointed out that heavy wood beams, with planked floors 3 inches or more thick, well fitted together and with perfectly air-tight connections to the walls, would afford sufficient time, in case of a fire breaking out, for enabling persons to escape and to effect the removal of any light or valuable property.

The great drawback in practice to the employment of timber, or, indeed, any other combustible material in floors destined to be fireproof, is the fatal defect that its destruction is merely a question of so many minutes or hours. In the floor experimented upon, the best method of dealing with the material was employed; yet, with merely such a fire as might occur in any room or in any portion of a warehouse building, a solid timber floor, 7 inches thick, was burnt through, and the part unprotected by plaster effectually destroyed, the only really fireproof part of the construction being the plaster. Now plaster, or concrete (which is merely a coarser kind of plaster), is wholly incombustible, and is probably less affected by fire than any other known building material; in fact, if it were possible to construct floors, walls and partitions entirely of plaster, a perfectly fireproof building, from a theoretical point of view, would be obtained. The recognition of this fact many years since led to various attempts at employing it practically.

The inherent weakness of plaster or concrete, however, when exposed to the transverse strain of loaded floors, led to the introduction of rolled-iron joists, which were imbedded in that material, being thus more or less perfectly protected from the action of fire. This principle has subsequently been modified and improved in its details, especially as regards the thorough protection of the iron by the covering of plaster; and it may now be regarded as a perfect method of constructing fireproof floors and buildings. This, at any rate, was the opinion of Mr. Braidwood, than whom there is no higher authority on such a subject. Probably no other man had more experience of fires, or brought more exhaustive study to bear upon the best means of dealing with them and preventing their recurrence. He says:—"I consider that houses built of brick or stone, with party walls carried through the roof, the partitions of brick, the stairs of slate or stone, the joists of rolled iron filled in with concrete, and the whole well plastered, are practically fireproof."

In Paris, where such a form of construction is universal in principle, being modified only in details, a fire is rarely heard of; and insurance companies are able to achieve very remunerative results, while charging the ridiculous low sum of something like 5d. (five-pence) per cent. for insurance rates.

In the earlier fireproof buildings, the conditions for successfully resisting fire were not yet recognized, and only after more than one large fire had occurred, were the weak points of construction revealed. Especially was it noticed that cast-iron girders and brick arching failed, owing to the action of the fire causing expansion of the iron, and the brick arches losing their abutments or ties, thus permitting a few bricks to fall out, when the fire leaped forth into the next story.

In a concrete floor, on the contrary, this can never happen; the iron, the plasters, and the concrete form a homogeneous whole—in fact, a solid slab or monolith.

The experiment with the rolled-iron joist is of no practical value, as in actual construction joists are never fixed under the conditions recorded. Every practical man knows that a bar of iron, fixed on two points of support, and sustaining a weight of 3 cwt. in the middle, would, when made red-hot, sink down, and ultimately topple over; and it is self-evident that, other things being equal, iron resists fire better than wood—in fact, a 7-inch timber joist, subjected to the same test, would not have held out for ten minutes.

After all, we must be guided in our judgment in this matter, as in all others, by actual facts; and here experience is entirely in favour of a good system of iron and concrete construction properly executed in all its details. Many will remember the great fire which happened at the Leather-Cloth Factory, North Woolwich, some years ago. This building was filled with inflammable materials, such as cotton, oils and varnishes, and had an iron and concrete floor, covering only the warehouse portion and the offices; the floor withstood the fire for three days, having also many tons of water thrown upon it by the large floating fire engines; it resisted the fall of the roof and the walls, and preserved the stock and papers uninjured. When this result is compared with the absolute destruction, in a few hours, of the timber floor experimented upon, there is ground for some hesitation before going back to timber construction, or, indeed, to any other in which the materials employed are not practically incombustible.—I am, &c., ENGINEER.

ACTION OF SEA WATER ON LEAD.—The *Journal of the Chemical Society* says that, after keeping strips of new cut lead in a bottle of sea water, frequently shaken, for four days, no trace of lead could be detected in the water, but the bright surface of the strips was coated with an insoluble lead compound. Hence, lead pipes may be used in marine aquaria without any fear of injury to their inhabitants.

THE Indian State railways have extended considerably in the past few years. In 1873 there were only 160 miles of railway open for traffic in India, 1213 were under construction and 1294 under survey. The figures are just now as follows: 849 miles open for traffic, 1294 under construction, and 1239 under survey.

COLORATIONS ON ZINC.—An original recipe for giving beautiful and durable rainbow colorations to zinc is reported. The zinc may be in any form, cast or sheet, but must be pure, dry, polished, or filed, and the coloration is the more brilliant as the materials of the bath are pure, so that the best effects are got with chemically pure re-agents. The bath consists of 30 grammes tartrate of copper (weinsaures Kupferoxyd), 40 grammes caustic potash, and 480 grammes distilled water. On subjecting the zinc to the action of the bath for a couple of minutes it appears violet; for three minutes, deep blue; four and one-half minutes, green; six and one-half minutes, a golden yellow; eight and one-half minutes, purple violet.

ANIMALS AND MACHINERY.—A writer in a German engineering journal contrasts the behaviour of different animals towards steam machinery. That proverbially stupid animal, the ox, stands composedly on the rails without having any idea of the danger that threatens him; dogs run among the wheels of a departing railway train without suffering any injury, and birds seem to have a peculiar delight in the steam engine. Larks often build their nests and rear their young under the switches of a railway over which heavy trains are constantly rolling, and swallows make their homes in engine houses. A pair of swallows have reared their young for years in a mill where a noisy 300 horse power engine is working night and day, and another pair have built a nest in the paddle-box of a steamer which plies during the season between Pesth and Semlin.

IMPROVED UPENDING TONGS.

BY JEREMIAH HEAD, M.I.C.E.*

* Read before Cleveland Institute of Engineers, April 25th.

(See page 208.)

The following is the substance of a verbal description given at the above meeting of engineers, and it will be seen that Mr. Head deals with the question under an entirely new aspect.

A single shingler, furnished with a high pair of tongs, can easily manipulate under a hammer, puddled balls weighing 2½ cwt., including upending them. A pair of shinglers, assisting one another, can, with equal facility, deal with balls up to 5 cwt.

But modern rotary furnaces are capable of producing as much as 20 cwt. per heat, which must be dealt with in one mass. There appears to be no way of expelling the cinder from crude wrought iron, and of consolidating it, more effectual than the old process of shingling, providing it is done expeditiously. But this becomes extremely difficult with weights greater than those mentioned, unless means be devised for assisting the men with power, and admitting of their working at a reasonable distance from the heated mass.

The piece of mechanism at present illustrated will, it is hoped, afford a solution of the difficulty.

When the oval-shaped ball is tipped from the bogie upon the anvil, it is first necessary to give it the form of a parallelopiped. This is intended to be done by three men acting with suspended hooks, and turning the piece over a quarter of a revolution after each blow of the hammer. The bloom is prevented from escaping sideways by a roller skirting one side of the anvil, and is just clear of the hammer head when it falls. Thus far the operation is a simple one, and such as may be seen at many forges. But the effect of the repeated blows is not only to consolidate, and to give a square section to the bloom, but also to elongate it. To prevent it from becoming unmanageable in this respect, and to flatten the ends it now becomes necessary to upend it, and for this purpose the improved tongs are brought into requisition.

Their construction will be readily understood from the drawing. They are suspended, by a chain passing over a pulley, to a small steam-winch on the hammer-platform, and worked by the hammer-driver. At the point of suspension, between the tongs and suspension-chain, is a small pair of subsidiary tongs, connected with the former by universal joints ; and with the latter by a nearly horizontal sling chain. Their effect is to give a self-gripping action to the main tongs, the amount of the grip being exactly proportionate to the weight to be lifted. In up-ending the piece, two men stand, as shown in the drawing, at the end of the tongs. Each man takes hold of one of the handles with one hand, and of a cross-bar with the other. The object of the cross-bar is partly to afford a fulcrum to act against in opening the tongs (for they need not concern themselves about closing them), and partly to give a better purchase in bearing down. The winch really does the whole of lifting, and of gripping.

The points of the tongs are formed of conical centre-pieces of soft steel, which can be readily changed, according to the size of the blooms under treatment, or when worn out.

In this way, blooms of great weight can be side-hammered, up-ended, and put upon the bogie with a minimum amount of labour, and of exposure to heat.

The whole apparatus has been fitted up at Messrs. Fox, Head & Co.'s Iron-works, at Middlesborough, and seems to answer its purpose well.

THE ELECTRIC PEN AND BATTERY.

(See page 205.)

We regret that the letter-press for this illustration has been mislaid, and as our Editor is absent, its publication must be deferred ; it will appear in a future number.

THE UNITED STATES AND THE WAR.—It has been ascertained that Turkey has received over 300,000 stand of arms from the Providence Tool Company within the past two years, under a contract made with that company to furnish 500,000 Peabody guns—a breechloading rifle similar to the Martini-Henry. The rifles are still being manufactured for and delivered to the Turkish Government, several officers of which have been in the country for some months past superintending their manufacture. The Turks also have contracts with various firms in the country for 200,000,000 rounds of metallic cartridges. Russia, it is stated by the same authority, has also received a good supply of arms from America, including a large quantity of revolvers from the Colt Company.

A GUIDE FOR SAWING LOGS.

(See page 205.)

Some have asked for a method by which inexperienced persons may be able to saw logs, or shingle blocks square at the ends. It is very easy for beginners in the art of sawing to saw these uneven, and to do otherwise is almost impossible. There are several reasons for this : one is, if the saw is not set truly, it will run to one side ; old sawyers, with great trouble, prevent this by constant pressure on one side of the saw. Another reason is that new sawyers cannot keep the handles of the saw steady and upright, but permit it to "wobble" about, and at every "wobble" the cut goes to one side. But with a guide to lead the eye, almost any person can, by using care, saw a log squarely at the ends. Such a guide we have occasionally improvised for "greenhorns" at sawing, by taking a flat hoop of a flour barrel, and tacking it to the log with two shingle nails, as shown in the illustration. Then a narrow cut should be made on the top of he log with the ax, for a starting point, and with a saw properly set and sharpened, it will be easy to follow the guide and saw a square cut.

A HANDY FRAME FOR SAWING WOOD.

(See page 205.)

G. McAdam, of Egmondville, Canada, sends a draft of a very handy sawing frame, contrived by Mr. Joseph Stevenson, Egmondville. This frame has, in this locality, altogether superseded the buck saw. With one of Boynton's cross-cut saws, there is no trouble to cut cord wood ; the end where the saw is inserted in the pendulum should work in a slide. The accompanying engraving very clearly represents the frame above mentioned, so that one could be readily constructed from the illustration without the need of any further description.

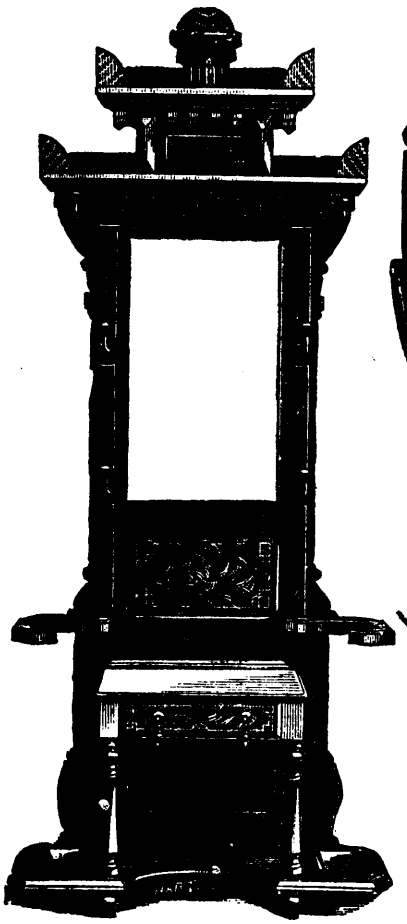
CANADIAN PACIFIC RAILWAY.—The track on this road has been laid for 35 miles from the eastern terminus at Fort William on the Kanimistiquia river, two miles from its mouth in Thunder Bay. At Fort William a wharf has been completed, and a substantial stone roundhouse, repair shop, storehouses, and other buildings are in progress, including dwellings for the railroad staff. A branch line has been "located" about four miles long to Prince Arthur's Landing.

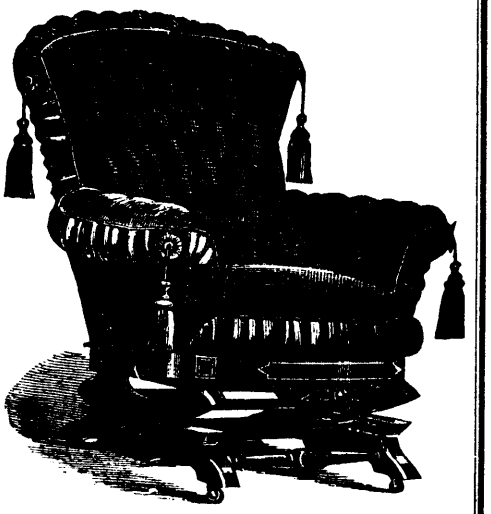
A FRENCH INDUSTRY.—A peculiar industry has recently come to grief in Paris. An establishment was organized for the purpose of breeding maggots. The means by which the "god-kissing carrion" was encouraged in the process was very simple. Over the soil there were spread large quanities of stale fish, dead lobsters, odorous poultry, and other refuse of the markets, as much as half a ton of large fish being taken on the premises in a single day. This stuff was soon atacked by the maggots, which in time were carefully picked out and packed in casks of galvanized iron, and finally were sold for fish bait and chicken feed. The remaining refuse was converted into manure. It may well be supposed that the neighbors objected to the smells from the establishment. Moreover, the production of maggots was not confined to the premises ; the flies roamed round and deposited the larvæ upon any exposed food in the vicinity. There was a little doubt as to whether the flies came within the scope of the sanitary laws, but at last the authorities ordered in the police and stopped the manufacture.—*Min. and Sci. Press*, xxxiv, 279.

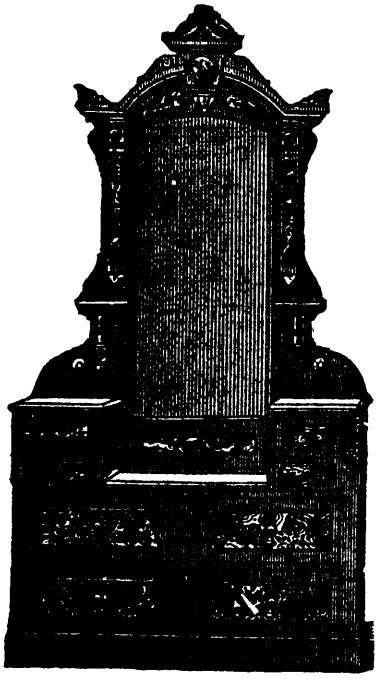
TO PREVENT STEEL FROM OXIDIZING DURING TEMPERING.—Small articles in steel are said to be preserved from rust while being tempered by giving them a coating of ferro-cyanide of potassium. For this, two parts of finely powdered charcoal and one part of ferro-cyanide of potassium are boiled up to a thick paste with a solution of gelatine or strong glue. After warming them, the articles are dipped into this mass, dried, dipped again, and so on, until the coating is the twelfth of an inch thick. The articles can then be exposed to a coal fire ; heated to redness, and tempered without fear of rusting.—*Iron*, ix, 556.

FIRE PROOF CONSTRUCTION.—The frequency of disastrous fires recalls a suggestion of the late Hiram Powers, for rendering buildings comparatively fire-proof at a small cost. It was to place a layer of sheet iron or tin between the joists and the flooring. The difficulty of igniting and consuming a plank lying upon the ground without a draft underneath is well known, and Mr. Powers contended that the plan he proposed would localize a fire to one apartment quite as well as is would be in European houses by the concrete or plaster in which their floors are laid.—*Bulletin*, xi, 139.

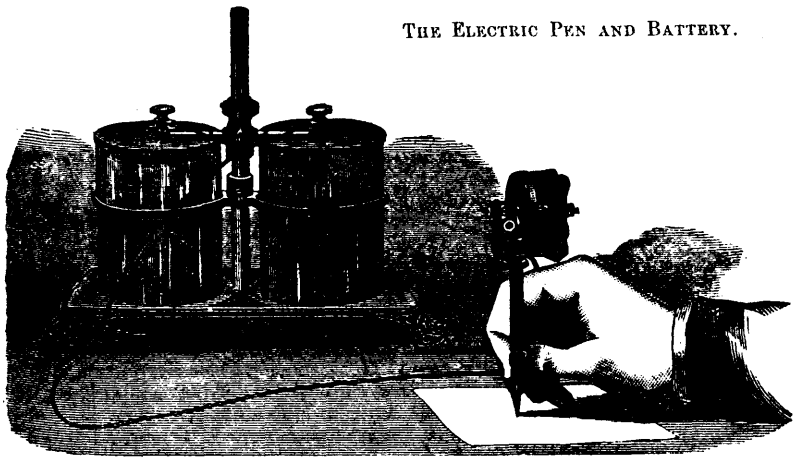
EXAMPLES OF FURNITURE.



