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CANADIAN MECHANIC'S MAGAZINE AND PATENT OFFICE RECORD

Vol. 5. NOVEMBER, 1877. No. 11.

TECHNICAL EDUCATION

REQUIRED FOR CANADIAN MECHANICS.

IN another month the fifth volume of this MAGAZINE will be completed, and it is with much regret that we have to place on record the totally inadequate support it has received from that class for whose instruction and information it was intended. Indeed so far from receiving even a moderate share of encouragement from Canadian mechanics, it must have fallen to the ground had it not been for the support it has received from many not connected with mechanical work, but who felt interested in the scientific information contained within its pages. It was to be hoped that the great improvements made during the past two years in its typography, illustrations and selection of subjects, would have largely increased its circulation—as its now ranks favorably with any other scientific work published on this continent. Its price, too, can be no drawback, as two dollars per annum any mechanic can afford to pay in whom the desire to acquire knowledge is sincerely felt; but unfortunately for them and the country they live in, that class who alone of themselves should be able to support a mechanical magazine published in their midst, seem dead to reading any work that would tend to instruct them and elevate their positions in life, therefore we cannot refrain from passing upon the mechanics of Canada, as a body, a severe censure for such unmistakeable apathy to the acquirement of scientific knowledge of any sort, but, more particularly, for that branch which appertains to their own trades. In this apparent apathy there must be some reason deeper than that of a simple disinclination to study. Why should the mechanics of Canada be so far behind those of the United States in mechanical talent and general intelligence? It is not because they are deficient in ability or intelligence, but because any latent talent they may possess is never awakened by a proper kind of instruction in their youth. It is a hard thing to say of our own countrymen, but take our mechanics, as a body, and nine-tenths of them know little more than the use of the few simple tools they have been taught to use; nine-tenths of them, if deprived of the foreman who directs their movements, would be totally unable to complete any job upon which they have been employed; nine-tenths of them are content, after their day's work is over, to sit down and smoke till bed time, without one single thought of improving their minds by reading any class of work that would tend to elevate their thoughts and improve their condition. To what then is this distaste for literature to be attributed? We reply to the want of a technical education in youth, which, we regret to believe, is almost totally ignored in our common schools. In country schools, education is principally confined to books of a mere elementary character, and even in the higher class of schools, where a mathematical education is given, it is taught in a most impractical way, leaving the student ignorant of its application to practical science.

There is no more important body of men in the Dominion than the mechanics. It is to their skill, labour, and inventive genius that we are to look forward for the enrichment of this country by working up its crude wealth into such shapes and uses as will bring from foreign countries gold in exchange. It is the gold that will be received for these ores when manufactured, for our timber, and the produce of the land, that will ultimately make this a great and wealthy nation, and the longer the mechanical genius of the country remains uneducated and undeveloped, the longer will its wealth and power be retarded. To turn our rich but crude resources to the greatest advantage, we contend that mechanical and agricultural education in our common schools should receive more attention from the heads of the departments of education. The mere routine of a school education seldom develops a taste in boys for further study in leisure hours after leaving school; they content themselves, as their fathers did before them, with just sufficient knowledge of their trades to eke out an existence; it is therefore a necessity that technical instruction should be given in such a form as to create a desire for further information, and something exhibited in the way of practical lectures to be an incentive to study.

During the two past years that we have conducted this MAGAZINE, we have strenuously endeavored to impress upon mechanics the necessity of giving to such of their

children as they intended should follow trades, as far as they were able, a good technical education, and to endeavour to create in their minds a desire for knowledge, and if the teachers of schools in the country would give more attention to this branch of education, much benefit would accrue therefrom.

When we speak of the higher intelligence of mechanics in the United States over those of Canada, and their superior technical knowledge, we do so in no spirit of detraction of the ability of our own countrymen; the advantage on the American side is from the fact that technical education has received so much particular attention by that people, that it has at last grown into a national talent, and their inventive genius is remarkable over the whole world. The wealth that has been derived from many of their self-made-men from their inventions, has been a great incentive to the study of mechanics and to superior workmanship, and has created a love of research in minds that would for ever have remained dark, had not the light been allowed to enter.

There has been a great cry for protection of late in Canada, and we are not a party that would object to a just protection to our manufacturers; but if protection is to cause them to retrograde rather than advance, because competition no longer acts as a stimulant to improvements —we do not want it. We do not want to be compelled to purchase an inferior article at a higher price than it is worth to put money in the pocket of a manufacturer who has neither the enterprise nor liberality to make an article equal in value and finish to what manufacturers make in the States and sell at a lower price. As it is, in almost every article of mechanical industry, we are far excelled by the Americans, and this excellency over our productions is not that we cannot arrive at the same degree of perfection, but because our manufacturers do not go to the expense of obtaining superior machinery and skilled labour. The work of a skilled mechanic in Canada scarcely receives any more remuneration than that of a mere bungler. If protection is to keep our mechanics in darkness and half a century behind the times, then we hope never to see it. But when the practical education of our mechanics receives more consideration in our public schools than it does at present, no doubt a higher spirit of emulation will be evinced, and there will be a greater desire to vie with our neighbours in the excellence and finish of artistic and mechanical work. Canada, with all the disadvantages of a high protective tariff against her, has so many advantages on her own side in possessing at lower rates the raw material and labour, that if she would only turn out equal workmanship with the Americans, the balance of competitive trade would still be in her favour.

CEMENT FOR IRON.—The *Iron Age* recommends the following cement;—Take four or five parts by weight of dried and finely powdered brick earth, and one part of peroxide of manganese, and mix them with two parts of fine iron filings, which must be free from rust, one half part common salt, and one half borax. Grind all fine together and mix intimately, then make into a stiff mass with water. The cement is applied as soon as made. It is first gently warmed, and then exposed to a heat little short of whiteness. It is stated to be thus converted into a slag-like material which stands boiling water and all common heats. Another recipe is: Equal parts of finely sifted peroxide of manganese and finely triturated zinc, which are rubbed up to a thickish fluid with common water-glass; this must be applied as soon as ready, and makes as hard a cement as the foregoing.

NEW METHOD OF MAKING PROPELLOR PATTERNS.

(See page 332.)

We give herewith an illustration of a new method of making patterns for propellors, so as to get a turn screw by mechanical means, without the necessity of calculation and drafts. The new method was designed by Mr. Otto Osten, a mechanic of this city. As shown in the engraving, a number of pieces of wood are planed to the same size, and placed on a piece of iron threaded on its upper end, so that a nut may clamp them together. They are then spread out to the required pitch and marked on both ends with a pair of compasses. All the wood outside the marks is then taken off. The pieces are smoothed up, clamped and glued together, and the pattern is narrowed at the hub and rounded at the tips to make it neater.

This gives all the curves true with no guess work, as is too often the case with the method in vogue. It ought to reduce the cost of propellors, as the pattern is so simply made. Propellor patterns are the most difficult jobs to do around a foundry; a true screw is difficult to make, and then they are not always sure of being correct.

Several propellors have been made as samples from this style of pattern, and can be examined at the shop of E. H. Thompson, 228 Main street. After the pattern is made, before it is glued together, the purchaser may examine and see if the pitch suits him; or he can set the pieces of wood before the pattern is made and get exactly the pitch he wants. Where it is desired to have the propellor curve inwards at the tip to prevent slip, the pieces of wood are made a little thicker at the tips so that the screw can be made accurately. We have seen several of the patterns made on this principle, by Mr. Osten, all of which were very correctly made. Any ordinary mechanic can make one, as it takes no scientific knowledge to prepare plans and drawings before the pattern makers take hold of the work.

—*Mining Scientific Press.*

A STEEL WIRE SUSPENSION BRIDGE IN CALIFORNIA.—The Pacific Bridge Company are building in Mendocina county, California, at Cottoneva, a suspension bridge which is described as follows: "The distance from centre to centre of the saddles on the towers is 270 feet. The deflection or fall of the cable is 23 feet 6 inches. The cables are built in the same manner as those of the Clifton Bridge, at Niagara. The steel wire is about No. 11 Birmingham gauge, and is protected against rust by immersing in a bath which gives it a fine coat of zinc. There are eleven wires in each strand, seven strands in each 1½ inch rope, and seven ropes in each cable. The ropes are not twisted together to form the cables, but gathered up every six feet by the suspender bands. Each rope is warranted to bear a strain of 60 tons. It is made fast to an independent anchor bar, 1 by 3 inches in diameter, and forming links 18 feet long, until connection is made with the anchors. The anchors are of cast iron, 3½ by 3 feet in surface, weigh 1000 pounds each, and are placed 14 feet below the surface of the rock. Great care was taken in securing these anchors in place by means of cross I beams which run under the rock at either side. The lower part of each pit was enlarged so as to form a hemispherical chamber, and the rock work, set in Portland cement, which is built upon the anchor, is so constructed that the upward strain is transmitted to its sides. The towers are of red wood. There are four posts 10 by 10 inches, and two 10 by 12 inches, giving an effective area of 640 square inches to withstand the strain of the cable on the tower. The wooden truss to prevent vertical vibration is 8 feet high and of the Howe truss pattern. The 270 feet of the bridge is divided into 45 panels. The longest suspenders, 44 in number, are of ⅞ inch steel wire, the 42 shorter ones are of 1⅛ inch solid iron. The estimated dead load of the bridge is 1000 pounds per linear foot; live load, one ton per linear foot; in all, one and one-half tons, or one-fifth of actual breaking load. The bridge will be completed in about thirty days, and promises to be a structure which the builders may well be proud of."—*Iron Age.*

RAW-HIDE HORSESHOES.—A Manchester mechanic has invented a horseshoe composed of cow-hide compressed into a steel mold and then subjected to a chemical preparation. Its inventor asserts that it lasts longer than the common shoe, and weighs only one-fourth as much; never splits the hoof, and has no other injurious influence on it; requires no calks even on asphalt; is so elastic that the horse's step is lighter and surer; and adheres so closely that neither dust nor water can penetrate between the shoe and the hoof.

RULES AND PROCEEDINGS OF THE GERMAN PATENT OFFICE.