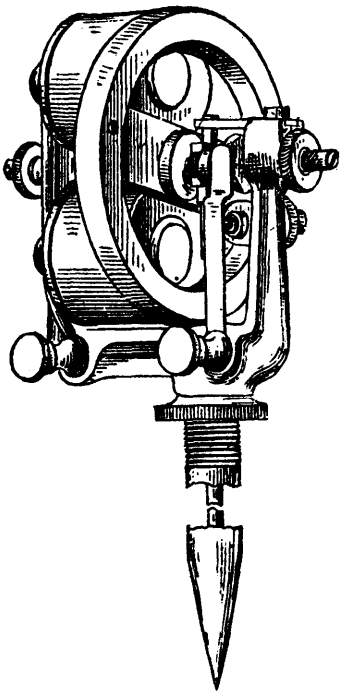




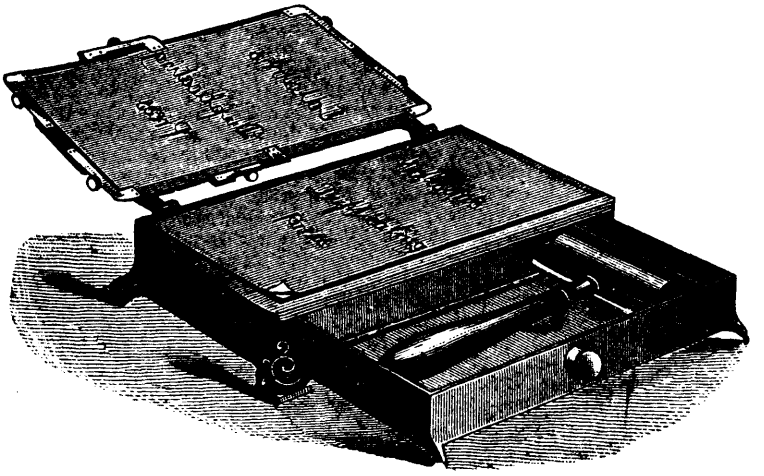
THE ELECTRIC PEN AND BATTERY.



ELECTRIC PEN AND BATTERY.

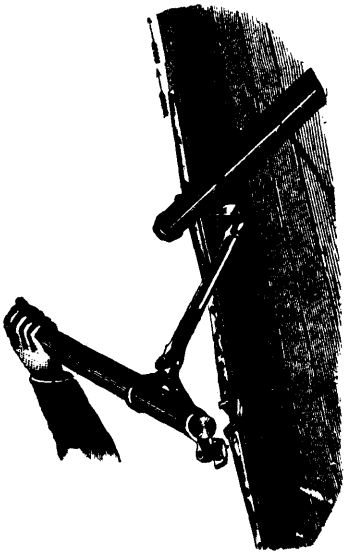


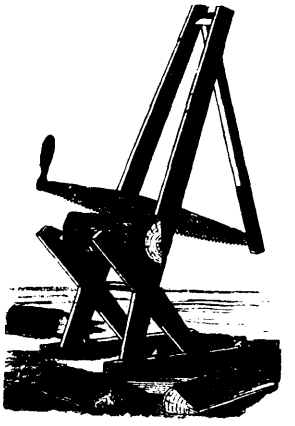
THE ELECTRIC PEN—FULL SIZE.



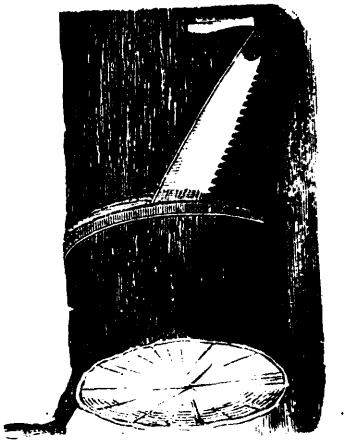
DUPLICATING PRESS.

LYMAN'S ROWING GEAR.





FRAME FOR SAWING WOOD.



A GUIDE FOR SAWING LOGS.

NEW INVESTIGATIONS ON THE SPONTANEOUS COMBUSTION OF OILY REFUSE.

We give below a valuable report, taken from the columns of the *Woolen Manufacturer*, of certain experiments recently made in England, with the various oils in common use in factories. The results reached by Mr. Coleman are the same as have frequently been obtained by chemists in this country. We commend the article to the attention of our readers generally :

Mr. J. J. Coleman, of Glasgow, has recently transmitted to the *Société Industrielle*, of Mulhouse, France, a memoir on the spontaneous combustion of oily refuse, and on the relative inflammability of the different oils employed for lubricating purposes. He describes a series of experiments upon fragments of cotton, linen, jute and woolen waste, saturated with oils of different natures. The materials were placed in a box of tin, having a double bottom in which steam entered, so that the part which received the refuse could be maintained at a temperature of 180° Fahr. A thermometer was inserted in the oily substance so that the variation of temperature occurring therein could be noted.

The results obtained show, first, that *any vegetable or animal oil inevitably takes fires after a few hours*, under the above conditions. On employing cotton waste, the mass burns quickly and with flame, in contact with the air. Wool refuse is slowly transformed into a black carbonaceous mass. Second, the addition of mineral oil—known as lubricating mineral oil—serves to retard the spontaneous combustion of vegetable or animal oil if mixed in small quantity. If a large amount be added, inflammation is entirely prevented. The mineral oil used by Mr. Coleman is a very dense product, having great vicosity and emitting no inflammable vapors, even in contact with an ignited body at any point below 338° Fahr., in other words, remaining safe at temperatures at which mixtures of less dense mineral oil or colza oil burns. The addition of forty per cent. of mineral oil is sufficient to prevent spontaneous combustion. Twenty per cent. doubles the time necessary to determine conditions favorable to the same.

There is another advantage to be gained by mixing mineral oil with that of animal or vegetable origin, in that the latter is thereby prevented from resinifying, or thickening, on prolonged exposure to the air. Mr. Coleman exposed in his hot air bath, for a period of forty-eight hours, vessels containing olive, colza, sesame, and cotton seed oils. The first thickened, the second the same to a greater degree, the third still more, and the last yielded a semi-liquid, amber colored mass. The addition of twenty per cent. of mineral oil caused all to remain perfectly fluid. The author concludes that, for the lubrication of machinery, it is advantageous to employ a mixture containing as much mineral oil as is possible, while retaining the material at the proper degree of vicosity. Colza and other oils employed for lubricating heavy machinery are greatly improved by the addition of from ten to twenty per cent. of mineral oil, the small vicosity of the former preventing a mixture of greater proportions of the latter. For spindles, on the contrary, it is better to use a larger amount of mineral oil, making a mixture of about the vicosity of sperm oil.

Boiler Explosions due to Grease and Lime.—A French paper says : A commission, appointed to report on a boiler explosion at La Villette, Paris, attributed it to an insoluble deposit, composed chiefly of a calcareous soap, which formed near the opening of the water feed-pipe, and which was due to the nature of the feed-waters. Some of the water was furnished by the city, containing calcareous matters ; some came from condensers, bringing fatty particles from the machines, in which they had been used as lubricants. The commissioners cite numerous accidents which have occurred during the past 15 years, all of which are attributable to the same source. They, therefore, think it important that all manufacturers should be warned of the danger, and if they are obliged to use such a mixture of waters they should use all possible precautions, such as the purification of the calcareous waters by carbonate of soda ; the filtration of the condensed waters, by passing them through wood or felt ; the skimming of the grease from the surface of condensing cisterns ; and frequent drawings off from the surface of the water in boilers.

New Guano Deposits.—An English commission, sent to examine some recently discovered guano deposits to the south of Tarapaca, in Peru, has confirmed the reports of previous explorers as to the immense quantity of the deposit, amounting to at least 10,000,000 tons ; and it is richer in ammonia and phosphates than that of the Chincha Islands.

We regret having omitted the letter press of this article in the June number.

THE PULSOMETER.

We publish on page 172 an illustration taken from the *Engineer* of an extremely expeditious mode of raising water out of quarries. During the late unprecedentedly heavy floods, Messrs. S. Seal and Son, of Wakefield, whose quarries are situated in Yorkshire, Derbyshire, and Staffordshire, have had several of their works stopped from the extraordinary accumulation of water. This was notably the case at their Normanton quarry in Yorkshire, where they extract large quantities of material for grindstones for the Sheffield market, as well as for scythe and other stones for South America and India. This quarry is 82 ft. by 60 ft. and 72 ft. maximum depth. The shallowest workings were covered to a depth of 10 ft., but on a space of 46 by 24 ft. it was filled with 45 ft. of water. This occurrence was quiet a new experience in the working of the quarry, and no pumping apparatus had been provided for clearing the water, consequently the whole of the workmen were out of employ. It was first the intention of the owners to fix a centrifugal pump, but this would have entailed heavy expense and considerable delay, moreover the part to be drained was very inaccessible and there were but small facilities for fixing the machinery. They consequently decided upon fixing one of the No. 7 pulsometers, manufactured by Messrs. Hodgkin, Neuhaus, and Co., of Queen Victoria-street, London. This pump, the construction and mode of working of which has already been described in these columns, was, together with a 4-in. cast-iron suction pipe and a 4-in. cast-iron discharge pipe, slung to the quarry crane and lowered to the water. As the water was pumped out, additional pipes were fixed until at length the bottom was reached, a depth of 72 ft. from the surface. This body of water, from the commencement of the pumping, was lifted in about three days, the men being then again able to resume work. A well is now being formed at the foot of the suction pipe into which the quarry is drained and the place is now easily kept dry by turning on steam for about two nights per week. The pump is fixed upon two beams about 9 ft. from the bottom, and with a steam pressure of from 50 lb. to 55 lb. to the square inch from boilers about 135 ft. away (and which are running the whole of the machinery of the works), the water is at present raised at the rate of 15,000 to 20,000 gallons per hour for a height of 72 ft.

The introduction of the pulsometer into this country has been attended with considerable and very marked success. The first cost is of small concern, compared with the promptness with which the apparatus can be installed, and the inexpensive nature of the appliances required to fix it. When in operation it requires no special attention and is not liable to derangement or stoppage.

At the car wheel foundry of the Pennsylvania Railroad Company in Altoona, says the Johnstown *Tribune*, large quantities of worn-out steel rails are used in the manufacture of chilled car wheels. The rails are sheared into convenient lengths, and are charged into the melting cupolas with pig iron, in a percentage proportioned to the varying qualities of the pig. Irons heretofore worthless for car wheels, owing to their non-chilling qualities, are thus rendered valuable for the purpose, and more uniform results are obtained than from pig iron alone.

Massachusetts has 1144 miles of steel rails, and during the past year 5999 tons of steel rail have been placed on the main line of the Pennsylvania Railroad, and 7068 tons on the New Jersey division, making an aggregate of 13,067 tons. 3854 tons of steel rails were laid on the Philadelphia and Erie Railroad.

The total number of railway servants employed in Great Britain is about 285,000 ; during 1876 about one in 64 were either killed or injured, nearly nine-tenths of the casualties being within the sufferers' control. Engine drivers and firemen, goods guards and brakesmen, shunters and ground pointsmen contribute most of this total, about one in 34 falling victims. About one out of every 15 goods guards and shunters employed on the railways of England is either killed or injured every year.

Removing Scales from Boiler Tubes.—Mr. S. S. Pilson, master mechanic of the Louisville, Cincinnati and Lexington road, removes scales from boiler tubes by placing them in a furnace. The heat loosens the scale and causes it to fall off, besides annealing and restoring the tubes. They are straightened by being placed, while hot, on an iron rod, and hit where needed with a hammer. Mr. Pilson has also invented an attachment for grain-car doors, which excludes dust and rain, and also serves to seal and lock the car.—*National Car Builder.*

MISCELLANEA.

A CANADIAN firm are endeavoring to get an order filled in Charlestown, West Virginia, for 2,000,000 ft. of sawed lumber, to be used for lock gates of the Welland canal. The order was sent South on account of the great dimensions of some of the pieces, there being no trees sufficiently large for the purpose in Canada.

A SAFE ENVELOPE.—A safety envelope, to prevent tampering, has been devised by an American maker. On the flap, the words, "Attempt to open" are printed with a double set of chemicals, the first impression containing nutgalls and the second green vitriol. If the flap be steamed or moistened in any way, the magic printing will appear.

FIVE THOUSAND DOLLARS REWARD FOR A NEW INVENTION.—The Directors of the London General Omnibus Company offer to award a prize of £1,000 for an invention or a scheme for effectually recording or checking the receipts of their passengers' fares, and which may be accepted by them as being so effectual. But the acceptance of any invention or scheme is to be entirely in the discretion of the Directors, who will not be bound to accept any invention or scheme at all, nor to give any reason for non-acceptance.

HELL GATE.—The contractors have begun to clear away a mass of broken rock from the scene of the recent explosion at Hell Gate, New York. The rocks do not appear to have been broken into very small fragments, some of the pieces weighing several tons. The contractors are using dynamite to break these large fragments.

PROFIT IN POULTRY.—We do not think that one half of those persons who keep poultry as a special business make ends meet, unless they sell eggs or fowls at fancy prices. Everyone cannot do this. Those only succeed who have more than usual tact, patience, perserverance, and aptness to learn, if they have not already had experience on a farm. It is not advisable for any person to embark in the business largely at first, but it would be wise to begin in a small way and let it grow by success.

THE exportation of English salt to Boston for the first three months of this year shows an enormous increase over the exportations for the same period last year. One of the causes is the low rate of ocean freight from England to America. Vessels prefer to take salt at very low rates rather than make the trip across the ocean in ballast, and much has lately been sent at merely nominal rates.

ENGLAND produced last year 700,000 tons of Bessemer steel' while the mills of the United States turned out 512 tons during the same period.——A shipment of 700 tons of steel rails has just been made to Rio Janeiro. These were manufactured by the Pennsylvania Steel Co., and are 45 lb. sections, hammered rails.

AMERICAN-MADE boots and shoes are making inroads upon Europe, and the clamor at the invasion is heard from the shoemakers of several continental countries. The Berlin *Shoemaker's Gazette* says American boots are sold in Switzerland at $2.90 per pair, and this has suddenly put a stop to the exportation of boots and shoes to America, by opening competition on their own ground.

A GERMAN chemist has demonstrated that by tinting the collodion used in taking a picture, or by employing glass plates of different colors, objects may be vividly photographed which, under ordinary circumstances, would be only faintly depicted. This method is now employed at the Bank of France for detecting forgeries. The slightest erasure upon the face of a check, or the alteratoin of a figure, which is imperceptible to the eye, is at once made apparent by photography.

NEW GUANO DEPOSITS.—An English commission sent to examine some recently-discovered guano deposits to the south of Tarapaca, in Peru, has confirmed the reports of previous explorers as to the immense quantity of the deposit, amounting to at least 10,000,000 tons, and being besides richer in ammoniacal salts and in phosphates than that of the Chincha Islands.

NON-TRANSPARENT VARNISH.—When oxidised silver needs to be varnished—which could not till now be satisfactorily done for want of a suitable varnish—a recently invented species of varnish is used, which produces a perfectly opaque non-glistening coating. It consists of 18 parts of alcohol, 3 of red arsenic, and 1 of castor-oil, and may be diluted for especially fine coating of instruments, &c., with an equal quantity of alcohol.

CANADIAN RAILWAY WORKING EXPENSES.—The ratio of the working expenses to the traffic receipts on the Great Western Railway of Canada still continues most severe. In the six months ending January 31, this year, the ratio was 83.15 per cent., as compared with 78.77 per cent. in the six months ending January 31, 1876, and 78.82 per cent. in the six months ending January 31, 1875.

OIL FOR BELTS.—A preparation intended for oiling belts has lately come to market, which appears to be a linseed-lead soap dissolved in turpentine. The preparation is said to possess many advantages and can be made, according to Prof. Gintl (*Techn Blttr.*,) by boiling 9 parts of linseed oil, with addition of water, with 4 parts of oxide of lead to a plastic consistency, and then, after pouring off the remaining water, dissolving it in such a quantity of hot turpentine to reduce it to a varnish-like fluid.—*Deutsche Ind. Zig.*, 1877, 188.

RED INK.—A superb red ink is obtained by a solution of eosin in water. This ink has a brilliant red color, much finer than that made of cochenille, and it is free from the blue tinge which the latter possesses. By using the so-called imperial red or scarlet instead of the eosin, a yellow tone is given the ink. The ink flows freely from the pen, and can, by adding gum arabic and glycerine, be made to copy.—*Färber Zig.*, 1877, 139.

HARD times in Russia. In St. Petersburg and vicinity, 90,000 artisans are destitute; at Moscow 40,000. The distress among the lower classes is increasing, apparently. The commercial crisis, numerous failures of banks and mercantile houses, the closing of factories, the discharge of a multitude of clerks, and a recent inundation, which destroyed whole villages, have done the work.

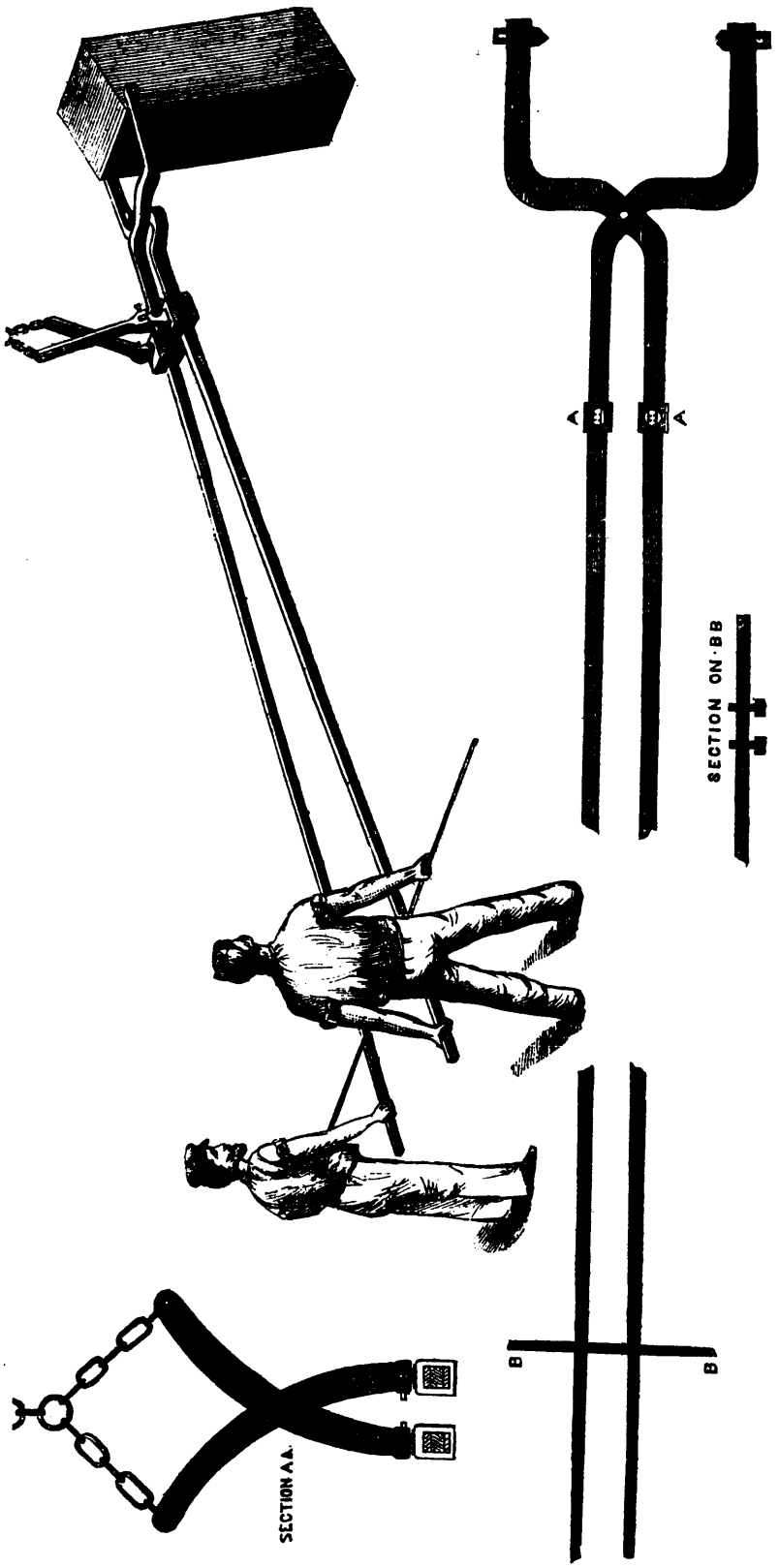
CEMENT AND BROKEN STONE FOR CULVERTS.

A writer in the *Railway Age* aims to meet the needs of builders, by describing culverts of grouts made with cement mortar and broken stone for culverts, in a country where stone of good quality is scarce.

For a two to six feet culvert, make a good stone foundation, laid in a trench dug for the purpose, and cover it with grout made of cement mortar mixed with coarse gravel or broken stone, in or on which lay a penstock of desirable diameter, the staves made of any cheap lumber, one inch in thickness and four or five inches wide, properly hooped, laid on the grout, and cover it with grout from three to six inches, according to the diameter of the culvert, covering the grout with dirt as the work progresses, so it will not dry, but harden. Two or three months' durability of the penstock would be all required of it.

In cases where large culverts are required and stone can be procured for side walls, and money cannot for cutting the stone to make a stone arch, lay up the side walls to the height required, the whole length of the culvert to be made. Then make a strong wooden arch, well braced, from five to ten feet long, with its span or base line a little shorter, say one or two inches, than the distance (or width) between the side walls of the culvert, which we might call the abutments of the arch. Then commence at one end of the culvert and set the wooden arch so one end will rest firmly on the inner side of the top of one of the abutments, and the other on a piece of plank lying on and projecting over the inside of the other abutment on a line of about two inches of the inner face of the abutment. It would require about three pieces of plank at equal distances and made to support that side of the arch by putting heavy stone on the part of the plank lying on the abutment. Or, that side of the arch might be made six to twelve inches longer than the other, and rest on strong pieces of wood built in the wall the same number of inches from its top. Or, the base line of the arch might be made about four inches less than the distance between the abutments, and both feet of the arch rest on two or three boards laid across the abutments at equal distances. After the arch is adjusted in place, lay stone along the base of each side to prevent the grout from falling inside, and then put on the grout over the entire arch to the desired thickness, covering it with dirt as it progresses, to favor the setting of the cement, and as soon as it is sufficiently hard, saw or cut out the wooden supports and take out the wooden arch from the inside, move it below and set it up close to the section of grout arch built, and complete another section, repeating the operation until the whole culvert is completed.

I have in my mind a culvert with side walls laid as in an ordinary box culvert, about five feet apart and six feet high above the pavement.



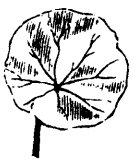
THE IMPROVED UPENDING TONGS.

THE FAMILY FRIEND.

This part of the MAGAZINE, for the future, will be devoted to instructive domestic reading for the *Home Circle*, such as SHORT PLEASING STORIES, DRAWING, MUSIC, BOTANY, NATURAL HISTORY, POPULAR GAMES, and amusements for the boys and girls; NEEDLE WORK, AMATEUR MECHANICAL PURSUITS, and all the elements of a *practical domestic education*; also GARDENING and ARCHITECTURAL NOTES.

BOTANICAL GLOSSARY.


Legume.


Orbicular Leaf of Tropæolum.


Oblanceolate Leaf


Peltate, or shield-shaped leaf.


Perianth.


Revolute Segments of Perianth.


A Leaf with lobes.


Oval Leaf.


Obovate Leaf.


Pepo. Cucumbers.


Pericarps: Hazel-nut, Pea & Cherry.


A Ringent Corolla. Salvia.


A Loment.

Pistil, with Ovary laid open, showing the ovules.


Ovate Leaf.

Pistil. Ovary J; Style, I; Stigma, H


Nemophila, showing its five petals.


Rhizome or Root-stock.


Beet Leaf, showing mid-rib.


Leaf of Begonia Rex, showing the netted veins.


A Panicle.


Anther, discharging pollen.


Pelargonium Leaf. O, Petiole.

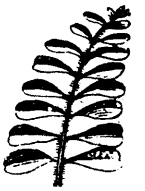

Rotate Flower. Potato Blossom.


Nerved Leaves.

D, Node or Joint.


Thistle Seed, with crown of pappus.


Raceme of Dicentra.


Pinnate Leaf of Clianthus.


Sagittate Leaf.


Opposite Leaves of Nummularia.


Obcordate Leaflets Oxalis Bowei.

Wallflower. Peduncle M, and pedicel N


Gaillardia. Ray flowers around the margin.


Reflexed Segments of Perianth.


Leaf with Sinuate Margin.

BOTANICAL GLOSSARY.

HIRSUTE : Hairy ; having stiffish or beard-like hairs.
HORTUS SICCUS : An herbarium, or collection of dried plants.
HYBRID : A cross between two allied species.
INSERTION : The mode or place of attachment of an organ.
INTERNODE : The part of a stem between the nodes.
INTRORSE : Turned inwards ; an anther is introrse when it faces the pistils.
INVOLUCRE : A whorl or set of bracts around a flower, umbel, or head, as shown at G in the engraving.
LABIATE : Lipped ; bilabiate.
LACINIATE : Cut irregularly into deep, narrow lobes ; slashed.
LANCEOLATE : Lance-shaped.
LEAFLET : One of the parts or divisions of a compound leaf, as seen in the Horsechestnut leaf. (See engraving of digitate leaf.)
LEGUME : The fruit of a leguminous plant ; as the pod of a pea ; a single, two-valved carpel.
LOBE : Any projection or division, especially of a somewhat rounded form.
LOMENT : A pod like the legume, of two valves, but divided into small cells, each containing a single seed.
MACULATE : Spotted.
MARGINATE : Having an edge or margin different from the rest.
MIDRIB : The middle or main rib of a leaf.
NEEDLE-SHAPED : Long, slender and rigid, like the leaves of pines.
NERVE : A name for the ribs or veins of leaves when simple and parallel.
NETTED-VEINED : Furnished with branching veins forming network.
NODE : A knot ; the joint of a stem from which springs a leaf or a pair of leaves.
OBCORDATE : Heart-shaped, with the attachment by the pointed end.
OBLANCEOLATE : Lance-shaped, with the attachment at the tapering point.
OBOVATE : Ovate, but with the broad end upward.
OPPOSITE : Placed on opposite sides of some other body ; thus when leaves are opposite they are on opposite sides of the stem ; and petals on opposite sides of flowers.
ORBICULAR : Circular in outline, or nearly so.
OVAL : Broadly elliptical.
OVARY : That part of the pistil containing the ovules or future seeds, and in the course of development becomes the fruit.
OVATE : Egg-shaped ; like the section of an egg lengthwise.
PALMATE : Digitate ; resembling the hand with the outspread fingers ; spreading from the apex of a petiole as the leaflets or divisions of a leaf.
PANICLE : An open flower cluster more or less branched, after the style of a head of oats.
PAPPUS : Thistle-down, and the similar formation in other flowers.
PEDICEL : The stalk of each single flower of a cluster.
PEDUNCLE : A flower stalk of a single flower when borne singly, or of a cluster.
PELTATE : Shield-shaped ; applied to a leaf when the petiole is attached to its lower surface.
PEPO : A fruit like the Melon and Cucumber.
PERIANTH : All the flower-leaves taken collectively when they appear so much alike that they cannot be distinguished as calyx and corolla ; as, for example, in the flowers of the Lily family.
PERICARP : The ripened ovary ; the shell or rind of any fruit taken as a whole. When it separates into layers each layer may have a different name, but the whole taken together constitutes the pericarp.
PETAL : A leaf of the corolla.
PETIOLE : A leaf-stalk.
PINNATE : Feather-shaped ; a pinnate leaf consists of several leaflets arranged on each side of a common petiole.
PISTIL : The central and seed-bearing of the flower, consisting of three parts, the ovary, the style and the stigma.
PLUMOSE : Feathery ; when any slender body is beset with hairs along its side, like the plume or beards on a feather.
POLLEN : The fertilizing dust or powder of the anther.
PYRAMIDAL : Shaped like a pyramid.
RACEME : A flower cluster with the flowers arranged singly, on short pedicils, along the common flower-stalk ; as the Lily of the Valley and the Dicentra.
RACHIS (the backbone) : The axis of a spike.
RADIATE or RADIANT : Furnished with ray-flowers distinct from disk flowers ; as in the Sunflower, &c.
RADICAL : Pertaining to the root, or apparently coming from the root.
RADICLE : The first root of a plant in the embryo.
RAY : A marginal floret of a compound flower ; as in the Aster, Sunflower, &c. ; the branch of an umbel.
RECEPTACLE : Head of a flower-stalk from which the organs of a flower grow or into which they are inserted.
REFLEXED : Bent outwards or backward.
REVOLUTE : Rolled backward.
RINGENT : Grinning, gaping open.
RIB : One of the principal pieces of the framework of a leaf.
ROOTLETS : Little roots or root-branches.
ROOTSTOCK : Root-like stem under ground ; an underground stem.
ROTATE : Wheel-shaped ; a monopetalous corolla, expanding into a flattish border, with scarcely any tube.
RUGOSE : Wrinkled, roughened with wrinkles.
SAGITTATE : Arrow-shaped.
SCABROUS : Rough to the touch.
SCANDENT : Climbing.
SCAPE : A peduncle or flower-stalk rising from the crown of a root.
SEPAL : A single part or division of the calyx.
SERRATE : Toothed, like a saw ; having the margin cut into teeth pointing forward.
SERRULATE : Same as "serrate," but with fine teeth.
SESSILE : Sitting ; without a stalk ; as a leaf without a petiole, or anther without a filament.
SILICLE : A short and broad pod of the Cress family.
SILIQUE : A long pod peculiar to the Cress family.
SINUATE : Strongly wavy.
SPADIX : A fleshy spike of flower.
SPATHE : A sheathing bract which envelopes a spadix.
SPICATE : Pertaining to or resembling a spike.
SPIKE : A flower-cluster in which the flowers are sessile on the axis or rachis, as in the Mullein.
SPINE : A thorn.
SPINDLE-SHAPED : Tapering to each end like a Radish.
SPINOSE : Thorny.
STAMEN : One of the essential organs of a flower, which secretes and furnishes the pollen or fertilizing dust ; it consists of two parts, the anther and the filament.
STAMINATE : Furnished with stamens.
STELLATE : Starry ; arranged in rays like those of a star.

POMPEII.

(See pages 216, 220 and 221.)

To alight from a railway train, to purchase a ticket of admission, to negotiate with a guide, and then, after walking a couple of hundred yards, to find oneself transported back and brought face to face with the every-day life of eighteen centuries ago, is to experience a sensation which no subsequent visiting of famous relics of the past can ever efface from the mind. An ancient ruin is but a heap of stone, whether in Mexico or in Egypt. The massive blocks of Stonehenge or those of the Ephesian Temple of Diana mean nothing to those who, from their knowledge and imagination, cannot call up mental pictures of the circumstances under which they were erected ; and it requires no small effort on the part of even those possessing the appreciative faculty to exercise it, when a locality hitherto surrounded with a halo of romance, sentiment, or historical interest, is for the first time viewed from the window of a nineteenth century railway train. Pompeii is perhaps the one exception. Tourists who have wearily ascended Pisa's leaning tower and thought of nothing but the steepness of the stairs, or who have "done" the Acropolis at Athens at sunrise, with the idea of breakfast uppermost in their minds, find in the exhumed city an interest which leaves no room for such incongruous feelings. It is the interest which attaches to all things personal, the same interest which induced thousands at the Centennial to turn their backs on the magnificent Castellani collection of antiquities and linger in the New England kitchen.

To reach Pompeii from Naples, a fifty minutes' journey by the railroad which skirts the bay is necessitated. The line cuts through the great lava stream of 1794, over two thousand feet wide and forty feet thick, at the base of Vesuvius, and passes a number of little villages, inhabited (in the face of constant danger from earthquake) on account of the great fertility of the soil. On reaching his destination, the visitor pays a small admission fee, and enters at once into streets of the ancient city.

Pompeii was partly destroyed by two earthquakes in the year 63 A.D. Its inhabitants were still engaged in rebuilding the injured portion, when, on August 24, 79, a great eruption of Vesuvius overwhelmed the city and the adjacent towns of Herculaneum and Stabiæ. So sudden was the outbreak that the escape of the people was prevented. A dense cloud of black smoke burst forth from the crater, and settled thickly over the town, plunging it in complete darkness. A dense rain of thin light ashes followed, and then showers of hot stones, mingled with masses of lava giving off mephitic gases. Meanwhile great rivers of black lava poured irresistibly down the mountain sides, filling the streets and cutting off the exit of those who had taken refuge in cellars; while others, who were attempting to leave the city by the gates, were blinded by the drifting ashes and overcome by the sulphurous vapors. For three days this terrible infliction continued; and then, when the smoke dispersed, where once was a beautiful town was but an arid mass of ashes, pumicestone, and hardened mud.