NOTICE.—Pursuant to section 20 of the Patent Law of the 25th of May of this year, we issue the following provisions concerning the notification of inventions:

SECTION 1. The application and every accompanying drawing or specification must be signed by the applicant or his attorney. Explanations of the subject of the invention may not be given in the application itself, but only in the documents annexed to it.

SEC. 2. Each annex to the application must be furnished with a consecutive number. Each annex is, as far as it does not deal with models or samples, to be handed in in a duplicate.

SEC. 3. The application must contain the statements as hereafter required, as far as possible, in the given order of succession:

a. A short but accurate specification of what forms the subject of the invention. From the specification there must distinctly appear the claim for a patent — *i. e.*, that which the applicant considers new and patentable.

b. The petition that a patent be granted for the subject of the invention so described. If only an additional patent is to be granted (section 7 of the Law of Patents), the applicant must expressly state this and the original patent, as also its number and the year when granted be stated. If the patent is only to take the place of an existing patent (section 42 of the Law of Patents), the applicant must likewise also expressly state this, and, at the same time, add thereto the documents about such patents in place of which the patent is to stand. The petition is in this case to be confined to a transformation from a territorial patent to one for the whole empire. If at the same time a patent is claimed for an improvement, a special petition must be made for the same.

c. The declaration that the governmental charges of twenty marks (section 20 of the Law of Patents), is already paid into the treasury of the Patent Office, so that it will be paid in along with the application.

d. The statement of name, rank, and residence of the applicant, as far as the application if effected by an attorney. The latter must hand in a power of attorney, signed by the applicant. If an attorney is appointed for an applicant living within this realm, and if the attorney is to be entered as such in the patent roll (section 19 of the statute), then it must be expressly stated in the power of attorney.

In appointing an attorney on the part of an applicant for a patent not residing in this realm, it is taken for granted that such agency extends to the rights and powers specified in section 12 of the statute.

e. The enumeration of the different annexes to the application, giving their number and contents.

SEC. 4. For all written documents of applications, paper of the size of thirty-three centimeters height by twenty-one centimeters must be used. For the writing, deep black ink (not strictly) must be used. Of each of the drawings there must be handed in duplicates. For the first and principal copy, white, stout, and smooth drawing-paper (so-called Bristol or carton paper) of the size of thirty-three centimeters height by twenty-centimeters breadth; or thirty-three centimeters height by forty-two centimeters breadth, or thirty-three centimeters height by sixty-three centimeters breadth, must be used.

The drawing, as also all writing on the principal copy, must be done with China ink, in deep black lines — not be colored or tinged. The drawing must be enclosed by a plain marginal line, which is to be drawn two centimeters back from the edge of the paper. All writing must fall within the space enclosed by the marginal lines.

The signature of the applicant is to be affixed in the lower right-hand corner. On the upper side of the sheet a space within the border-line, of at least three centimeters height, must be left free for number, date, and a specification of patent.

As a second copy, a tracing of the first and principal copy on drawing-cloth is to be handed in. In this copy the use of mixed colors is permitted and desired. The drawings may not be folded or rolled. They must be packed so as to arrive at the Patent Office in a smooth condition.

SEC. 4. All weights and measures must be given according to the metrical system, statements of temperature according to Celsius, those of density as specific weights.

SEC. 6. Te specifications must confine themselves to what is pertinent towards forming a judgment of the application for a patent. Explanations of a general character should be avoided. Moreover, the specifications must be so arranged as to adapt themselves for publication on granting of patent. In the summary in conclusion the claims for a patent should be specified more closely than done in the application.

SEC. 7. The subjoining of models and samples is desired so far as it may aid in giving a clear idea of the invention. It should be done when without this the judgment of the application for a patent cannot take place with any certainty.

COSTS AND CHARGES.

The costs and charges, which, according to the provisions of the Patent Law of 25th of May of this year, must be paid into our Treasury, are, for the sake of convenience, not to be sent in with the applications, but, by post-office order, addressed to the Treasury of the Imperial Patent Office. The post-office order must, however, if it is a case of a grant of a patent, show the name of the applicant, and the subject of the application — in case of complaint the name of complainant, and the cause of complaint; in other cases, that of the patentee, the subject of the patent, and the number which the same has in the patent roll. The Treasury furnishes receipts only if expressly wished for; the cost of postage in such case to be borne by the receiver of such receipt.

VULCANIZING WOOD.

A New York firm claims to have discovered a process for vulcanizing wood, requiring, when the wood is green from the mill or tree, only from four to six hours in the preparation. By this process it is said that all kinds of wood and lumber are made hard. The fir, the cotton wood, the spruce, and even cedar, when treated by it, are rendered hard enough to be used as ties, and as such will last for an indefinite time, without being worn by the rail, or destroyed by decay.

But the effect of the treatment upon the southern yellow or pitch pine is really marvellous. The pitch is converted into oil, which is diffused through, and becomes homogeneous with, the fibre; it is then solidified and converted into resin. This imperishable substance fills all the pores, and so cements the fibres of the wood as to make it harder and stronger than oak, while it prevents it from absorbing air or moisture, from shrinking, cracking, warping or expanding.

But there are many other uses for which wood and lumber preserved by this process will prove invaluable. The railroads are maintaining 125,000 miles of fencing, the annual expense of repairing which is $10,000,000. This is another very large item which might be saved to the stockholders. Bridges can be made of wood treated by this process, which will be as strong, as safe and lasting as those of iron, and at a much smaller cost. The annual expense for repairing the woodwork of railroad cars is very great, especially freight cars, which are always exposed to the weather, and are constantly rotting. The lumber prepared by this process has the appearance of the precious woods, when manufactured and used for mechanical purposes. The vulcanizing develops in it, and throughout every portion of it, a susceptibility of the highest polish, more beautiful and more lasting than the most expensive varnish. A polish, which is not tarnished by any exposure to the weather, nor affected even by the strongest acids. The construction of cars of lumber so inexpensive, which will not rot, which will not swell, nor shrink, which requires no oil, paint or varnish, must result in another great saving to the railway companies.—*National Car Builder*, viii, 133.

PRESERVATION OF BELTING.—In order that belting of cotton or linen should have both strength and flexibility, together with increased adhesive power, they should be thoroughly soaked in linseed oil varnish. If the belting be new, the varnish may be applied with a brush until no more will be taken up, whereupon it may immediately be used without any preparatory drying. After having been in use for some weeks, a second application of the varnish should be made. Cotton or linen belting thus prepared will neither contract nor stretch, and will always be pliable and unaffected by change of temperature. The adhesion of the belt to the pulley is likewise increased by the varnish, while steam and acid fumes have no effect upon the belting at all.—*Maschienen-Constructeur.*

A REMARKABLE RAILWAY BRIDGE.—The new iron railway bridge over the river Douro, near Porto, Portugal, crosses it with an arch of a single span which measures 160 meters (520 feet) and has a rise of 42 meters (138 feet 6 inches). It is crescent-shaped in form; that is, the extrados and the intrados, which are connected by struts in the form of St. Andrew's cross, are farthest apart at the crown.

PHILLIPS' TRAM-CAR BRAKE.

FIG. 1.

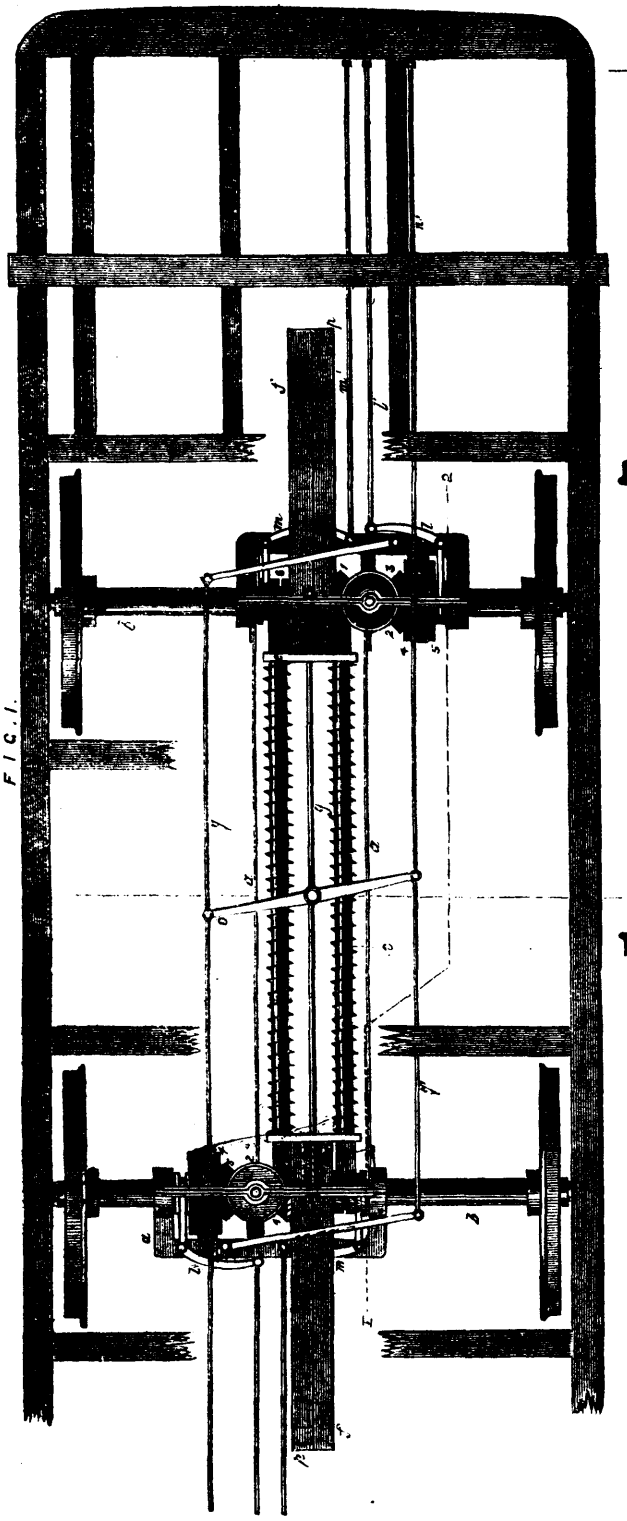


FIG. 3.