Centuries went by. The rich volcanic soil became covered with a profusion of vegetation, and a new town sprang up over the buried city, only to be destroyed by earthquake four hundred years after the great eruption. Pompeii then existed only in tradition; and this located the lost city several miles from the uninhabited plain under which it was eventually discovered. In the middle of the last century, the finding of relics in the vicinity induced the government to undertake systematic excavations. An inscription was soon unearthed establishing the fact that the true Pompeii had undoubtedly been found: and since that time the work of uncovering the buildings has been slowly and carefully carried on.

A fine series of engravings, from "Italian Pictures Drawn with Pen and Pencil," presented herewith, give an excellent idea both of the appearance of the excavation and the manner of conducting the work. Fortunately the material which chiefly covered the city was not lava, which would have set like stone after probably burning paintings and melting objects in metal, but a fine light ash, which insinuated itself into the minutest crevices, and even through porous earthenware. The writer assisted in opening a large wine jar still bearing the seals placed over its mouth at the time of filling. The white ashes had replaced the wine, and had made their way through pottery of close texture and now harder than stone. Generally, however, the presence of ashes has proved a positive advantage, because in opening a street for example, as shown in Fig. 1, they are easily dug out and removed; while by packing closely around perishable objects they have formed perfect moulds, retaining the form of the objects after the same have wholly decayed and disappeared. The work of removing the *débris* from a room is represented in Fig. 2. It is not frequently that articles are found at a height above four feet from the floor, as their weight naturally carries them downward through the soft mass of ashes. The digging is therefore rapidly prosecuted until the above uniform level is attained. Then shovels and picks are put aside, and the ashes are taken out by handfuls, each workman carefully crumbling the material to powder before rejecting it. As soon as the experienced eye of any workman recognizes the indications of a mould being formed in the ashes, labor near that point is stopped, and tamping irons are cautiously inserted to make two or three vents in the cavity. Then liquid plaster is poured in; and after being left sufficiently long to harden, the ashes are taken away and the cast removed. Fig. 9 is from a photograph of casts thus obtained. The bodies are those of two women, apparently poor people, as on the finger of one an iron ring was found. The elder one has the limbs drawn up as if in agony; the other, a girl probably of fifteen years of age, is more composed. One of the hands is half open, as if holding something. The texture of the dress is exactly reproduced, even to the stitches of the seams.

It is believed that of the inhabitants of Pompeii thousands perished. Many hand in hand groped their way through the streets, and so escaped to the open country. At the chief gate there stood a sentinel, who sternly kept his post through the thunders of that dreadful day. He died in harness. Planted in his sentry box, he covered his mouth with his tunic, and held on against the choking and sulphurous shower. But the ashes fell and fell, and finally filled the box, and buried the soldier alive, still grasping his weapon in one hand and veiling his mouth with the other. There, after ages of rest, he was found—a grisly skeleton clutching a rusty sword.

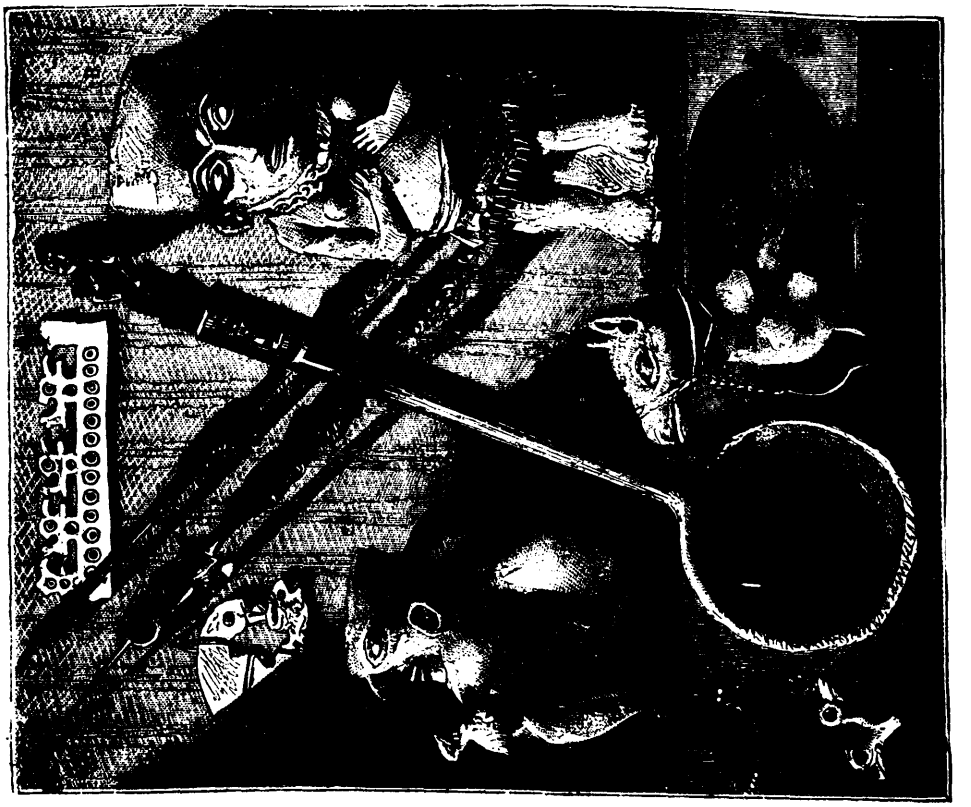
Sad discoveries were made in the street leading to that gate. There were two skeletons locked in close embrace, the teeth perfect, indicating youth in its prime: skeletons of a young man and maid. They had fallen together in their flight, and death had wedded them. There was a mother with her three children hand in hand, who tried vainly to outrun death. Perhaps the mother singly might have done it, but she could not leave her children. Plenty of food for sad thought is furnished in remembering that six hundred skeletons have already been exhumed!—many in such positions and circumstances as to suggest very touching episodes accompanying the final catastrophe. Of the family of Diomed, seventeen persons were stifled in a wine cellar well stocked with amphoræ of wine, some of which bore the date of the vintage. The fugitives in their agony of fear stood all huddled in a corner. One swooning girl fell forwards on to the bed of ashes that had drifted in. She left the impress of her bosom in the drift like a seal in softened wax.

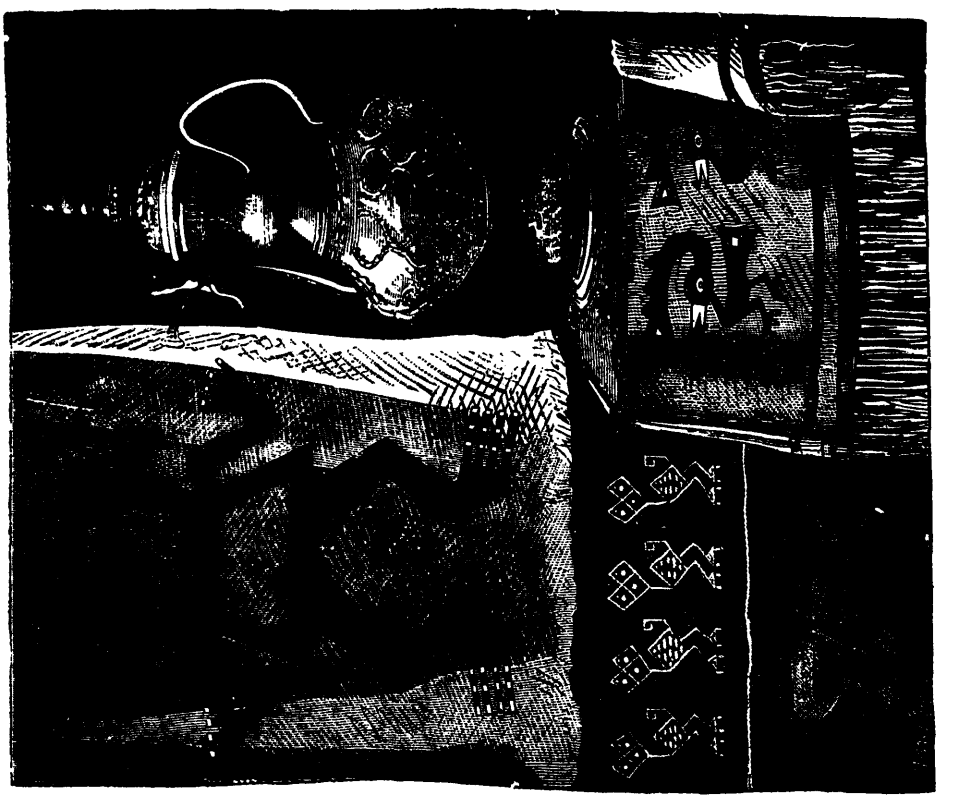
An interesting little circumstance is connected with one of these houses. The skeleton of a dove was found in a niche overlooking the garden. Like the sentinel, she had kept to her post, sat on her nest through all the storm, and from beneath her was taken the egg she would not leave.

The shops and taverns which have been exhumed are very interesting as illustrating the domestic life of the people. Fig. 5 represents the interior of a baker's shop. Eighteen hundred years ago, the baker, having placed his loaves in the oven, had closed the iron door, when he had to fly for his life. A few years since the batch was drawn. The loaves are jet black, and of stony hardness; but the marks of the baker's fingers show plainly on them. In an eating house were found raisins, olives, onions, figs, fish cooked in oil, and other articles of food, some retaining their natural appearance and all plainly recognizable. It is a curious fact that a precisely similar mode of cookery prevails in the modern Italian villages to that indicated by the utensils and prepared food found in Pompeii; and in some instances vessels have been found which might at the present day be put to their original use, as they differ little from those now employed. In one eating house, for instance, is a dresser of brickwork in which are large metal and earthenware vessels for soup, with furnaces to keep it warm and ladles to distribute it, precisely as are used in modern restaurants. Amphoræ of wine are marked with the year of the vintage, the characteristic quality, and the name of the wine merchant from whom they were purchased. Taverns are indicated by checkers on the doorpost, or by a sign painted on the wall. The streets are paved with solid blocks of stone worn in deep ruts by chariot wheels; and at one drinking fountain, where slaves stooped and drank from the flowing spout, on the edge of the trough is a spot worn smooth by the pressure of the many hands that rested against it.

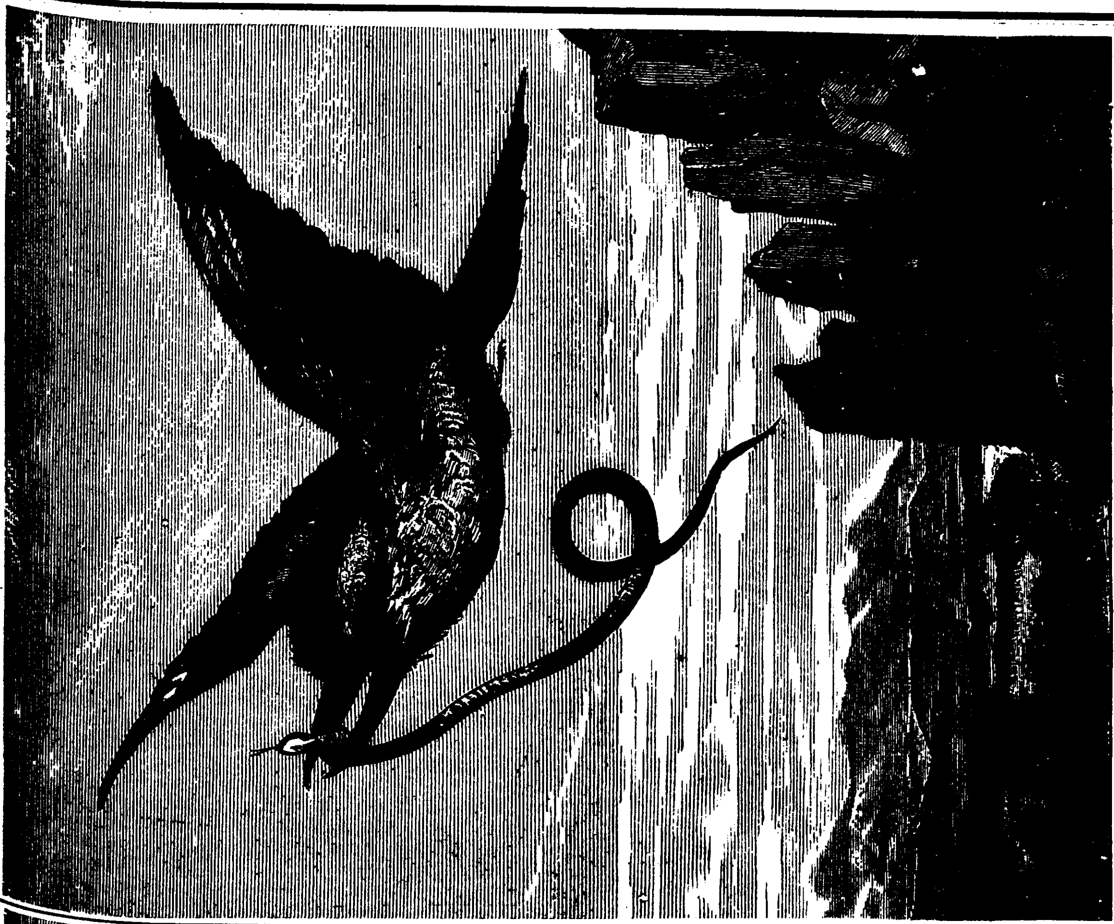
The dwellings for the most part are small and low, few exceeding two stories. They have little ornamentation externally, and are well adapted to a people accustomed to pass most of the day in the open air. The upper stories, being of wood, with flat roofs, were speedily consumed; but as those portions of the house were generally used as storerooms or apartments for servants, their loss is of little consequence. The ground apartments have escaped serious injury; and on their walls some of the frescoes appear as brilliant as if recently painted. Figs. 6, 7, and 8 afford an excellent idea of the various objects found in the dwellings, as well as of their remarkable state of preservation. Fig. 6 shows a collection of cooking utensils. It is hardly necessary to call attention to the colander, the frying pan, and the forks and spoons, as being the same as those now used. Gold ornaments, copied from the designs shown in Fig. 7, are now quite common; and many of the terra cotta lamps depicted in Fig. 8 have served as suggestions for the pattern of modern gas fixtures.

The walls of the city, which have been traced throughout their full extent, indicate that an irregular oval area of about two miles in circumference was occupied. It has generally been supposed that the population was 20,000 to 50,000, but according to Signor Fiorelli, the general superintendent of the excavations, Pompeii had not more than 12,000 inhabitants at the time of the eruption. Eight gates have been discovered, and the roads outside of them were lined on each side with tombs of considerable size and architectural pretension. The Street of Tombs, before the gate of Herculaneum, Fig. 3, was probably the principal burial place of the city; and the sepulchral monuments adorning it give evidence of the refined taste and great wealth of prominent Pompeiians. The streets, which for the most part run in regular lines, are with some exceptions barely wide enough to admit a single vehicle. The widest does not exceed 30 feet in breadth, and few exceed 22 feet. Five of the main streets have been partially or wholly traced; and with these a regular system of minor streets appear to have been connected. These thorough-

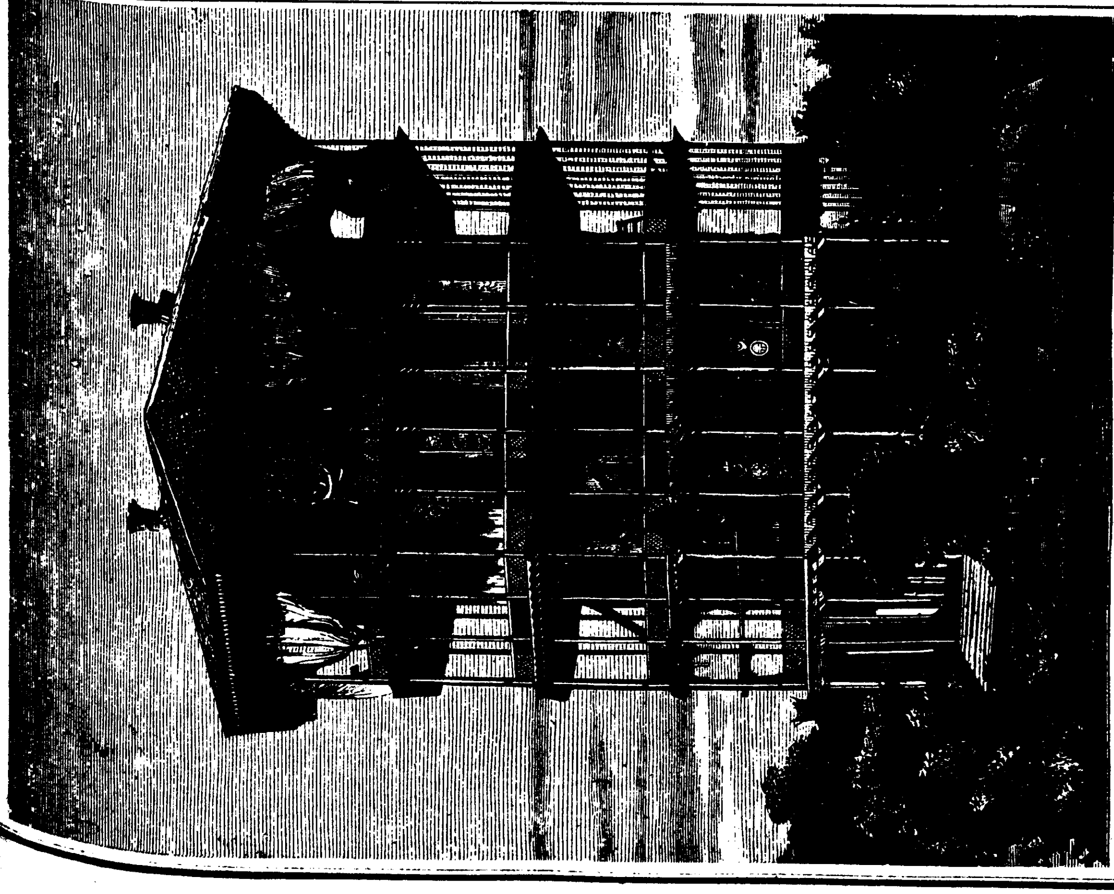




PERUVIAN ANTIQUITIES.



THE LAUGHING JACKASS OF AUSTRALIA.



TEMPORARY RESIDENCE OF THE SHAH OF PERSIA.

fares, with a single exception, terminate in or traverse the western quarter of the city, which is the only part yet completely explored. The public buildings were profusely decorated structures, and included temples of Jupiter, Mercury and Venus, besides two theaters. The *thermæ* or public baths—a room in one of which is represented in Fig. 4—were elegantly adorned.

The most important paintings and objects of art discovered by excavation have been deposited in the National Museum at Naples. Until recently the excavations have proceeded slowly; but at present the Italian Government is liberally assisting the work. The space now laid bare measures about 600,000 square feet, or one third of the whole area occupied by the city. Signor Fiorelli calculates that, making the excavations on an average 25 feet deep, and employing 81 laborers daily, the whole city will be unearthed in 1947.

PERUVIAN ANTIQUITIES.

(See page 212)

The plateau of Ancon, in Peru, is an arid table land overlooking the sea coast and situated about 12 miles northwest of Lima. It is the location of a vast sepulchre, dating back to the earliest historical periods. Owing to the dryness of the air and the impregnation of the soil with salts, the contents of the tombs are finely preserved; and, as was apparent from the collection of mummies exhibited at the Centennial, even the lapse of ages has not determined the disappearance of either skin or hair. Fabrics, wooden vessels, and food have been found in the tombs in perfect condition; and as it was the custom of the ancient people to inter with their dead their choicest ornaments and objects of utility, a rich treasure is now open to antiquarians, from which it is possible to determine the habits and manner of life of the Peruvians during the period prior to the Spanish conquest.

A collection of these relics now exists in Paris, at the Musée de St. Germain, and is to form a portion of a still larger gathering relative to ancient life in America, which is to be exhibited at the French Exposition of 1878. Several of the more interesting objects are represented in the annexed engravings, for which we are indebted to *La Nature*.

There was recently exposed for sale in this city a collection of Peruvian remains, which were sold at ridiculously low prices. The condition of the objects was scarcely such as to tempt the collector of bric-à-brac, however interesting they might have been to the antiquarian; but despite the prevalent dilapidation, we noted, on examining the articles, the remarkable state of preservation of the woven fabrics—a circumstance which our contemporary also considers the most phenomenal feature in the fine French collection; not only is the tissue intact—as our engravings indicate—but the colors have kept their primitive brilliancy, and this although the fabrics seem but rough specimens of woolen weaving. The designs are always either fantastic or combinations of geometrical figures. Grotesque representations of animals are frequently introduced, as witness the remarkable cubical birds and the geometrical cats shown in Fig. 1. The man represented is an astonishing figure; and it will be noticed that he is provided with but four toes or fingers on the respective limbs. This is an invariable peculiarity in the pictures of the ancient artists of the country, which has not yet been accounted for. On the right of the engraving are two birds, which look like geese or swans, and which, strange to say, closely resemble the birds of like species represented on ancient Etruscan vases. We can commend these designs to those who are searching for new grotesqueries for Eastlake rugs. Mr. Eastlake suggests figures of animals not accurately drawn but possessing character, and these certainly answer the requirements.

Besides manufactured fabrics, distaffs and spindles, used for spinning the cotton or Ilama wool yarn, of which they are woven, have been found. The spindles, F. Fig. 2, are often ornamented with pearls and are gaily painted. Hanks of yarn and hand looms, the latter roughly made of sticks, have been exhumed, and even pins and needles. The pins are simply long thorns, the thick portion at the point of junction with the branch serving as the head. The needles are the same, having a hole for the thread.

In Fig. 2 are represented a number of other curious articles. D is a wooden spoon with carved handle; A is a Ilama in pottery, and B a terra cotta statuette of a woman; G and E are pendants in mother-of-pearl and ebony. H is an ivory ornament; and C is a red earthen vase representing a man seated.

Not only are objects of metal and wood found in the tombs, but some beautiful specimens of glassware have been obtained. The glass is perfectly clear; and as there is no evidence that the people possessed the material for making it, it would follow that it was imported; but whence, it is impossible to tell. The glass vase represented in Fig. 1 is of light blue color, ornamented with opaque white glass, which bears the traces of gilding. The ornamentation bears no resemblance to that commonly employed by the Peruvians, and thus another proof is added of its foreign origin. The handle and the neck were made separately, and fastened on afterwards in a manner which shows superior skill on the part of the workman. The neck is ornamented with a kind of griffin's head, which has no resemblance to any animal indigenous in Peru. It is supposed to have been brought from Asia, as it is believed that the Japanese and Chinese knew of the New World and maintained commerce with the inhabitants long before the discovery by Europeans. But the decoration is not Oriental, but strictly Spanish; and hence the more probable assumption is that the object was brought into the country by the Spaniards in the 16th century, and hence that the Ancon sepulchres were in use at that period.

THE VALUE OF SMALL INVENTIONS.

An excellent exemplification of the large returns which a small invention may often bring to its fortunate originator is found in the experience of Mr. Charles W. Cahoon, who recently died at Portland, Me. Mr. Cahoon possessed much inventive ability, besides that quality of persistent determination to succeed which usually characterizes the successful inventor. It is said that he realized sixty thousand dollars out of a little lamp burner, which had an appliance for lifting the chimney so that the wick could be reached for lighting or the mouth of the lamp for filling. This saved the frequent removal of the chimney while hot, and so doubtless prevented many fingers from being burned and many chimneys from being broken. Simple as was this device, Mr. Cahoon studied hard over it, and nearly lost his eyesight by persistent watching of the lamp flame under different conditions. It was the first invention of the kind patented (February, 1861), and infringers were plenty, but Mr. Cahoon protected his rights manfully and triumphed in the end. It is to be regretted that he could not have lived longer to have enjoyed the fruits of his strivings.

Boston Cream Cakes.—Several recipes have been asked for by our friends, and there not being room for them in the Household Department, they are given here. Cream cakes, as they are called in Boston, and "Cream Puffs" elsewhere, are remarkably popular in modern Athens. The following recipe is from a friend who is very successful with it. Take of flour, sifted, 8 oz.; butter, 4 oz.; sugar, a teaspoonful. Rub together thoroughly and put these into a pint of boiling water, boil and stir quickly until it thickens; remove from the fire and add gradually 8 eggs, well beaten, and stir rapidly; when thoroughly mixed, let it stand until cold. Having buttered tins ready, drop this mixture in tablespoonfuls, about six inches apart, brush over with white of egg, and bake in a quick oven to a light brown color. When done these will be hollow shells which are to be cut open on one side and filled with the "cream," which is really a custard, and to make which: beat two eggs to a froth, add half a teacupful of flour; stir all into a pint of boiling milk, and cook until it thickens. When cool, flavor with lemon or other extract, and fill into the puffs or shells.

Sermons by Telephone.—A remarkable application of the telephone is, according to the *New York Herald*, about to be tried. It is proposed to erect a marble retreat in Union-square, New York, with tubes connecting every church in the city. On Sunday the congregations will assemble as usual, but instead of gazing into the minister's face they will look at a huge funnel-shaped projection in the middle of the chancel. A popular preacher will be placed in the marble retreat with an eloquent and stirring sermon. He will preach at about 500 open tubes, and his eloquence will be transmitted to as many congregations, and emerge from the bell-shaped projection in the chancel with all the various modulations of the preacher's voice. Church music will be done on the same principle by means of the "pyrophone,"—an organ with copper pipes whose notes can be distinctly heard all over the city. This latter invention will enable the people to sit in their own houses and listen a sacred concert, or gather on their "front stoops" and unite in a congregational hymn, while a precentor up in a balloon ["wind and weather permitting"] beats the time.

A PERSIAN ROYAL PAVILION.

(See page 213.)

At the southeastern end of the Caspian Sea, not far from Resht (which is the only harbor accessible in stormy weather, on that part of the Caspian), is a village called Enseli. It is near the borders of Russia, and was selected by his Oriental Majesty the Shah as the locality for a temporary marine residence, wherein he could take a solemn leave of his dominions, and say farewell to his wives before his journey to Europe four years ago. We publish herewith an engraving of this structure, which was built in great haste and is very slightly put together. The material is chiefly adobe or sun-dried bricks ; and the clay was so poor that the building is already returning to dust, a fate which overtakes many buildings in that part of the world. The one-storied houses, which are common in Persia, of course suffer less than such a building as is shown in our engraving ; and the danger to the inhabitants of the upper stories of the pavilion is obviously very great. So, with true Oriental sagacity, the upper rooms are allotted to the women of the family, an additional reason for this arrangement being that the roof under the blazing sun makes the top stories exceedingly uncomfortable from the heat.

In his journey eastward to Enseli, the Shah was accompanied only by a detachment of his wives, each of the ladies being carried in a tight box suspended on one side of a mule. With unusual forethought, a small opening had been made in front of the box to admit light and air ; and each box was so tightly packed that the occupant was obliged to forego the use of her limbs, and could not even sneeze without disturbing the lady on the other side of the animal. A few carpets were all the furniture thought necessary for the ladies' accommodation ; and an appearance of royal pomp was imparted by the presence of a few regiments of soldiers. When the solemn farewell ceremony was over, the wives were boxed up again and sent back, much to their disappointment, as they had indulged a hope of seeing Europe ; but, it is stated, the Emperor of Russia objected to such a cavalcade crossing his territory.

A SNAKE-EATING FROG.

(See page 217.)

Mr. C. F. Seiss, of Philadelphia, Pa., writes as follows :

"It is a well known fact that many serpents subsist almost entirely upon frogs, but I never knew of frogs attempting to devour their common enemy, the snake, until I myself witnessed it. Last autumn I had in my vivarium a female shad frog (*rana halecina*, Kalm), a young bullfrog (*Catesbiana*, Shaw), and also two male marsh frogs (*rana palustris*, Le Conte). One morning I introduced to them a De Kay's brown snake (*Storeria Dekayi*, Holbrook). The bull and marsh frogs were much terrified at the appearance of the snake, and leaped wildly about, hiding at last under stones in corners as far removed from the snake as possible. Not so, however, with *halecina*. She did not, if I may use slang, 'scare worth a cent,' but looked upon the sudden appearance of the snake as a matter of course. The snake, happy at being released from the small dark box in which it had been confined, began moving about quite briskly. It at length crawled too near *halecina*, who with her tongue instantly seized it by the head, and began swallowing it with rapid gulps, until six inches of the snake had disappeared in her now extended abdomen. At this moment the snake had the appearance of an immense tongue, which the frog was slashing about most energetically. Not wishing to lose the snake, it being the most valuable of the two reptiles, I endeavored to force the frog to part with the snake, by tapping her smartly with my lead pencil. This had not, however, the desired effect, but I was forced to grasp the frog in one hand, and the snake in the other, and thus draw the snake from its unpleasant situation. The snake acted as if partially blind or bewildered after its removal, but otherwise seemed none the worse for its five minutes' trip around the frog's stomach. *Halecina* made two more attempts to swallow her fellow prisoner the snake ; but both times she was caught in the act and frustrated, and it is without doubt, she would at length have succeeded, had I not adopted precautionary measures. The above-mentioned snake was twelve inches in length, and the frog, from nose to vent, two and a half inches. Previously, this same frog had swallowed a live brown Triton (*desmognathus fusca*, Rafinesque), over three inches long. I will presume the frog mused thus : 'I will be compassionate toward you, poor Triton, and end your sorrowful longing for liberty'—and swallowed him !"

PREVALENT MANIAS.

The blue glass mania has had its day. The bar rooms are removing their signs of "cocktails in blue glass," and the cerulean goblets, wherein those seductive and presumably sun-strengthened beverages were dispensed, may be purchased for small sums from the cheap china vendors on our sidewalks. We notice a diminution in the sheets of blue glass hung in windows of private dwellings, "signs," some one calls them, "to inform the public of the gullibility of the inmates ;" and in fact the only evidence at hand which exhibits any vitality of the now rapidly collapsing blue glass mania is the production of a cheap variety of note paper, called the "Pleasonton," because the pasteboard box in which it is contained has a blue glass lid. The General can doubtless explain the efficacy of the glass in this connection. Blue glass, therefore, has had its run, its inventor has earned his notoriety, and also the thanks of the glass dealers, who have reaped a fine pecuniary harvest.

Two new manias are at hand, to wit, the celery cure and metallo-therapy. "Celery is the greatest food in the world for the nerves," says one of our contemporaries : and the information is travelling the length and breadth of the land. It is fashionable nowadays to call every ailment flesh is heir to a nervous disease ; and where our ancestors would have resorted to such homely remedies as a hot drink and simple cathartics, the present practice demands chloral, and bromides, and quinine, and strychnine, and phosphates, and rare chemicals without number. Of course celery is pleasanter to take than most drugs ; and now that it is brought forward as a new nervine, plenty of people will use it. As it can do no harm, and, indeed, may actually work good by checking the too prevalent consumption of "nervous specifics," the mania is rather a benefit than otherwise, and should be encouraged. Wild celery or smallage is known to possess some narcotic effect, and is reputed as unhealthy. As regards the medicinal properties of cultivated celery, there are no utilizations of them in the United States Pharmacopœia ; but as celery (*apium graveolens*) belongs to the same family as the parsley (*apium petroselinum*), it is probable that it would yield apiin and apiol, as such substances are obtained from the latter. Apiol acts as a tonic, similar in its effects upon the system as quinia.

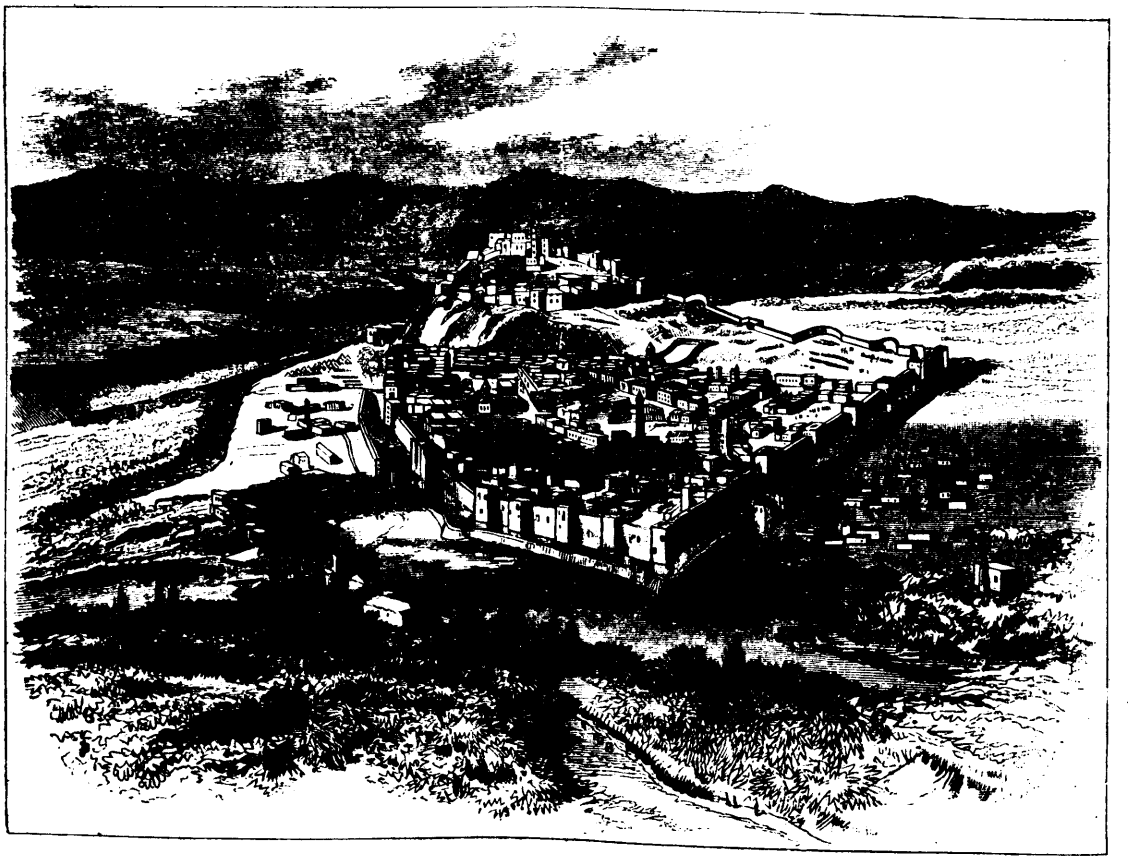
The other mania, metallo-therapy, to which we have already briefly alluded to, is perfectly harmless, and at present is confined to France. *Les Mondes*, of recent date, reports another "astonishing cure"—a child four years old this time, almost dead with meningitis. The metallo-therapy inventor enveloped the infant—there is no Children's Protective Society in France—in plates of iron and copper from head to foot. Half of the body was covered with one metal, half with the other, in order "that both metals might have an equal chance of doing good." In eight hours, the child revived ; in six days, it was out of danger ; in a month it was well. Manufacturers of iron and copper plate may now consult with blue glass makers as to how to advertise this.—*Scientific American*.