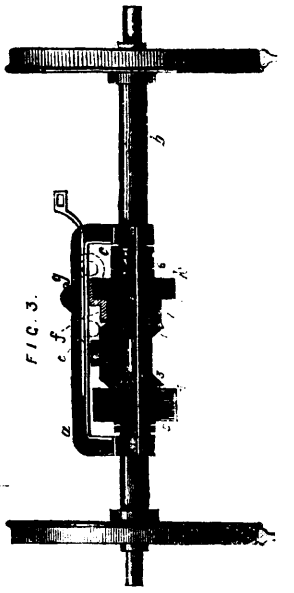
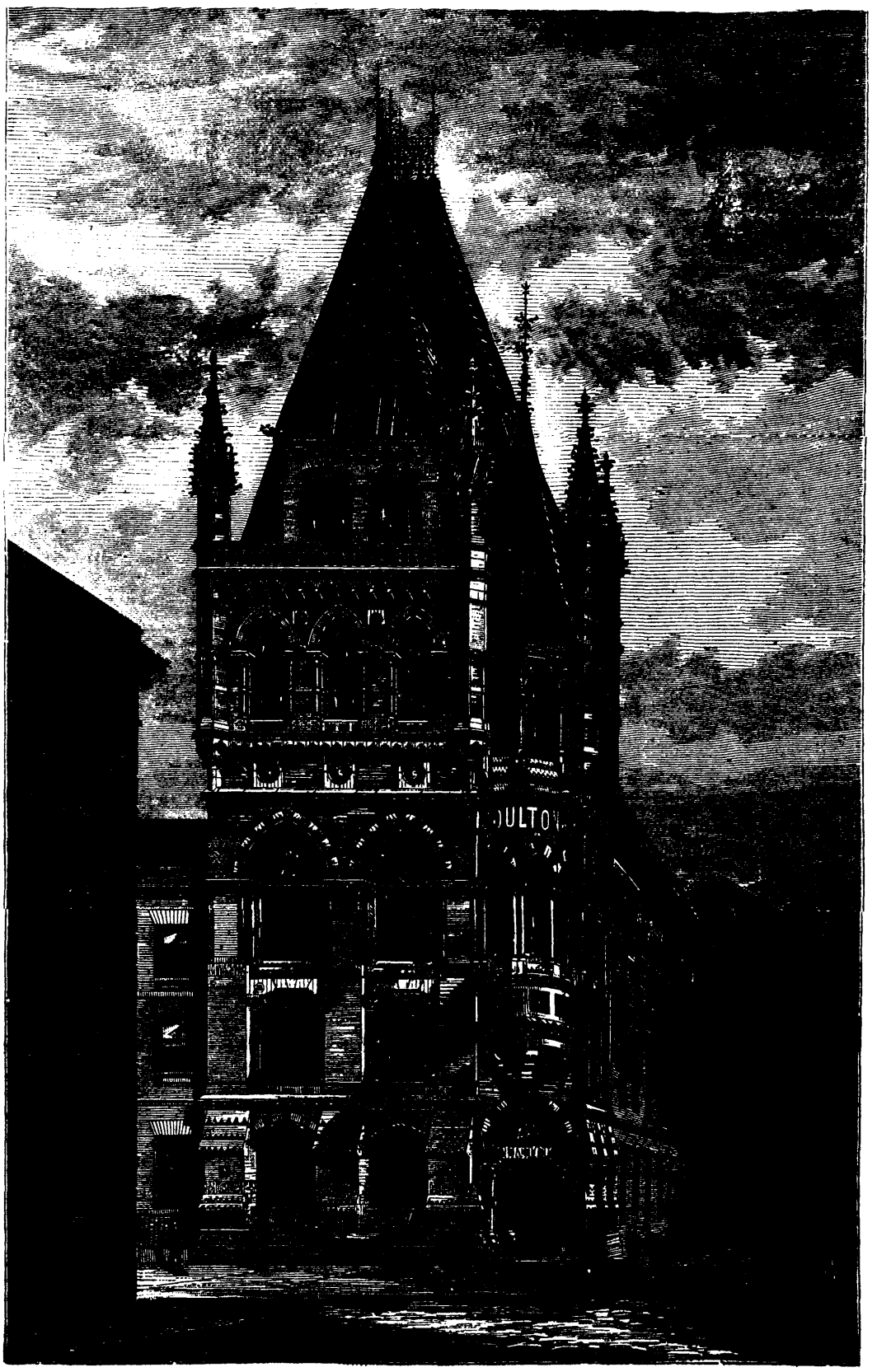


FIG. 2.



MESSRS. DOULTON'S PREMISES OF TERRA-COTTA AND STONEWARE.

PHILLIPS' TRAM-CAR BRAKE.

(See page 324.)

The application of steam power on street tramways, though meeting with much success in the provinces, will probably be deferred for some time in the streets of London, and perhaps in some of the largest cities, such as Manchester, where traffic is very great. Meanwhile horses must be employed to carry on the traffic already obtained on existing tramway lines, and everything which tends to lessen the heaviness of the work and so decrease the expenditure for horses, must command the attention of tramway companies and their managers. For this reason we illustrate on the page 324, a form of brake by which the power required to stop a car is stored up in springs, and by them given out in re-starting the car, thus relieving the horses of the heaviest part of their work.

In our illustrations Fig. 1 is a plan of the arrangement of springs and gearing as applied to a tramway car, the flooring of the car being removed; Fig. 2 is a sectional side view of the same, the section being taken in the line 1, 2, of Fig. 1; and Fig. 3 is an end view, partly in section, showing more clearly the train of gearing. *a* is the frame which is carried by the wheel axles *b*, and is in no way connected with the body of the car. This frame supports a pair of rods *c*, on each of which is mounted a helical spring *d*. The ends of these springs *d* abut against cross heads *e*, which are supported by and capable of sliding on the rods *c*, and are connected to the toothed racks *f*. The cross heads *e* are further supported by a rod *g*, which also acts as a tie rod to hold together and strengthen the upper part of the frame *a*, and which also serves to carry short springs *h* or blocks of India-rubber, which act as cushions to prevent the cross heads from striking against the ends of the frame, should the springs *d* act too suddenly owing to the slipping of the wheels on the rails or through accident. The teeth of the racks *f* take into the teeth of the pinions *i*, *k*, (see Fig. 3) which are mounted loosely on the wheel axles *b*. The pinion *i* is cast with and forms a part of the bevelled wheel 1, which, with the bevelled wheels 2 and 3 and the cone 4, receives motion from the friction clutch 5. This friction clutch 5 is keyed to the wheel axles, but is capable of a slight lateral motion thereon, so that it may be brought into contact with the cone 4, which with the bevelled wheel 3, of which it forms part, is mounted loosely on the wheel axle *b*. This contact of the friction clutch 5 with the cone 4 is caused by the cranked lever *l*, which is connected by the rod l^1 to a hand lever or treadle to be worked by the attendant. The pinion *k* is capable of being put into gear with the toothed clutch 6, which is also keyed on to the wheel axle *b*, and is capable of slight lateral motion thereon, such motion being communicated by the cranked lever *m*, and rod m^1, which are worked by the attendant by hand lever or treadle.

The action of the arrangement in stopping the car is as follows:—The attendant will bring the friction clutch 5 into contact with the cone 4, as above described, and by the impetus of the car motion will be communicated through friction of contact to the train of geer wheels and pinion *i*, and the rack *f* will be forced back, at the same time compressing the springs *d*. The springs *d* will be held in the compressed position by the brake until released by the attendant. By this means the cars will be quickly brought to a standstill, while a power will be created whereby the re-starting of the car will be greatly facilitated. As soon as the car is stopped the friction clutch 5 should be thrown out of contact with the cone 4. When re-starting the car the attendant will first put the toothed clutch 6 into gear with the pinion *k*. He will then take off the brake, and the springs will be free to expand and exert their power on the wheel axles by forcing forward the rack *f*, which in turn will actuate the pinion *k*, and this pinion, through the clutch 6, will communicate motion to the wheel axles. A band brake is applied to the friction clutch as shown in Figs. 1 and 2. This is worked by the cranked lever *n*, rod n^1, and hand lever *n*2, and may be made to act on both wheel axles by prolonging the rods *n*1, and connecting them to the double lever *o*, by which means both brakes may be worked from either end of the car. The brake may also be made automatic, and this is effected by placing at the end of the rack *f* a hinged tappet *p*, which as the rack *f* is forced back will strike against a fixed tappet p^1, on the under side of the lever *q*. The lever *q* is connected to the cross lever *o*, by the rod q^1. Thus it will be seen that as the lever *q* is pushed forward by the tappet *p* from the dotted position Fig. 1, the rods n^1 will be forced forward, and the brakes which are worked by these rods n^1 will be brought to bear on the surfaces of friction clutches 5, and the hand lever *n*2 will be forced from the dotted position, shown in Fig. 2, into the other position, when it will spring into a notch in the rack *r*, and remain there until it is released by the attendant. This arrangement has been patented by Mr. J. Phillips, White Hart-street, Kennington.

NEW HOISTING CLAMP FOR BUILDING STONE.

(See page 328.)

We extract from the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale* the annexed engraving of a new apparatus for hoisting building stones while the same are being hoisted into position. In principle the weight of the stone itself is used to act upon levers so that the block is tightly grasped as it were in pincers. C D and C^1 D^1 are arms pivoted at E in the piece A B. To the lower ends of these arms are attached the clamps F, and to the upper extremities are pivoted short arms which form a V at the point G, in the vertical piece H. To the latter is secured the hook K. J is a screw which serves to elevate the point G.

In using the apparatus the clamps are placed on the sides of the stone, as shown, and the screw J is elevated. By this means the outer ends of the arms C D and C^1 D^1, are forced apart and the clamps pressed against the block. When the whole is lifted by the hook the tendency of the V arms C G and C^1 G^1 is to open, when the weight of the stone itself causes the clamps to be forced the more tightly against it. The holes in the piece A B serve to adjust the pivot points E of the large arms to any size of stone.

ELLIOTT AND BURNETT'S ECCENTRIC VALVE.

(See page 328.)

The accompanying illustrations show the construction of a stop valve made by Messrs. Elliott and Burnett, of Stockton-on-Tees, called by them an eccentric valve. The valve, however, is really mounted upon a short throw-crank, and is guided by a pair of small projections running upon similar projecting strips in the valve case. The opening or closing, as will be seen, may be almost instantaneous, and one advantage is that, in case of accident or any cause making it necessary to close the valve with great promptness, an excited person could not make any mistake by opening in place of closing the valve, as less than one revolution of the hand-wheel, either way, closes it. The makers prefer that the steam should be admitted on the valve seating side of the case opposite to the letter *s*, in order that the steam should, when shut off, be also shut off from the packing on the valve spindle, when made tight in that way, in place of with the cone seating as shown in the illustration. There is one objection, however, to this, namely, that if the packing by wear became loose, the steam might open the valve. The spindle, however, only being turned usually through one, or a half revolution, the packing will last tight for a very long time, and might in some situations never need renewal. In the valve spindles, as shown made tight with a cone seating, sufficient tightness and friction to prevent the undesired movement of the valve, and to make it remain in any position for regulating, is secured by means of the spring washer under the nut on the top of the spindle.

This form seems to us to recommend itself as the better one. The valve is very simple, the screw employed on most valve spindles is avoided, and we understand it works well in practice.

PARISIAN COPYING-INK—HOW TO MAKE IT.—The best kinds of copying inks are, as is well known, prepared by adding a percentage of alum, sugar and glycerine or salt to the extract of logwood. Such inks have a violet tint, and gradually become blacker on paper. The copy is, however, very pale at first, and is often indistinct. The Parisian copying ink is distinguished from the common kinds by its appearance more or less yellow in a liquid state and by producing a distinct bluish black on paper. It has the additional advantage of preserving its fluidity, while the common kinds soon thicken. Professor Gintl recommends the following method of preparing an ink which has all the advantages of the Parisian: A strong solution of logwood extract is treated with one per cent. of alum, and then with as much lime water, so that a permanent precipitate is formed. Some drops of weak chloride of lime are then added so that a perceptible bluish black color is attained, and hydrochloric acid is added by drops till a red solution is obtained. A little gum is then added with 0.5 per cent. of glycerine.—*Paper Trade Journal*, vi, 269.

MAKING SURE.—A very shrewd person wishing to catch a mouse that ate his books, bited, and set a trap, and sat by it to watch.

IMPROVEMENTS IN BAND-SAW MACHINES.

(See page 329.)

A method of arranging band-saws so that they may be driven either by hand, by treadle, or by a motive-power engine, has been recently patented by Mr. W. Lanfear, of Kingsland. The following description, with the accompanying diagrams, will render clear the improvements of the inventor:— Fig. 1 is a side elevation of the sawing-machine complete, and Fig. 2 is a front elevation of the lower portion. In carrying out the invention the patentee adapts to the lower shaft or axle of the band-saw a flywheel B, to one of the arms of which is secured a crank-pin connected by means of a link or connecting-rod to a treadle lever placed below, so that it may be worked by the foot of the attendant while the latter is watching the sawing operation on the table. Sometimes it may be found convenient that the workman should be relieved from the labour of driving the saw by means of the treadle, and that an ordinary labourer should be employed for the purpose of actuating the machine. To this end is adapted to one of the arms of the flywheel B, a handle, shown by dots at G. Fig. 2 is so affixed that when the crank-pin and connecting rod are removed the machine may be driven by hand power. If preferred the winch handle G may be adapted to a separate wheel, and the motion of the latter communicated to the shaft of the band-saw by toothed or other gearing, as indicated by dotted lines. In this case, however, it will be necessary to remove the flywheel B, in order to give room for the handle of the large-toothed wheel to pass. Or the winch handle may be cranked and adapted to the crank-pin of the treadle arrangement, as indicated by dots at L, in Fig. 2. By this arrangement the treadle and hand power can be used in combination when required. As, however, the shaft will usually be required to be driven faster than a man can conveniently turn it by hand, it is preferable to adopt the separate wheel and gearing as shown. As it will be convenient that the endless band-saw should also be capable of being driven by other power than by treadle or winch, the patentee places on the main shaft of the machine a fast and loose pulley H, capable of receiving a driving band, so that when the machine is properly secured in place it may be driven either by horse power, by a wind or water mill, or by a steam-engine, when any of these motive agents is available. The endless band-saw is mounted in the usual manner on the two pulleys, the upper one of which is adjustable vertically, as shown in the drawing, for the purpose of tightening the saw should it become slack by wear. This adjustment, however, forms no part of the present invention, the patentee claiming only the "adaptation to endless band-saws of two or more different arrangements of driving mechanism."

News has been received in Europe of an eruption of the volcano Cotopaxi, near Quito. The eruption was as usual preceded by an earthquake. An immense quantity of ashes was ejected, principally in the direction of Guayaquil, falling on board ships sailing from Guayaquil to Panama. The distance was, in some instances, reckoned at 1000 miles.

The telescopic spar torpedo, a model of which was submitted recently by one of the laboratory artisans named Griffiths, was tried in the Thames on the 9th inst., with a roughly constructed apparatus but on the full scale. The spectators, who were taken out into the stream in a steam launch, saw only a couple of poles, each about 30ft. in length, lying upon the deck, one upon the other, with a red disc at the extremity to represent a charge of gun cotton, and the other end made fast a little astern of midships. The practice consisted of taking aim at the floating buoys in the river as the launch steamed past at full speed, and simple as the affair looked the effect was remarkable. Steering within a calculated distance of about 50ft. the torpedo was cast overboard, when the tide and the motion of the vessel carried it out to arm's length, and at the same time caused the upper spar to stretch out in telescopic fashion, carrying the torpedo head completely under the object attacked. It was the opinion of all who witnessed the experiments that the invention was both clever and valuable, capable of rendering useful service even in the hands of an unpractised crew, and certainly to be preferred to the ordinary spar torpedo suspended over the bows of a vessel attacking end on, and risking its own destruction.

The German Patent Office, we learn from a reliable correspondent, received during the first month after the going into effect of the new patent law, no less than 3,000 applications for patents.

NUT-LOCKS.

(See page 329).

Among the innumerable contrivances for securing and preventing bolt-nuts from working loose by the jarring and trembling of machinery, the following are most worthy of note. Most of them are American devices, though some of them are foreign. Very little description is necessary, since the devices are very simple, and can easily be understood from the drawings. The illustration is "Levytyped" from *Knight's Mechanical Dictionary*.

a has a washer cut obliquely, forming edges which cut into the nut and bar.

b consists of a plate which is fitted between the two nuts of the splice bar.

c has a plate fitting over the nuts and held by a staple and key.

d and *e* are right and left handed check-nuts, one being smaller than the other and allowing the smaller to be slipped over the larger; they also have set screws at either side.

f consists of an interior left-handed screw with its head forced against the face of the outer nut.

g consists of a conical screw whose longitudinal slits allow it to be forced down on the bolt screw by the outer nut.

h and h^1 consists of a through-pin which pierces the nuts.

i consists of a feather which is fixed into a longitudinal groove in the bolt and into a spine-way in the nut.

j consists of a racket-washer and a click, with the nut partly imbedded in the washer.

k consists of pin contrivances which enter grooves in the washer and nut.

l consists of a spreading wedge inserted into a split box.

m consists of an unequal-sided washer which causes one side to imbed itself into the object, and thus offer resistance to the screw.

n consists of a concave-faced nut, which fits on a convex seat on the splice bar or washer.

o and o^1 is a bifurcated washer with the legs bent up against the nut.

p and p_1 is a split washer, one side bracing against the nut and the other braced against the splice bar or washer.

q shows a gravitating nut, heavier on one side, and thus preventing turning.

r consists of a winged washer which springs against the sides of the nut.

s consists of a notched plate which slips over recesses in the nuts.

t and t^1 consists of a washer with spring wings which hold the nut.

u and u^1 is a hinged washer which holds the nut.

v and v^1 is a spring which is braced against the nuts.

w consists of a nut with a gravitating extension piece.

x consists of a cam which braces against the nut.

y consists of a grooved nut and bolt, into which a wedge may be inserted.

z consists of a nut which is forced upon a yielding washer.

a^2 consists of a split bolt and a wedge held by a key.

b^2 is a nut with internal ratchet and a spring click on the bolt.

c^2 c^3 and c^4 show the so-called Noblet washer, some of whose points can be turned up against the washer and others down against the object, if desired.

d^2 is the Nicholson (1852) bolt, with a hemispherical bearing surface and nut.

e^2 shows Adams' wedge-shaped washer (1856.)

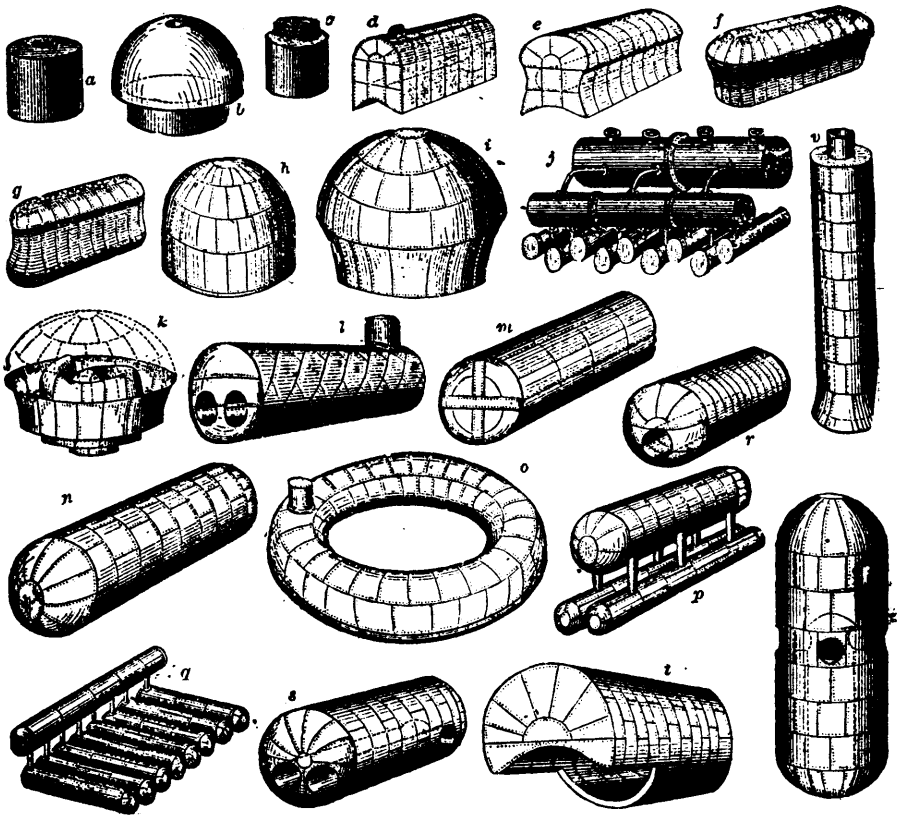
f^2 consists of a right and left ended screw bolt.

g^2 g^3 consists of a washer beneath the nut, with a tip which projects into a slot in the splice bar.