"Flesh Worms."—The *Demodex folliculorum* is a worm-shaped minute mite, which lives in the sebaceous and hair follicles of the skin in man and some mammals. M. Megnin has lately published a full account of it. It is said to be viviparous, the female producing small footless contractile larvæ, without any mouth organs, which shortly after their birth acquire three pairs of short wart-like feet. After a change of skin a fourth pair of legs appear, as well as traces of a beak. After a second change the perfect demodex is produced, but still without the sexual organs, which appear later. Megnin distinguishes three if not four forms of these parasites, which, however, he prefers to regard for the present as varieties of a single species—*Demodex folliculorum*. The commonest of these appears to be that of the dog (var. *caninus*), which inhabits the hair follicles of all parts of the body of that animal ; a smaller variety (*D. cati*) is found almost solely in the sebaceous glands of the ear of the cat ; and a larger one (var. *hominis*) in the follicles of the human face. M. Simon also met with similar parasites in the glands of the margin of the eyelids in sheep (var. *ovis*) ; but no other writer has ever seen them there. In the dog the presence of these parasites, which occur in great numbers together in the hair follicles, produces a regular skin-disease or mange ; but this does not appear to be transmissable to the human subject.

Body Copal Varnish for Coachmakers' Use.—Fuse eight pounds fine African gum copal ; add two gallons clarified oil ; boil slowly until quite stringy ; mix with three and one-half gallons turpentine, and strain. The boiling will take four or five hours.

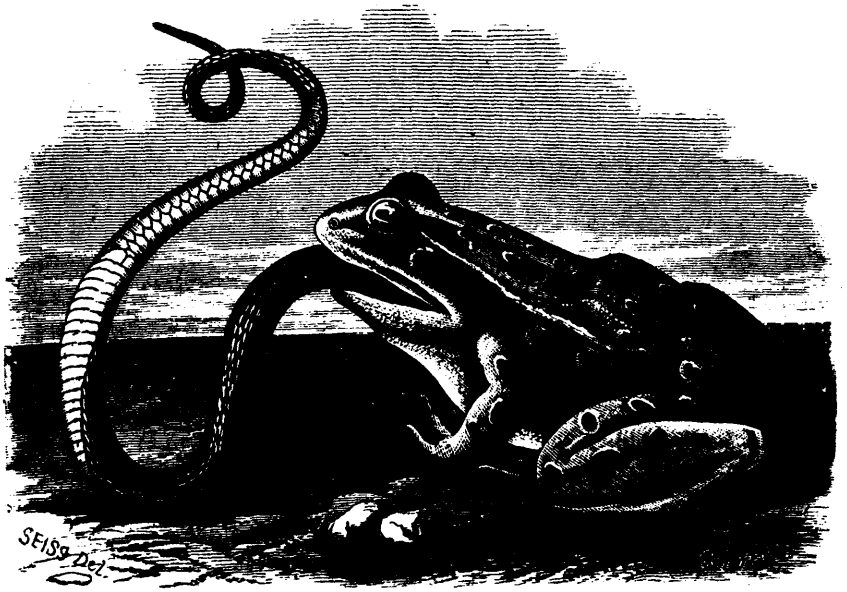
ANTIQUITIES OF POMPEII AND HERCULANEUM.

FIG. 9. CASTS OF HUMAN BODIES FOUND AT POMPEII.



THE CITY OF KARS.

THE PENNSYLVANIA RAILROAD; SPRUCE CREEK TUNNEL.



THE SNAKE-EATING FROG.

A REMARKABLE KINGFISHER.

There are over fifty species of the *halcyonidæ* or kingfishers; but none is more remarkable than the one shown in our illustration. From its peculiar screaming laugh, not unlike the bray of a donkey, it has obtained the name of "the laughing jackass." Its zoölogical name is *dacelo*, one species, *d. gigas*, being a large bird, 18 inches long, and endowed with strength and courage; it feeds indiscriminately on any animals of suitable size, whether quadruped, bird, reptile, fish, insect or crustacean. It is a handsome bird, being brightly colored; and its flight is quick and noiseless. Its powerful bill makes it a formidable enemy.

The *Illustrated News*, of Adelaide, Australia, from whose pages we select the engraving, gives the following particulars of this interesting bird: "The laughing jackass is almost too well known to need description. His appearance and extraordinary note are familiar to the inhabitants of every country village. Indeed, he frequently extends his researches into the neighborhood of towns, occasionally taking up his abode for life in some healthy suburb, and punctually entertaining the inhabitants thereof, morning and evening, with a succession of those singular sounds which have rendered his name famous. Although a kingfisher, he never procures his food from the water, after the orthodox fashion of kingfishers, but has more the habits of a bird of prey. Sitting motionless among the lower branches of some tall gum tree unnoticed, and apparently half asleep, he waits, like Micawber, for something to turn up. Suddenly, without noise, he drops off his bough and flies direct to a certain spot, whence he soon returns, bearing in his beak a lizard, a small snake, or perhaps a rat. His acuteness of sight is extraordinary. From his elevated post he seems to miss nothing, and discerns his prey in swamps and crevices of rocks at a distance that is perfectly astounding. The laughing jackass has the advantage of being able to live on almost anything that presents itself; hence it is always in good condition, and apparently in good humor. It seems, indeed, to pass its life in self-congratulations; and when four or five meet and unite their voices, and they invariably do, morning and evening, the noise would suggest the idea that a party of demons had broken loose and were rejoicing over some piece of successful mischief. But in spite of his careless, happy life, the laughing jackass has his peculiar duty, and he performs it conscientiously. Snake killing is his speciality; lizards, frogs, beetles, small birds, rats, etc., are his usual food. In fact, nothing comes amiss to him; let a snake appear on the scene, and the laughing jackass recognizes his quarry at once. Never hesitating, he makes straight for it, his agitation being observable by the quivering crest feathers. With some caution, he swoops backwards and forwards, seeking an opportunity to seize the reptile. The snake, with head erect, ready to strike, keeps on the alert. The excitement continues for some time till the bird finally settles down, close by on the ground. But all his stolid heavy appearance is gone. His wings and tail quiver with agitation and eagerness. Fully alive to the dangerous character of his opponent, he keeps at a safe distance. Flitting round, his head just out of reach, he continues to annoy him, till becoming exhausted, the snake affords him the opportunity he is seeking. With the rapidity of lightning the bird descends upon his prey, then rises in the air, bearing with him the captured snake, neatly held just behind the head, in such a position as to render him perfectly powerless. Rising until he has attained a considerable height, he directs his flight to a more open part of the country, then suddenly backing in the air, he drops the reptile, following it down and reaching the ground almost at the same time. Stunned and bruised, the unfortunate snake is in no condition to renew the contest, and is very soon despatched and eaten by his victorious enemy."

REMEDY FOR INSECT BITES.

When a mosquito, flea, gnat, or other noxious insect, punctures the human skin, it deposits or injects an atom of an acidulous fluid of a poisonous nature. The results are irritation, a sensation of tickling, itching, or of pain. The tickling of flies we are comparatively indifferent about; but the itch produced by a flea, or gnat, or other noisome insect, disturbs our serenity, and, like the pain of a wasp or a bee sting, excites us to a remedy. The best remedies for the sting of insects are those which will instantly neutralize this acidulous poison deposited in the skin. These are either ammonia or borax. The alkaline reaction of borax is scarcely yet sufficiently appreciated. However, a time will come when its good qualities will be known, and more universally valued than ammonia, or, as it is more commonly termed, "hartshorne." The solution of borax for insect bites is made thus: Dissolve one ounce of borax in one pint of water that has been boiled and allowed to cool. Instead of plain water, distilled rose water, elder, or orange flower water, is more pleasant. The bites are to be dabbed with the solution so long as there is any irritation. For bees' or wasps' stings, the borax solution may be made of twice the above strength. In every farm-house this solution should be kept as a household remedy. —*S. Piésse.*

KITCHENS UPSTAIRS.

The most radical improvements in our system of model habitations lie in the arrangement of the roofs and kitchens. In the houses of the present day the kitchen is at the basement, while the upper part of the house is carefully sealed down by the roof. The result is that all the close and disagreeable, and, it may be, foul and dangerous, vapors from the kitchens and lower offices ascend to the upper rooms and passages of the house, just as gases introduced into an inverted bell-jar filled with water ascend to the upper part of the jar, displacing the water. In our model house the risks from this cause are avoided by placing the kitchen at the top of the house, immediately beneath the roof. The kitchen acts a ventilating chamber, into which all the air from the lower part of the house is drawn and through the chimney and ventilator of which the air finds ready exit. Thus the house is kept free of the odours of the lower regions, and is ventilated at all times with fresh air, derived from without, and warmed by its passage through the honey-combed heated walls. The position of the kitchen at the upper part of the house is attended with other advantages than those just stated.

From the kitchen there is distributed throughout the house a constant supply of warm as well as of cold water. The weighted dishes have to be carried down stairs instead of upstairs—the light dishes only have to be carried upstairs. The kitchen is perfectly lighted, so that the least uncleanliness is readily detected. The scullery, which lies off the kitchen, communicates with the dust-bin shaft, and from every floor of the house a distinct communication, by a slender door, is made with the same shaft. A sink also exists on every floor for receiving waste water, so that the plan of carrying the slop-pail from floor to floor is dispensed with altogether. Above the kitchen is the arched roof of the house. The roof which is flat, or nearly so, on the exterior surface is coated with asphalt, and being barricaded with a light iron palisading, makes an airing ground, or a drying ground, or even a garden, according to the tastes and requirements of the owner. The smoke from the chimneys is collected and drawn away to a central shaft, so that the air is kept clear of soot-dust and a pure blue sky overhead is obscured only by the curtain of cloud which nature in her grand designing, sees it wise sometimes to impose.—*Good Words.*

INDUSTRY OF BULGARIAN WOMEN.

The correspondent of a London newspaper writes: "Every house has its rude loom, of a make so primitive that one wonders how such good material is produced by it, for the Bulgarian cloth, though rather rough in texture, is of excellent quality, and will wear for years; a finer kind is, however, produced in the towns and at Kazan, in the vilayet of the Danube; I was assured that they could imitate any quality or pattern of cloth that might be given to them. The other woollen articles made are chiefly carpets, generally in long narrow stripes of bright colour, something like the Spanish blankets; rugs of different patterns, cushion or pillow cases, and bed coverlets; these are sold either in the provinces or to the Constantinople market, and I do not think that there is any export for them; indeed, as the sheep of Roumelia give only about two pounds and three-quarters of wool to a fleece, the amount produced is probably barely sufficient for internal consumption. One of the most striking things in these villages is the apparently ceaseless industry of the women and girls, every one of whom, whether seated on the door-step, walking in the streets, or going to the fountain with her pails over her shoulder on a yoke like a milk-maid, always carries a hank of wool tied on a distaff under one arm, and twirls a spindle. In Kazan I walked for twenty minutes without being able to find one—literally one—woman or girl above eight years of age without this accompaniment, and mothers carry their little babies in a sort of bag on their backs, so as to have their hands free to use the spindle.

VALUE OF THE EARTH-WORM.

The common earth-worm, though apt to be despised and trodden on, is really a useful creature in its way. Mr. Knapp describes it as the natural manurer of the soil, consuming on the surface the softer part of decayed vegetable matters, and conveying downwards the more woody fibres, which there molder and fertilize. They perforate the earth in all directions, thus rendering it permeable by air and water, both indispensable to vegetable life. According to Mr. Darwin's mode of expression, they give a kind of under tillage to the land, performing the same below ground that the spade does above for the garden, and the plough for arable soil. It is, in consequence, chiefly of the natural operations of worms that fields which have been overspread with lime, burnt marl, or cinders, become, in process of time, covered by a finely-divided soil, fitted for the support of vegetation. This result, though usually attributed by farmers to the "working down" of these materials, is really due to the action of earth-worms, as may be seen in the innumerable *casts* of which the initial soil consists. These are obviously produced by the digestive proceedings of the worms, which take into their intestinal canal a large quantity of the soil in which they feed and burrow, and then reject in the form of the so-called casts. "In this manner," says Mr. Darwin, "a field manured with marl has been covered, in the course of 80 years, with a bed of earth averaging 13 inches in thickness."—*Encyclopædia Britannica.*

CLEAN HAIR.

A lady says in the *Western Stock Journal:* No matter what our work is, the dust will gather upon the hair. With housekeepers this can be largely prevented by wearing something over the hair while sweeping or working where there is dust in the atmosphere. A cap made of cambric is as good as anything to wear, and may be made in this wise: Take a square of cambric of the usual width (three-quarters of a yard), cut from it as large a circle as possible, turn a hem an inch and a half in width all around, stitch it down, and outside of this make another row of stitching, leaving a space of one-fourth of an inch between the two; into this space run a piece of elastic cord, and draw up until it is the right size for your head. Such a cap is easily made, looks well, will fit over your hair in whatever manner it is dressed, and will thoroughly protect it from dust. However, if dust does, and it will, collect upon the hair, it can sometimes be removed by brushing, but always by washing, provided we wash it properly. Never use soap—it leaves the hair stiff and unmanageable. The same is true of ammonia. Use the yolk of an egg, and in this way: Beat the yolk of an egg in a teacup, fill the cup with tepid water, let down the hair, shake it out well, and pour on a little of the egg and water, rubbing the head briskly meantime; repeat the process until the whole is used. If not enough to wet the hair thoroughly and to make a good lather, use more water on the head. After rubbing well, rinse the hair well with tepid water, applying a little cold water at the last. Dry it as well as possible with towels, and if it is long let it remain down upon the shoulders until quite dry. There is no danger of taking cold from this process if ordinary care is used. For children who are in school and often come home with something in their heads, which you think is scarcely an idea, yet is certainly animate, a wash with ammonia and water will destroy both parasites and their larvæ. Use 10 or 15 drops of ammonia in a tumbler of water, and apply it in the same manner as directed for washing with egg. If anything is cruel, it is to take a little curly head between your knees upon a pillow and rake it through and through with a fine-toothed comb until the little scalp is red and bleeding. Try the ammonia cure, and the children will rise up and call you blessed.

Recreation.—The literal meaning of this word is to make over again; but in its ordinary acception it is intended to convey the idea of rest, refreshment, or, rather, renovation. The body is refreshed by rest; the brain is renovated by sleep, by absolute repose. But both brain and body may be invigorated for a season by changing the direction of their respective activities, and also by working alternately. A man who has become tired of riding on horseback or in a carriage, rests himself, gets rid of his fatigue by walking. The brain which has become weary in thinking of one subject is refreshed by taking up some other study. On the other hand, a man who feels tired all over, by work or a long walk, will get "rested" sooner by sitting down to read than if he did nothing. Rachel, the great tragic actress, when returned from one of her performances, at two or three o'clock in the morning, rested herself by spending an hour or two in changing the furniture of her rooms. The best sedative which a public speaker can take after a great effort, is to read a newspaper or anything else which has a variety of short statements. The great practical idea we wish to convey is that recreation is not idleness, but a change of direction in the operation of the physical or mental forces. A French actress lately went mad within an hour after the play, because she went home, laid down, and let her mind run on in the same track. She should have changed to bodily activity, like Rachel.—*Hall's Journal.*

Poisonous Candy.—The Boston *Herald* says: "The City Board of Health has, after considerable effort, succeeded in bringing five cases of adulteration of candy before the criminal courts, which the prosecution hope will stand the test of law and evidence, and result in the punishment of the persons accused and the deterring of others in the same business from using unwholesome ingredients. Within a few months quite a large number of specimens of candy have been subjected to analysis, and the trash found only shows that to the ordinary purchaser at random, candy is a good deal like Mark Twain's hash—a mystery. Only five of the cases, however, proved to be so strong as to convince the Board that convictions could be had, and in these the evidence was presented to the Grand Jury. Bills were found, and yesterday William F. Schaffe, William Schnetzer, George Fera, William F. Stahl and S. Herbert Chase were arrested, brought into the Superior Criminal Court and gave bail in $600 each for their appearance for trial. The material portions of the indictment are substantially as follows: 'That the defendant unlawfully and fraudently did adulterate a certain substance, to wit: one pound of confectionery, with a certain substance injurious to health, to wit: with a certain substance called chromate of lead.' The second count charges the adulteration 'with a certain substance injurious to health, the name of which, and a more particular description of which is to the jurors unknown.' The indictment is drawn under chapter 106, section three of the Revised Statutes."