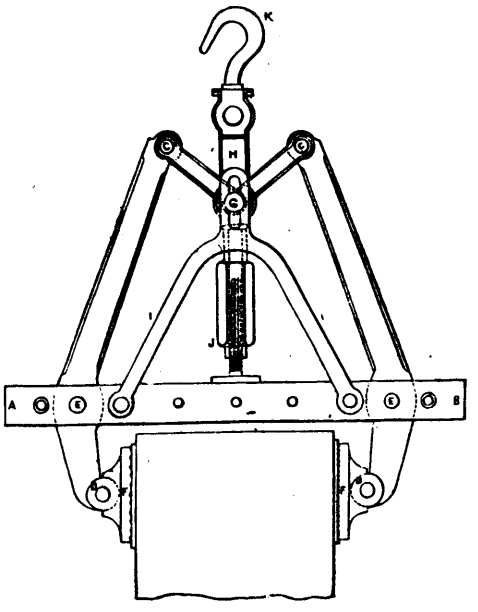
h^2 consists of a washer slip with a piece turned up to form a key.

h^3 shows the grooved nut.

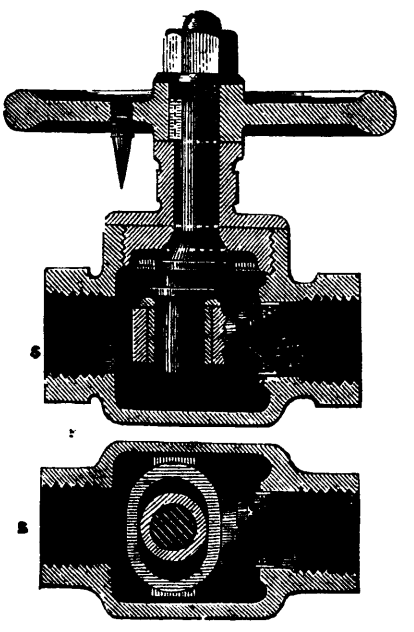
A Big Library.—A new library is in course of construction in the States, which will, it is said, be the finest which America possesses. It is the Lennox Library, so named from its founder, who has given 400,000 dollars to build it, and has endowed it with 300,000 dollars. The sum available for the purchase of books will be 212,000 dollars. The building is to be 200 ft. long and 125 ft. wide, and constructed of white marble. It will contain 300,000 volumes, besides the private collection of Mr. Lennox, which contains 15,000 volumes, devoted mostly to the history of America and to Shakesperian literature.



DIFFERENT FORMS OF BOILERS

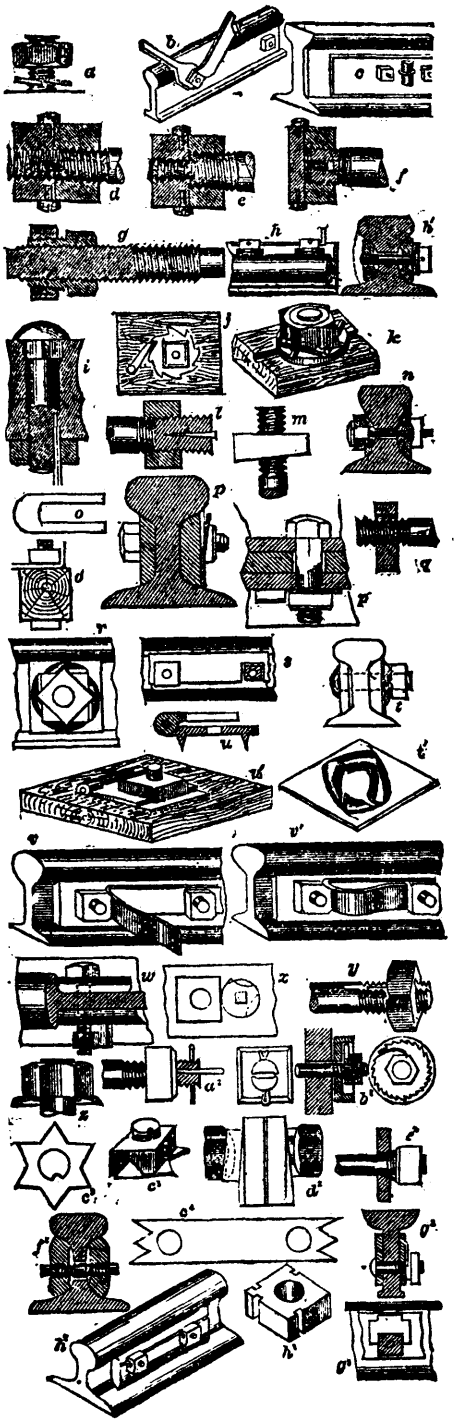


NEW HOISTING CLAMP FOR BUILDING STONE.

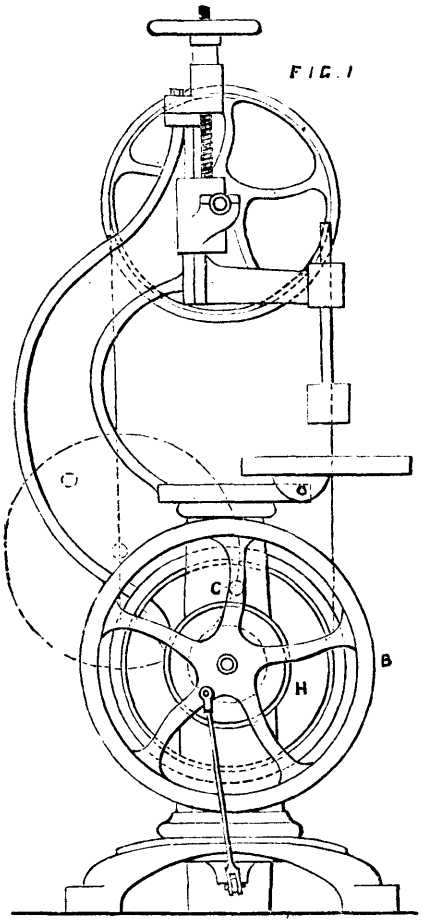


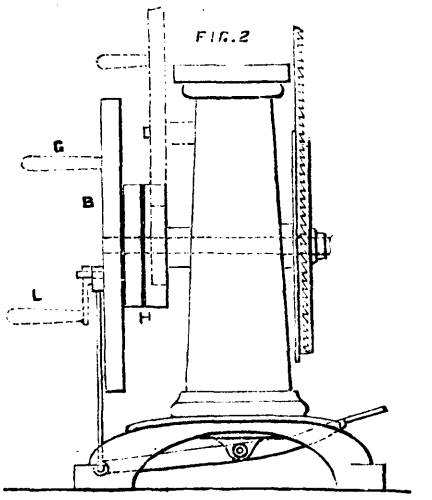
ELLIOTT & BURNETT'S EXCENTRIC VALVE.

NUT-LOCKS.



Improvements in Band-Saws.





HINTSON JOINING.

In "Andrews' Guide to Church Furnishing" are some hints for the fine carpentry of church interiors, which may apply just as well to other branches of tasteful joining. The main stay of constructive woodwork is the mortise and tenon. A piece of woodwork which can be put together without glue, nails or screws, and serves its purpose, is an ideal work of construction, but this is not always possible. Another principle of construction is that every piece of wood should be so placed that it can swell or shrink without injuring itself or displacing any other piece. This is maintained in an ordinary paneled door, provided no moldings are inserted. Still another principle is that miter-joints should be avoided, whether for molded work or not, for the reason that shrinkage causes all miters to open. No piece of wood should be used unless the straight grain of the wood can be seen through its full length in one place. Inserted moldings should be avoided as far as possible ; and all moldings for panel-work should be worked on the styles and rails. It is a general principle, observed in the best mediæval joinery, that all moldings on rails which are horizontal should butt against the styles ; and that styles should be either plain or should have moldings stopped before reaching the joints with the rails. In practice, all rail moldings may be worked the whole length of the stuff used ; and if muntins (which are the middle styles) are used, the moldings may be cut away to the square wood before the mortise is cut which is to receive the tenon of the muntin. Thus the molding will butt against the square sides of the muntin. All the parts for a door thus made can now be got out by machinery, and the door will be fully constructive in every sense of the word. There is no obstacle to this in the way of cost. The dovetail is a constructive device ; and the dowel is admissible in places as a substitute for the mortise and tenon. Tongue and grooving is a legitimate device, both for ends and sides of boards. Bueling the edges of the pieces thus joined is better than beading. The best way to construct large panels is to make them of narrow strips, tongue and grooved, and beveled at the joining edges. Such panels will never "draw." The shrinkage will be divided between all the joints. Solid table-tops should never be fastened with glue or screws, but should be secured with buttons fastened to the under side of the top, which travel in grooves cut in the frame-work to allow for expansion and shrinkage. These are but few of the principles to be observed in doing the best wood-work.

In all kinds of lumber the heart should be rejected. All boards cut on a radius from the center to the periphery of a tree will remain true, while all others have a tendency to warp or crack. The first are called "quarter-sawn." It is a peculiarity of oak that the best grain is found in quarter-sawn boards. It is only in these that the "silver-grain" is seen. This consists of a ribbon of very hard substance which grows out from the center of the tree. It is for this reason that oak is the most enduring wood ; it has a grain two ways. All woods crack in the direction of a radius from the center. . Quarter-sawn oak cannot crack.

Spontaneous Production of Protoxide of Iron.—M. Terreil, who is at the head of the laboratory attached to the Paris Academy of Sciences, has investigated the oxidised crust which he found rapidly accumulating on the surface of the iron rods of the registers of a Siemens furnace. This furnace was of a new design. It might be supposed at first that this crust consists of magnetic iron oxide, but this substance forms really only a fourth, hardly that, of the total mass. The great bulk consists of the protoxide of iron recently discovered by M. Debray, protosulphide of iron being present in the proportion of about 1 per cent. M. Daubrée remarks that this unexpected product, so far from being accidental, is quite normal, and occurs in spite of the strong clay lining of the rods, when they are plunged into a reducing atmosphere. The latter, according to M. Gigat, contain 64 parts nitrogen, 26 carbonic acid, 16 hydrogen, and 4 carbonic acid. The thickness of the deposit is estimated at half a millimetre a day.

To Remove Rust.—To extract rust from steel, immerse the article to be cleaned in a solution of one half ounce cyanide of potassium to a wine glass full of water until the rust and dirt disappear. Then clean by means of a tooth brush with a paste composed of cyanide of potassium, castile soap, whitening, and water.

To Change a Blue Liquid into a Green.—Pour a little of the infusion of violets into a wine glass, and add to it a few drops of a solution of potass or soda, and it will be changed into a beautiful green.

MACHINERY AND LABOUR.

A writer in the Lowell *Courier* gathers for that paper, from statistics furnished by Edward Atkinson and others, some very remarkable facts in regard to the revolution in American production made by the introduction of machinery within the last forty years.

The records of the operations of the Boot Mills in Lowell show that 90 operatives (men and women) engaged in the manufacture of cotton goods, produced regularly, in 1876, with sixteen and a half less labour per week, more cloth than 231 operatives did in the same mills in 1838. The statistics furnish the following additional facts : That the operative, working 60 hours per week, received in 1876 forty per cent more wages than the operative of 1838 who worked seventy-six and a half hours per week ; that the average profits have not increased relatively in anything like the same proportion ; that the standard of health is higher now than formerly and that of intelligence lower ; that while in 1838 it took 460 farmers, each earning besides his own subsistence a surplus of food and fuel products of $100 per annum to supply the wants of these 231 operatives, in 1876 it takes only 135 farmers, earning through improved farming machinery a surplus of $200 per annum to supply the want of the 90 mill hands. Or, in more general terms, it now takes only ninety mill hands and only 135 farmers to meet the demands of the country for cloth and food products, while in 1838 it took 231 mill hands and 460 farmers to produce the same results. Consequently 225 persons in 1876 accomplish as much as 691 persons did in 1838. The consumption of cotton cloth *per capita* has not materially increased between these periods, so that if these premises will justify a general conclusion, the labour of 466 persons has within this time and within this sphere of activity been rendered useless.

From these facts, which are indisputable, the writer goes to the conclusion that the idleness, vagabondage and beggary on the time is due mainly to the increase of labour-saving machinery. This may be partially true, but it should be considered that man's wants always increase with the ability to gratify them, and the increase of 40 per cent in the earnings of people since 1838 has been followed by a like extension of their needs, to supply which new avenues of business and employment have been opened. In 1838 the New England mill operative was confined to the manufacture of shirtings, prints and a few other coarse fabrics. To-day there is scarcely anything which man's ingenuity has fashioned to which he or she may not turn his hand. Again, the manufacture of this labour-saving machinery gives employment to tens of thousands, who, but for it, would be crowded into other callings, and so on to the end of the chapter. A complete revolution has been wrought in the industries of the country by machinery, but that that revolution will in the end prove detrimental to the intelligent and honest laborer we do not believe.

It does, however, render necessary a change in the distribution of our producing population. It demands that a great many who have been drawn into the cities by the tide caused by the upheavals of the war shall return to the country.

There is another factor in the labour disturbances of the period which is not alluded to by the writer in the *Courier*, and that is our foreign population. As a nation we are greatly indebted to foreign emigration. Many of our best citizens, our most skilful artisans, and our most industrious, frugal and thrifty farmers and labourers are of foreign birth. But with these, who are a tower of strength, there have come the outpourings of the slums of the great cities across the ocean. They herd in the dens of depravity, ignorance and idleness in this country. They recruit our army of tramps thieves and paupers, and though they would not work if they had a chance, they come to help swell the number of the unemployed, to stir up and participate in riots and to commit excesses and outrages for which honest labourers are held responsible.

How to deal with this class seems to us one of the most difficult questions we have to meet. Our jails and poorhouses are swarming with them, the social sewers of the great cities are choked by them. They are everywhere a burden, a source of weakness, of terror and of danger. To capital and to honest labour they are a constant menace, and at the polls they are a power which jeopardizes our whole system of self-government. If there was a way to sort out and send back this class of idlers, and with them the American born loafers, others would find work and wages in spite of all the machinery ever invented.

Cough Mixtures.—Syrup of poppies, syrup of quills, simple oxymel, equal parts a teaspoonful when the cough is troublesome.

INCRUSTATION OF STEAM-BOILERS.

(See page 333.)

One of the most dangerous causes of damage done to steam-boilers is incrustation. It is the reverse of pitting and grooving, but it is also caused by the quality of the water used. When the water contains substances which act on the material of which the boiler is made, and dissolves it, pitting and grooving may result, until the boiler in some places becomes so thin as to give way under the ordinary pressure ; but when the water contains ingredients, which, by the heat applied, leave an insoluble deposit on the interior surface of the boiler, it is called "incrustation," and this is as dangerous as the other incident. It is true that the metal of the boiler is not weakened by being diminished in thickness, as happens in the other case, but as the crust formed on the surface is a bad conductor of heat, the pacts touching the boiler plate become dry, and the iron of the boiler is overheated ; on the inside, instead of being in contact with the water, it is in contact with the dry incrustation, which does not readily let the heat through. So the first effect of an incrustation is waste of fuel, as all the heat does not reach the water. The next effect is that the iron of the boiler is damaged at that place, as it may become red hot, it will warp, and burn through. There are indeed cases on record, where the iron was actually perforated in some spots, and the boiler kept tight only by a thick crust of deposit.

A figure illustrating the possibility of such a case is given here. It is a section of a feed-pipe of a boiler in which water strongly impregnated with lime was used for feeding, and when it reached the boiler and was first heated it left a part of its lime in solution. It is a curious fact, but well known to chemists, that, contrary to the behavior of most all other substances, lime is less soluble in hot water than in cold, therefore when cold water, saturated with lime, is pumped into a boiler, it will, as soon as it comes under the influence of heat, release some of its lime and deposit it on the vessel in which the water is contained. Our illustration shows : 1st. How easily holes may be stopped up entirely in this way, obstructing the flow of feed-water, depriving the boiler of it, and resulting in calamities ; and 2nd, when the surface of the iron is exposed to the flame, how it may become red hot, expanding every time it becomes red hot, contracting on becoming cold, warping, and finally giving way.

Such dangerous water is quite common, and the best remedy is to have the boilers often inspected in case there is reason to doubt the purity of the water. To the casual observer the water may appear sparkling, limpid, and free from all deleterious substances, but when subjected to heat the various sulphates and carbonates are thrown down, and often form a very troublesome scale. The Hartford Steam-Boiler Inspection and Insurance Co. (to whom we are indebted for our engraving) found, during the past year, that out of 2,894 cases of incrustation and scale on boilers, 392 were to be regarded as dangerous.

We have on former occasions spoken of substances used to correct this tendency of some waters to form scale ; they are chiefly soda, chlorid of ammonium, and tannic acid ; but, in any case, great care should be used in selecting a preparation to remove, or aid in removing, scale from boilers. There are a great many "boiler purgers" and "anti-incrustators" in the market, some of which are very beneficial, while others are injurious, and dangerous to use. If the steam user is not conversant with the chemical nature of the composition proposed, he should seek advice from some competent person before using it.

A French machinist has discovered that by keeping his turning tools constantly wetted with petroleum, he was able to cut metals and alloys with them, although, when the tools were used without the oils, their edges were turned and dulled. The steel can be turned easily, if the tool be thus treated with a mixture of two parts of the petroleum with one part of turpentine.

THE BEGINNING AND THE END.—An example of the large returns which a small invention may often bring in is found in the experience of Mr. Charles Cahoon, who recently died at Portland, Maine—a man of much inventive ability and persistent determination. It is said that he realized $60,000 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.

HOW TO RE-BORE THE ENDS OF STEAM CYLINDERS.

(See page 332.)

A correspondent asks :—The wear of the bore of my 16in. engine cylinder has left a projecting ridge all around the bore of the cylinder at each end. Having no boring apparatus, how can I remove the ridges ?