Lemon-Juice in Carbuncle.—The *Doctor* says:—Dr. Gibbons, having been a sufferer from carbuncle, relates in his admirable journal his own case, in which lemon-juice seemed to have a most beneficial effect. Wine, whisky, 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. He also thinks blue pill frequently useful. 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.

Foreign Bodies in the Nose.—Parents are often puzzled to help their children when they get beans, buttons, etc., in their noses. The *Medical Record* says: Blow the patient's nose for him, by closing the empty nostril with your finger and blowing suddenly and strongly into the mouth—an efficient method which has often succeeded when instruments have failed. The glottis closes spasmodically, and the whole force of your breath goes to expel the button or bean, which commonly flies out at the first effort.

Ventilating Chambers.—When it is considered that pure air is essential to the purification of the blood, and that the food we eat never becomes nutriment until it meets with the air in the lungs, and when it is furthermore remembered that a full third of our entire existence is passed in our sleeping apartments, it must be clear to the commonest understanding that the difference between breathing a pure and impure air while we are asleep is literary incalculable as to the effects upon our happiness and well-being.

Gum Pastilles, or Jujubes.—Ingredients: 1 lb. picked gum arabic, 14 oz. of the finest sugar pounded and sifted, ½ gill of double orange flower water, and 1 pint tepid water to soak the gum in, which is afterwards to be strained off clean. Put the soaked and strained gum into a sugar boiler, with the sugar, and use a clean spoon to stir it over a moderate fire, while it boils and reduces to the small pearl degree; then add the orange flower water, stir all together on the fire, remove the preparation from the stove, skim off the froth, and use the mixture to cast the jujubes in levelled layers of starch powder contained in a flat box.

Popped Corn, dipped in boiling molasses, and stuck together, forms an excellent candy.

ANTIQUITIES OF POMPEII AND HERCULANEUM.

FIG. 1. CLEARING THE GROUND.

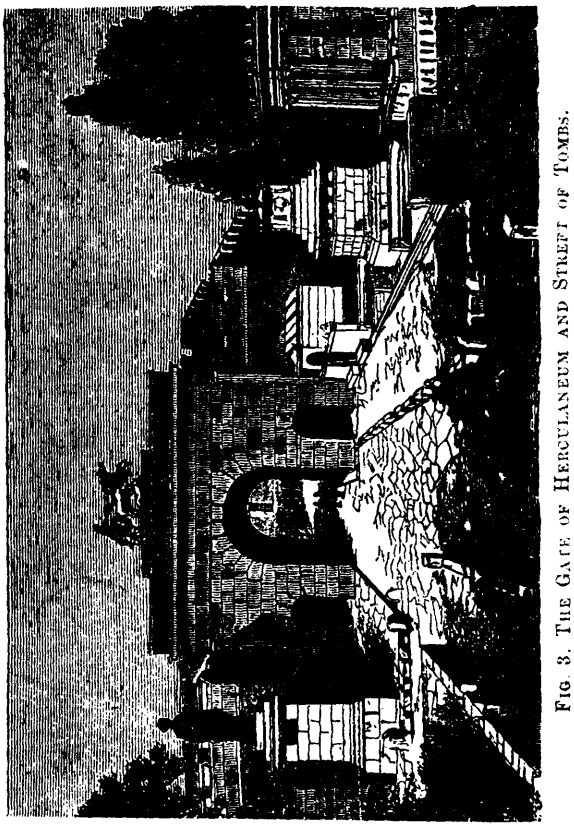


FIG. 3. THE GATE OF HERCULANEUM AND STREET OF TOMBS.

FIG. 2. SEARCHING FOR RELICS.

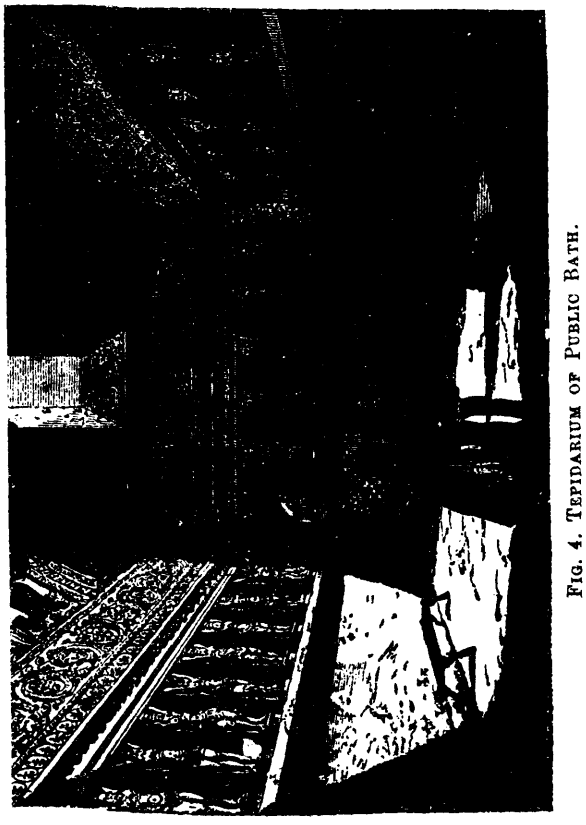


FIG. 4. TEPIDARIUM OF PUBLIC BATH.

ANTIQUITIES OF POMPEII AND HERCULANEUM.

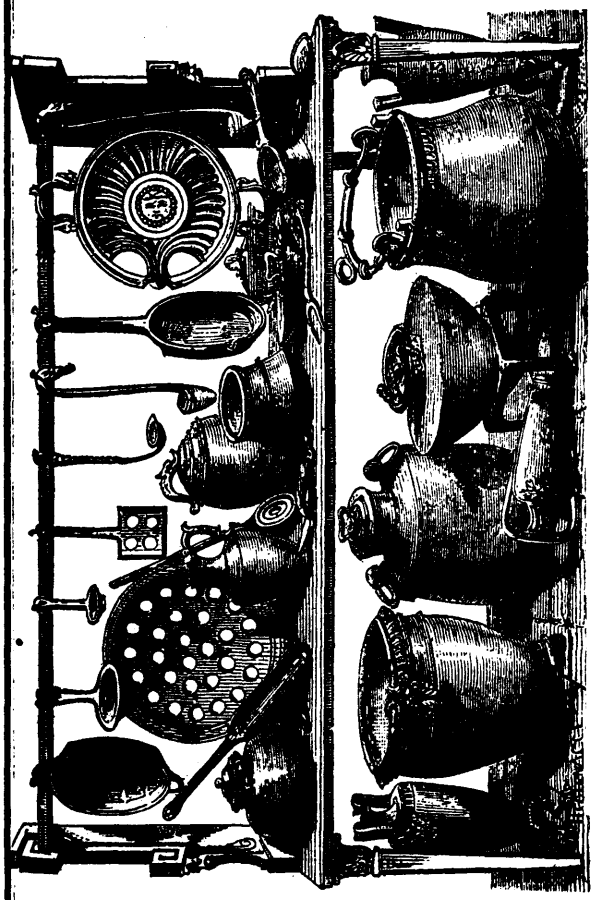


FIG. 6. POMPEII AN COOKING UTENSILS IN THE MUSEUM AT NAPLES.

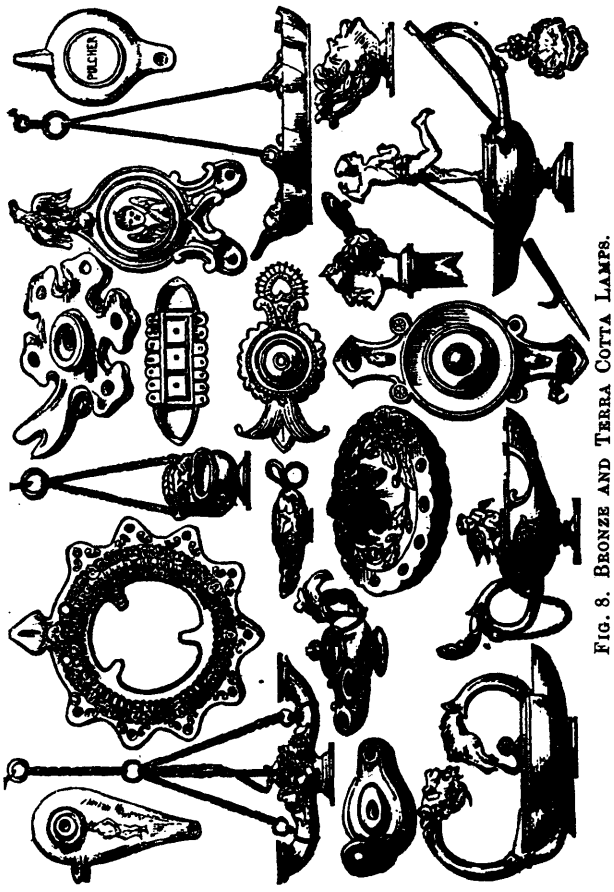


FIG. 8. BRONZE AND TERRA COTTA LAMPS.

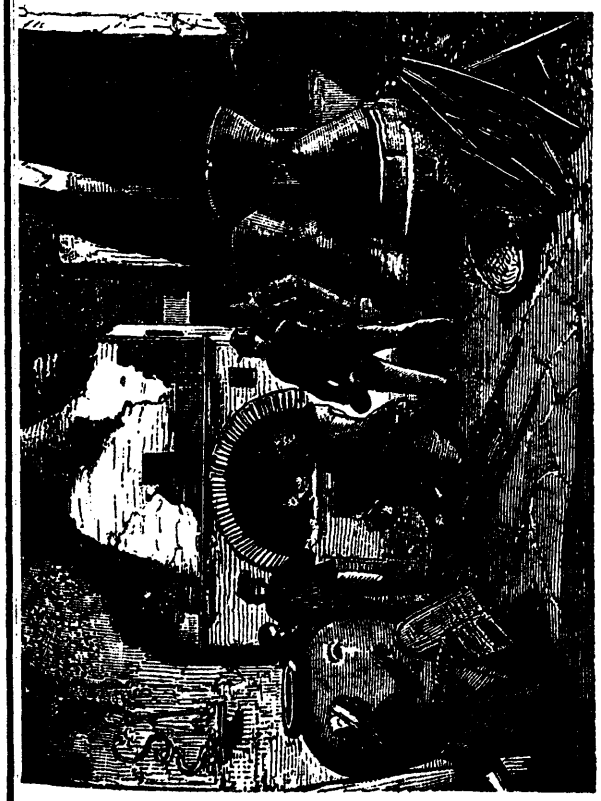


FIG. 5 BAKER'S OVEN—BREAD, AND FLOUR MILLS.

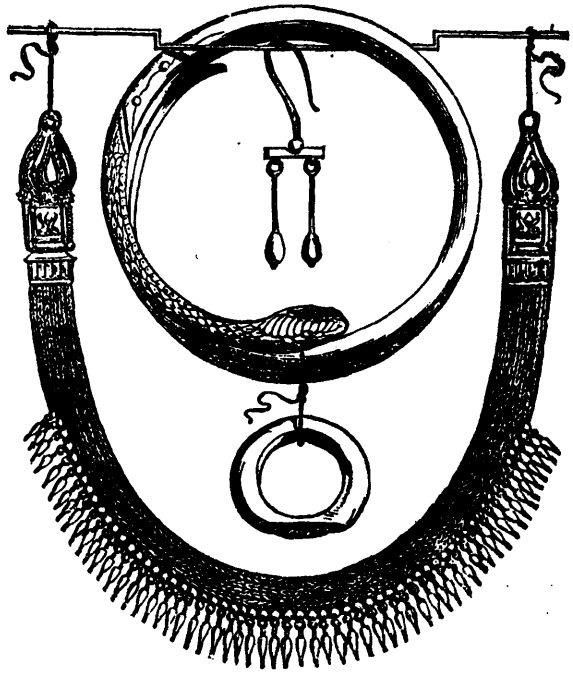


FIG. 7. POMPEIIAN JEWELLERY.

THE TREATMENT OF SERVANTS.

A great deal of nonsense is often talked on subjects about which we know nothing. We imbibe vague theories when young from those about us, and as we grow older we unconsciously allow them to develop, until, by constantly airing those ideas, we get to believe ourselves sound judges and experienced observers thereon, and indignantly defend them against all argument. How much less narrow-minded we should be if, whenever we found some "hobby" creeping up in our minds, we determined to face it boldly, turning it inside out with the help of sound reading on the subject, and the opinion of clever, practical people. Much is said about servants and the evils connected with them in the present day. Do we ever find ourselves for half an hour in a house without hearing some complaint, some account of "our cook," or "no cook," as the case may be? "Servants are not what they used to be," is the universal cry. Perhaps not. Mistresses are of course unchanged. It would be a great mistake to infer that anything could be wrong with them; at least, such an idea seems to have entered few people's heads. But do ladies, as a rule, look upon the servants in their houses with interest, except so far as their work and general behaviour are concerned? Does one lady in a hundred take the trouble to inquire into the history, friends, tastes—for servants have tastes as well as other human beings—of her dependents? Why should she take so much trouble about such an ungrateful, tiresome set of people? Now, I don't wish to moralize on the duties we all owe to those with whom we are brought into daily contact, nor do I wish to encourage "ladies'-maid gossip;" but I do say, and maintain, that ladies in the present day are unconsciously selfish and self-righteous in their way of speaking of and treating servants. There is a book by Mrs. Eiloart, "Some of Our Girls," which, whatever merits it may or may not have, is one which I hope many ladies will read, if only that their eyes may be opened to the relationship—"sisterhood," as, I think, it is there expressed—that does exist, whether acknowledged or cast into oblivion, between all women of all classes. Do mistresses ever trouble themselves to afford their servants intelligent amusements? "Dear me," I hear some much-vexed London lady saying, "they know well enough how to procure that for themselves!" Just so, because you don't do it for them. Do you ever lend them books, papers, pictures that will do them real good, instead of letting their active, restless minds run to seed, or, worse, bring forth weeds?

A servant's life must be a very, very monotonous one, especially in the country. We forget, whilst we go out somewhere walking, driving, or visiting every day, as a change from household duties, and we are very cross and low-spirited if we don't get out all day, that the maids go on from day to day in the same groove, seldom seeing their friends, and going out perhaps once a fortnight—perhaps once in three months. Why not allow servants to invite their friends to visit them openly? You think it would unsettle them. Not if you let it be a common event, and not a rare one; and, as to wasting their time, they do that without excuse, and would not work any the worse for having such wholesome treats. Of course it would give you trouble to find out if the friends are respectable before allowing them in your houses; but it might save you hours of sitting in register offices, and writing for characters; besides which, as they will have them secretly if not allowed to do so openly, you would prevent them hardening themselves in a course of deception.

I have heard people complain of servants laughing and singing about the house. Certainly vulgar noises, or any noise near the rooms where people are busy or ill, is not to be allowed; but why may not labourers' and mechanics' daughters be lively and show it, as much as gentlemen's? Then again, the dress of our inferiors. "So much above their station." What does that well-sounding phrase mean? I suppose dress, like other necessaries, should be suited to our means. Servants have high wages, and spend a good deal on dress. Ladies have large allowances, and run in to debt for dress. Ladies' style of dress has far more advanced of late years than servants'. "It is a woman's duty to make herself as beautiful as she can," some one has said. And is it not true? Are we not happier and pleasanter to our friends when well dressed? If servants dress vulgarly, it is the fault of their education, which has omitted all that might tend to give them a true sense of the beautiful. No one ever yet blamed a German peasant for her love of bright colours and finery, because she has good taste to make it suitable; and if our English peasant girls' taste were cultivated, we should see a marked difference in their dress.

Try to improve your servants mentally, to cultivate their higher powers, to enter into their troubles, pleasure, and interests; and you will not be answerable in the time, which is said to be approaching, when every lady will have to be her own servant.

GLUE AS A CURE FOR CUTS.