Take a bar of steel about 9-16in. square and 3ft. 6in. long ; forge it one end to the shape shown in Fig. 1, in which from A to B is the forged end. This end must then be heated along its entire length to a cherry red, and dipped vertically into cold water to harden it ; after which it must be ground from A to B on all four faces square across, and as nearly of an even curve as can be ascertained by the eye. Next take a piece of hardwood—oak for instance—about 1in. thick and three inch wide, cut it into such a length that when placed upright its ends will wedge tightly into the conterbore of the cylinder. Into the edge of this piece of wood saw out a series of notches, making its finished appearance to be such as shown in Fig. 2. The object of fitting its length tightly into the counterbore of the cylinder is as follows :—If both cylinder covers are off or can be conveniently taken off, the ridge can be operated upon at each end of the cylinder ; hence our piece of wood—which is merely an improvised rest to act as fulcrum for the bar scraper as shown in Fig. 1—would require to fit in the counterbore. If, however, only one cylinder cover can be conveniently taken off, the piece of wood will require to fit in the counterbore at the open end and in the cylinder bore at the closed end of the cylinder, hence we make it large enough for the counterbore, and, after having removed the ridge at that end we cut the length of the wood down to fit the cylinder bore, whereas if we made our rest to fit the bore at first, we should require to use wedges to make it fit the counterbore. In some cases the holes might be bored near the ends of the rest or fulcrum to serve the same purpose as the notches. The method of using the scraper, Fig. 1, is shown in Fig. 3, which represents an engine cylinder. B is the wooden rest or fulcrum ; C, the lever scraper operating on the ridge at the closed end of the cylinder. The lever C is worked on the pulling stroke only, and is so held that the edge presents a keen scraping tool which will cut very freely. The fulcrum B should be adjusted as closely as convenient to the work, so as to obtain good leverage for the scraper. It should be moved in its position so that during the roughing out only the lower notches in the fulcrum are used.

A plan was lately resorted to on the White Star line of steamships for re-boring a cylinder. The cylinder heads and piston follower were taken off ; a groove was cut from the outer end of the cylinder along the bore as far and as deep as the counterboring was required to be done. The counterboring was then accomplished in the manner shown Figs. 4 and 5. The junk ring was provived with a small tool holder, such as is used upon boring bars. The tool was fastened in the holder while its cutting edge was in the groove referred to, cut as deep and as far up the cylinder as the counterboring was to be. To the junk ring was fastened, by two long bolts, a wooden lever extending above and across the cylinder. Two men walked round pushing the lever, and when the tool at each revolution arrived at the groove, a fresh cut was taken by moving the engine so as to raise the piston the necessary amount. It is obvious that the piston head may be steadied and held true in the bore of the cylinder by means of a few wooden wedges. Thus we see that in this operation the junk ring was made to serve as a boring bar head, the men furnishing the necessary rotative motion, the feed motion to the tool being obtained by advancing the piston towards the end of the cylinder where the work was being done.—*Scientific American.*

BURNING KITCHEN REFUSE.—In the city, where the dweller is dependent upon the dilatory swill carrier to come for the refuse, it is better to burn the refuse in the kitchen stove or range than to allow it to lie around the area a source of pests and pestilence. We have for some time practiced burning, and find much truth in the following from the *Sanitarian :* "Among the internal rules and regulations of our kitchen, one of the most peremptory is the absolute prohibition of *swill tubs* and *swill gatherers*, and instead thereof, *daily* burning all pea-shucks, corn-cobs, potato-peelings, fruit-parings, and the like, together with all greasy table and kitchen scraps, which render the mixture readily combustible. The odors are all carried off with the smoke up the chimney, and with ordinary care for a *good* fire in the range, and *daily* combustion—so as never to have large accumulations—*ashes* only are the convenient result.

How to Re-Bore the Ends of Steam Cylinders.

FIG. 1

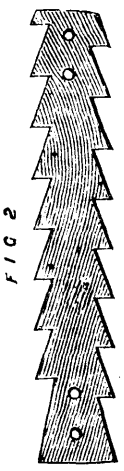


FIG 2

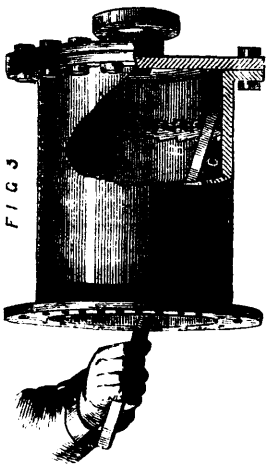
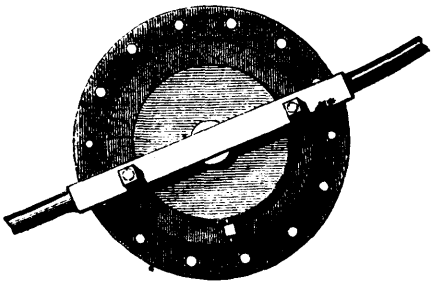


FIG 3

FIG. 4



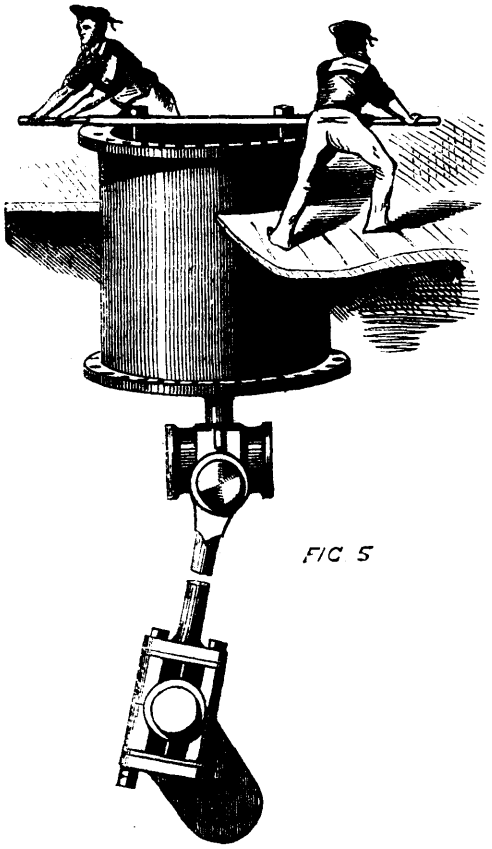
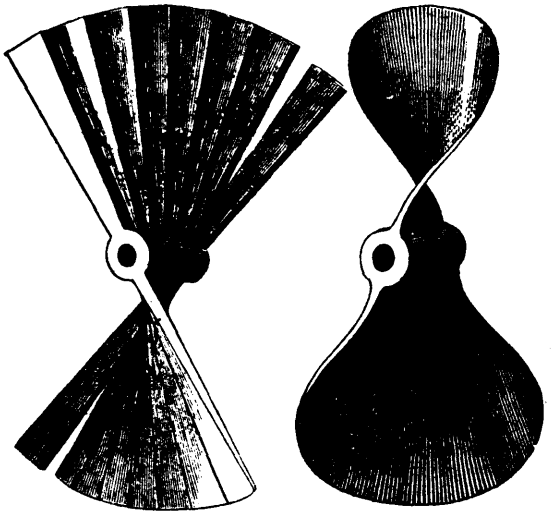
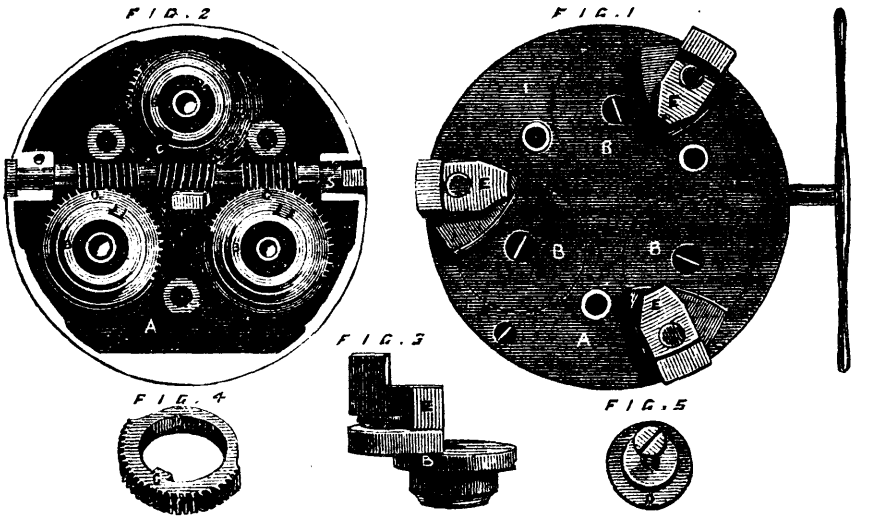


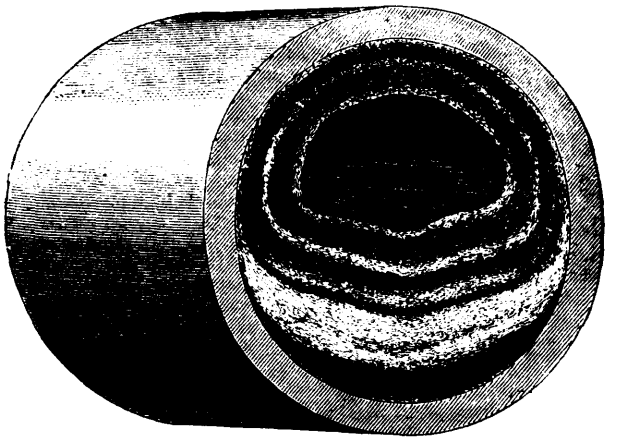
FIG 5



PLAN OF MAKING PROPELLOR CASTINGS.

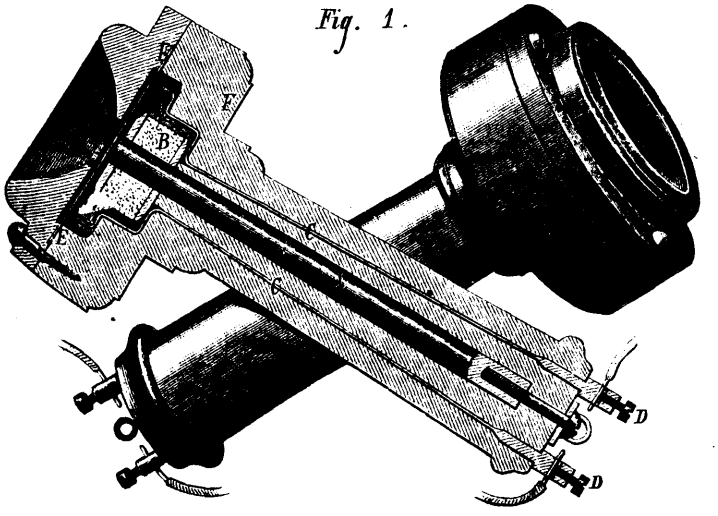
Universal Lathe Chuck.