A correspondent of the *Scientific American* writes as follows: "For the last twelve or fourteen years I have been employed in a shop where there are over three hundred at work, and as is the case in all shops of this kind, hardly a day passes without one or more of us cut or bruise our limbs. At first there were but few who found their way to my department to have their wounds bound up; but after a while it became generally known that a rag glued on a flesh wound was not only a speedy curative, but an effectual protection against further injury. I was soon obliged to keep a supply of rags on hand, to be ready for any emergency. I will here cite one among many of the cases cured with glue: A man was running a boring machine, with an inch and a quarter augur attached. By some means the sleeve of his shirt caught in the augur, bringing his wrist in contact with the bit, tearing the flesh among the muscles in a frightful manner. He was conducted to my department (the pattern shop), and I washed the wound in warm water, and glued around it a cloth, which, when dry, shrunk into a rounded shape, holding the wound tight and firm. Once or twice a week, for three or four weeks, I dressed the wound afresh, and it was well. The man never lost an hour's time in consequence. The truth of this, hundreds can testify to. I use, of course, the best quality glue."

[EDITOR'S NOTE.—A small opening should be cut in the rag to allow matter to ooze out.]

COFFEE INSTEAD OF WHISKY.

A correspondent of the London *Lancet*, who owns water-power mills, writes: I am frequently compelled, at this season of the year, to have men working in water even in frosty weather. I find the following allowance gives great satisfaction to the men, and we never have a case of cold or injury to the men in any way: Kettle of coffee, made with half sweet milk, half water, three or four eggs whipped poured into it when off the boil; hot toasted bread with plenty of butter of the finest quality. Serve up this every two and a half hours. The expense is much less than the usual allowance of whisky, and the men work far better, and if care is taken to have the coffee, milk (cream is still better), bread, and especially the butter, of the very finest quality, the men are delighted with it. I am persuaded it would be worth while to try this allowance instead of grog. Giving extra grog gives the men a notion that it is good for them, and perpetuates the belief in stimulants among workmen.

A PRACTICAL WORD FROM TYNDALL.—Prof. Tyndall, in a very thoughtful address to students, which ought to be read by every young man and woman, has given a practical word on health, which we would like to quote. Indeed we should like to give the whole address if we had space. He says: "Take care of your health. There have been men who, by a wise attention to this subject, might have risen to any eminence, but who, by unwise neglect on this point, have come to nothing. Imagine Hercules as oarsman in a rotten boat; what can he do there but by the very force of his stroke expedite the ruin of his craft? Take care, then, of the timbers of your boat, and avoid all practices likely to introduce wet or dry rot among them. And this is not to be accomplished by desultory or intermittent efforts of the will, but by the formation of habits. No doubt the will has sometimes to put forth its strength to strangle or crush a special temptation, but the formation of right habits is essential to your permanent security. They diminish your chance of falling when assailed, and they augment your chance of recovery when overthrown."

TO PRESERVE THE NATURAL COLORS OF DRIED PLANTS.—The following method of doing this is given in a German pharmaceutical journal, and will interest botanists and others: Dissolve one part of salicylic acid in 600 parts of alcohol, heat the solution to boiling in an evaporating dish, and draw the whole plant slowly through it—prolonged exposure discolors violet flowers; shake off any excess of liquid, dry between blotting paper, and press in the usual manner. A frequent renewal of dry blotting pads, particularly at first, is desirable. Thus treated, plants are said to dry rapidly, furnishing beautiful specimens which retain their natural colors in greater perfection than by any other process.

DOMESTIC.

MILDEW IN BLACK SILK.—Try simple cold water for this troublsome stain, wetting it well ; and I found it answers better than spirit, or anything else I have tried.

CHEESE STRAWS.—Make a paste with 6oz. of flour, 4ozs. of butter, 3oz. of grated Parmesan cheese, moisten with a little cream or milk, season with salt, white pepper, and cayenne ; roll it out thin, cut into narrow strips, and bake in a moderate oven.

LUNCHEON CAKE.—The following is a good recipe : 1lb. flour, ½lb. currants, 6oz. dripping, one teaspoonful of Yeastman's yeast powder. Rub all these ingredients together dry, add one egg, and a little milk or water, which my cook thinks makes it much lighter.

OATMEAL GRIDDLE CAKES.—One pint of oatmeal mush, one pint of flour, two eggs, piece of butter size of an egg, one and a half pints of sour milk or butter-milk, one teaspoonful of soda. Beat well and add the soda, dissolved in a little boiling water, just before frying.

CHEESE BISCUITS.—Have a little puff or short paste ready, and sprinkle over it a little cayenne, and as much grated Parmesan cheese as the dough will take ; double up the paste, roll it out rather thin, and cut it with a round paste cutter, glaze with an egg, arrange on a floured tin, and bake in a sharp oven till of a light yellow colour.

VEAL WITH TOMATO SAUCE.—Take a piece of breast of veal, cut it in pieces an inch square, toss them in a saucepan with some olive oil till they begin to take color ; add a shalot finely minced, some French tomato sauce, pepper and salt to taste, and some minced parsley ; let the whole simmer gently by the side of the fire, shaking the pan occasionally, for about half an hour.

BISCUITS WITHOUT BUTTER.—½lb. of pounded sugar, add a couple of eggs and stir always one way for a quarter of an hour, then add the finely grated rind of a fresh lemon, and very gradually ½lb. of flour. When well mixed and reduced to a smooth paste, roll it out very thin ; cut it into any shape preferred, with a paste cutter. Put the biscuits on to a buttered tin, and bake in the oven to a pale yellow colour.

VEAL CUTLETS BROILED.—Cut some cutlets from a small neck of veal, trim, and sprinkle them with pepper and salt ; dip them in liquified butter, and broil them on or in front of a clear but not too fierce fire. Serve garnished with fried bacon and quarters of lemon.

Knead a piece of butter with parsley and a little thyme finely mixed, plenty of lemon juice, and pepper and salt to taste. At the time of serving put a piece of this butter the size of a walnut on each cutlet, broiled as above.

BEETROOT WITH CREAM SAUCE.—Boil the beetroot, and when cold peel and slice it ; stew the slices until quiet hot in some well-flavoured white stock well freed from grease ; strain off the stock, and stir into it, off the fire, the yolk of an egg beaten up with a little milk or cream. Arrange the beetroot in a dish, pour the sauce over, and serve ; or serve plainly, boiled with a cream sauce made without stock. If wanted cold, serve with a mayonnaise sauce, or with a little plain cream poured over, and with a seasoning of pepper and salt.

LEMON JELLY.—Soak and dissolve 2 ozs. of Nelson's gelatine or 16 sheets of the best French gelatine in 1½ pints of water, add the juice of 4 lemons and 1 lb. of loaf sugar, more or less according to taste. Whisk the whites of three eggs to a froth, add them to the above, put the whole into a saucepan on the fire, and keep whisking the mixture till it boils, then add the thin rind of 3 lemons, and let it stand about 10 minutes. Place the rind of the fourth lemon at the bottom of the jelly bag, and pour the mixture over it. If it does not come out quite clear the first time it must be passed through a second time ; but it is generally sufficient to return to the bag the first half pint of jelly that comes through. When all the jelly has passed through quite clear, pour it into a mould, and place it in a cool place, or on ice to set. Dip the mould in warm water to turn out the jelly.

BOUDIN OF FISH.—Take the raw meat of either whiting, flounder, plaice, or pike ; pound it in a mortar, and pass it through a sieve. Put half a pint of water into a saucepan with a pinch of salt, and a small piece of butter, when it boils stir in it enough flour to make a thick paste ; when cold take off this paste, half the quantity there is of fish, and take of butter half the quantity there is of paste ; thoroughly amalgamate the whole in the mortar, season with pepper, salt, and grated nutmeg, work in one or two tablespoonfuls of white sauce (Béchamel), and lastly as many eggs, in the proportion of two yolks to one white, as will bind the mixture. Butter some moulds, fill them with the mixture, and steam them in a stew-pan half full of water for fifteen to twenty minutes. Then turn them out, and serve with white sauce.

Prepare some lobster as croquettes. Having filled the moulds, as in the preceding receipe, scoop out a space in each mould ; fill this space with the lobster preparation, then cover it up with the fish mixture, pressing it well down, and finish the dish as above.

OATMEAL.—Oatmeal should be purchased at places where there is a quick sale for it, as it absorbs moisture from the air, and very quickly becomes rancid and unpleasant.

NERVOUS EXHAUSTION.

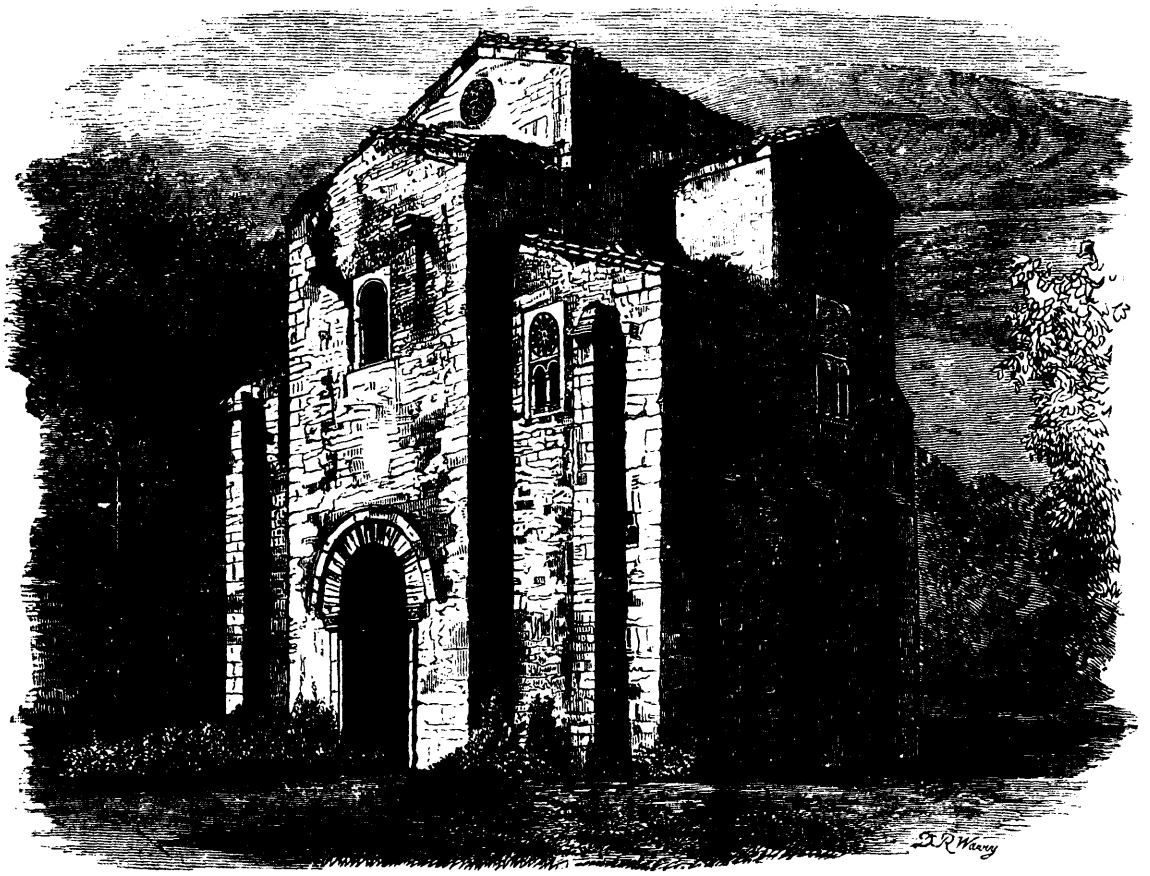
Dr. J. H. Jackson has a word on this subject in the last issue of "The Laws of Life," which is sensible and deserving of a place here. He says :

Seek to remove, in the first place, the causes, whatever they may be, which have induced prostration. No doubt the nervous centres, from which all nervous power and force are derived, are exhausted, and where this is the case, time is required in order that their nutrition may be thoroughly re-established. Let the person then avoid overdoing, always working or taking his pleasures within the limits of any taxation of body or of mind ; let him secure agreeable social associates ; live largely in the open air ; sleep as much as possible ; eat nutritious but unstimulating food, such, for instance, as is afforded by the various preparations of milk, fruits and grains, principally of wheat, so far as grains are coneerned, because it contains more of the nerve-making constituents than other grain. Avoid the use of condiments of all kinds and alcoholic liquors ; remembering, however, that if a person is not already accustomed to such a diet, the change must be made gradually, although positively, in order that the nervous system may not be thrown into perturbation by sudden withdrawal of its accustomed stimulation. All the habits of life, in regard to work, exercise, pleasure, eating and sleeping, should be in accordance with a thorough regularity of action in each 24 hours. He should take two baths each week, in which the body should be washed very thoroughly with tepid water, and rubbed afterward to insure good capillary circulation.

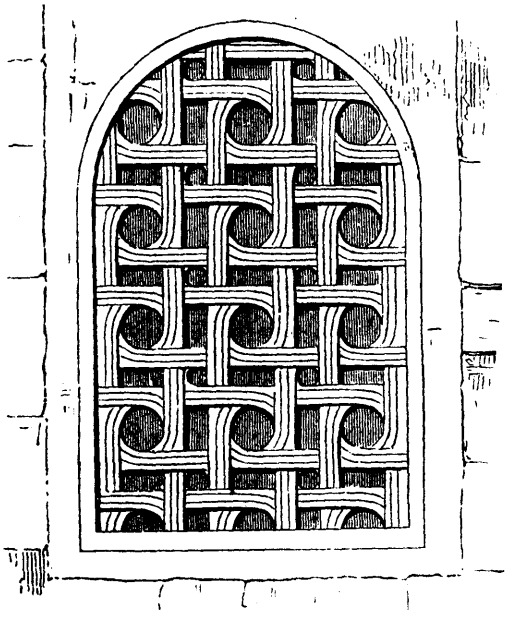
Some of the most eminent physicians are coming to advise as the best means for a permanent cure of nervous prostration and debility, a radical change in dietetic habits, embracing the use of unstimulating but nutritious food in the place of the more stimulating articles, such as meats and condiments. By carefully following such a course, health should be restored.

INFLUENCE OF AGE ON LEAF AND FLOWER.—Decandolle, the celebrated Swiss botanist, has started a question which promises to be a very interesting one. Does a tree produce flowers or fruit earlier as its age increases, temperature and other circumstances remaining the same ? He gives a number of observations to show that in some cases they do, and in other cases they do not, and botanists are in a quandary. It is generally found in these contradictory cases that there is a near reason, not discerned, that will explain the whole. It has been noted by American botanists (see Salem, volume of "Proceedings of American Association") that trees of the strongest constitutions leaf the earliest. Thus there are varying times of leafing in Norway spruces, though both be of one age. In a severe winter, if one or two such die, it will be the one which leafs the latest. The early one is the hardiest. Now a young tree is always more tender than one approaching a flowering condition. Young trees are often destroyed when older ones escape. This being the case, there would be a difference in the time of leafing between such young ones and their elders. On the other hand, where young trees had as strong a constitution as older ones, and there may be many such cases, there would be little difference.

THE HISTORY OF TOMATOES.—The tomato is said to be a native of Mexico, and the name signifies water berry. From Mexico it was introduced into Florida, thence it extended into adjacent parts of the South, and was used as an edible in the early part of the present century in that region, but did not receive much favor as food from the North before 1820. Tomatoes were grown as an ornamental plant under the name of "Love Apples," and were considered poisonous. There were very few persons who relished the taste of tomatoes at the outset of their use as food, but in due course of time both old and young will acquire a taste for the sour vegetable, and the more it is eaten the more palatable it will be to the taste.



St. Miguel de Linio.



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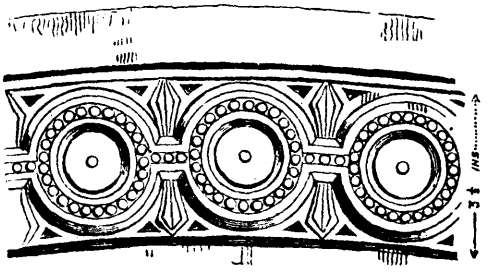
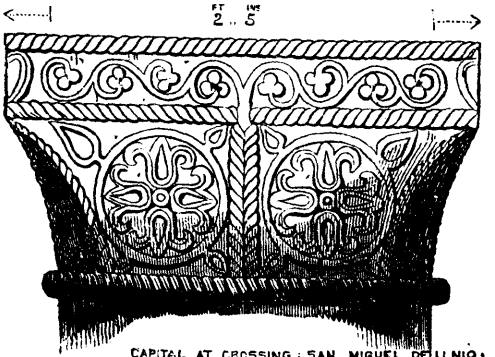


· PORTION OF ARCHIVOLT · TOMB · COLEGIATA · COVADONGA ·



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