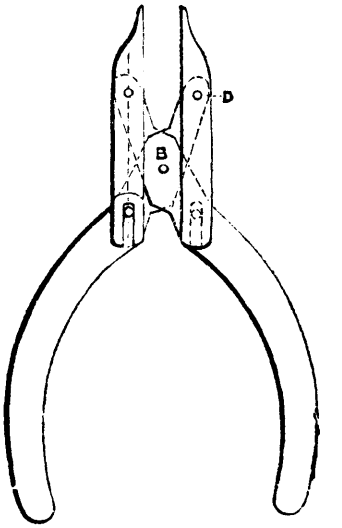


Section of Feed-Pipe of Boiler, showing Incrustation produced by Feed Water containing Lime.

Fig. 1.



Bell's New Telephone.—(*See page 342.*)



Parallel Pliers.

PARALLEL PLIERS.

(See page 333.)

On page 333, we give an illustration of a handy little tool, which will probably commend itself to the attention of our readers, and which is manufactured in several shapes by Messrs. Hagstoz, of Philadelphia. The handles of the parallel pliers are pivoted in the ordinary manner at B, but the jaws, it will be seen, are also pivoted to the ends of the handles at D. Slots in the rear end of the jaws work on guide pins, so that the jaws are always parallel at whatever position they are placed. The device is useful in holding articles liable to be damaged by the ordinary pliers, which having inclined jaws, imperfectly grasp the substance to be operated on, and consequently require the exercise of considerable force to hold it at all.

UNIVERSAL LATHE CHUCKS.

(See page 333.)

The desirable points about a universal lathe chuck, says the *Polytechnic Review*, are, that it shall have accurate centreing and shall correctly centre the work held; that its grip shall be firm with all sizes and shapes placed therein; that it shall permit a wide range of diameter and shape in the work held, shall be exempt from damage resulting from strain or bruising, shall be quick and easy of adjustment, and not liable to damage from dirt or chips (which also consume time in their removal). It is generally an advantage to have the wearing parts hard, few in number, and readily replaceable when worn. The time lost in changing chucks on miscellaneous job-work forms no inconsiderable item in the cost account; and that in rechucking work, in cleaning and repairing chucks, and in replacing work improperly done on account of faulty chucking, counts up fast on the wrong side of the profit-and-loss page in the ledger. In the cuts herewith annexed is shown the construction of the Johnson Universal Chuck, an excellent device possessing in a high degree the elements of durability, firmness, and adaptation to variety of work. Fig. 1 is a face view of the chuck ready for use. Fig. 2 shows a back view with the back plate removed. In Fig. 3 one of the jaws E, revolves upon a steel pin in the arm of the wheel B, to which it is also tongued and grooved, but which, when turned to a certain position, can at will be removed therefrom. The toothed ring C has a solid feather (see Fig. 4), and is accurately fitted and forced to its seat upon B, which last is secured in place by the screw and plate D (Fig. 5). The toothed rings are rotated by a cast-steel worm-shaft S; and the rings and jaws are of case-hardened hammered iron. The wrench P is well fitted and hardened so as to reduce wear. A small screw inserted in the chuck face prevents the wheels running out unintentionally; there is a screw closing the oil-hole in the edge of the chuck. As the wheels revolve the jaws adjust themselves to the work, and can be reversed or turned to any position at will, giving great range of work. One peculiar point is that it will hold from the smallest drill to a piece of work of the full capacity of the chuck, with a pressure increasing with the diameter of the work held.

IMPROVED MORTAR AND ARTIFICIAL STONES.—M. Decourneau attributes the cracks in common mortars and cements to the uncombined quick-lime that they contain. In order to neutralise the lime, he uses an *agrégat*, composed of a very fine silicious powder mixed with diluted nitric acid. He thus obtains mortar with much greater, more uniform, and more lasting resistance than those hitherto used. The application of his method, especially in the new forts of Paris, has given excellent results, without a single failure. Stone made by his process may be sawn and chiselled like natural stone.—*Soc. d'Enc. pour l'Ind. Nat.: Les Mondes*, quoted in the "Journal of the Franklin Institute."

IMITATION OF ALABASTER.—Carl Basehan says that if a statue made of plaster of Paris, or of papier-maché, be coated with thick white damarvarnish, and then dusted with a pulverized glass, it will have, when dry, the appearance of alabaster. If it be afterward varnished a second time, and dusted with coarsely pulverized white glass or mica, and again dried, it will be a very successful imitation of Carara marble, especially if the marble veins be first traced on it with some delicate blue pigment. This method of preparation follows that of nature, for alabaster consists of very small crystals of sulphite of lime, and Carara marble of somewhat larger crystals of carbonate of lime, which, in reflected light, glistens like white sugar. This effect is attained with perfect deception by the brilliant white glass in coarse powder.

DIFFERENT FORMS OF BOILERS.

(See page 328.)

The accompanying illustration shows some of the forms of steam boilers, both of the past and present, as taken from the report of Mr. Marten, of the Midland Steam-Boiler Inspection and Assurance Company of England:

a was the *Savery* boiler.
b, the *tun* boiler.
c, the *flange* boiler.
d, *e*, *f* and *g*, are forms of the *wagon* boiler.
h, haystack boiler.
i, balloon boiler.
j, a boiler of nine cast-iron pipes, a transverse larger connecting pipe, and an upper one forming a steam dome.
k, an improved *haystack* boiler, with a central dome-like fireplace and helical flue.
l, *cylinder* boiler with flues and boiler-plate head.
m, *cylinder* boiler with cast head banded.
n, *cylinder* boiler with hemispherical ends.
o, *ring* boiler.
p, the *elephant* or French boiler.
q, the *retort* boiler.
r, the *cylinder* boiler with single flue.
s, the *cylinder* boiler with two flues opening at the front and at the sides, near the rear end.
t, the *butterfly* boiler, fired internally, and uniting the *cylindrical* and *wagon* forms.
u, *upright* boiler with hemispherical ends.
v, *chimney* boiler.

WOOD STAINING.—The following recipes for staining wood different colors are given in *Dingler's Polytechnisches Journal*, per the *English Mechanic*. 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 sometimes, 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 17½oz. chloride of lime and 2oz. 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 traces 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 1oz. of curd soap in 35 fluid oz. of water, or else is rubbed with the solution; then magenta is applied in a state of sufficient dilution to bring out the tone required. All the analine colors behave very well on wood.

SCARLET.—Besides the aniline colors, which are, however, much affected by sunlight, cochineal gives a very good scarlet red upon wood. Boil 2oz. of cochineal, previously reduced to a fine powder, in 35 oz. of water for three hours, and apply it 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 ½oz. of tartaric acid in 35 fluid oz. of water. If instead of water the cochineal is boiled in a decoction of bark (2oz. bark to 35oz. 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.

VIOLET.—The wood is treated in a bath made up with 4½oz. 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 quantity 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 one 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 till 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.

GREY.—Greys may be produced by boiling 17 oz. orchil paste for half on hour in 7 pints of water. The wood is first treated with this solution, and 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 grey is produced, which may be completely converted into blue by means of a little potash.

BLACK.—Boil 8¾ oz. of logwood in 70 oz. of water, add 2 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.

PRIZES FOR ALLOYS.—The Council of the Prussian Association for the Promotion of Industry announce that they will award the following prizes this year and next:—For the best series of alloys of iron and manganese, £100; for a process for separating cyanide and ferro-cyanide of potassium from sulpho-cyanide of ammonium by means of potassium compounds, £50; for a process for utilizing anthracite oils in the preparation of aniline and alizarin, £75.

CLEANING IRON WIRE.—Betz, of St. Ingbert, has constructed an apparatus for freeing iron wire by mechanical means from forge scale. The process consists in drawing wire over rollers, which remove the scale from it on each of its sides by mere pressure, the last step in the process being to pass it through a box containing sand and calf-hair, whence it is wound on bobbins. The wire is said not to suffer in quality by the manipulation it undergoes.

CONCRETE BUILDING.

Some time ago Mr. Edge, architect, of Birmingham, acquired some building sites at Richmond-Hill, and found that before he could proceed with the plans, which he had formed, a large quantity of gravel must be removed. The existence of this large quantity of gravel led to the inquiry whether or not it might be utilised, and Mr. Edge entered upon a number of experiments in the direction of its employment in the making of concrete. The gravel consists of pebbles, red sand, and a certain quantity of marl, and it was found that if a lime concrete was to be made, the two latter constituents must be got rid of. The pebbles were accordingly washed, mixed with ground lime which is unslaked, and then water added. The lime has an affinity for the silica of the stones, but not for the sand and clay, and when the mixture described is allowed to rest for a few hours, it sets into a mass much more solid than brickwork, and nearly as hard as stone.* Mr. Edge is now building a house containing three sitting-rooms and nine bed-rooms, in which concrete plays a very important part. In order that the house may accord in style with those near it, it has a facing of red brick, but only to the thickness of 2½ in. Inside this is a wall of concrete, giving a total thickness of about 15 in. The object in the case of the present building, is not so much that of cheapness as of increased substantiality, it having been found that 9 in. brick walls, in the case of several neighbouring houses, have been insufficient to keep out the damp. There is, however, no necessity for an employment of brick at all, as is shown by the construction of several interior walls of only 4½ in. in thickness; and, as will be further demonstrated in buildings yet to be erected, even in the construction of the flues the concrete is amply sufficient. The apparatus for building the structure is of Mr. Edge's invention, and while being extremely simple, serves its purpose admirably. He commences on the ground by putting in position two parallel rows of uprights, secured by iron rods. These uprights support boards, the space between which constitutes the mould, to be filled with concrete. A height of about 2 ft. 6 in. is poured in at a time, and when this has set, the boards are removed and hung higher up the uprights, and the work is continued. The uprights are long enough for three removes, and on the third being completed they are raised, and are supported by rods through the work. The highest wall in the building is about 50 ft., and the concrete having been carried up to that height without the interposition of either brick or stone, stands as dry, hard, and solid as could possibly be desired. It is estimated that a cubic yard of the concrete work, where the gravel is on the ground, will cost 11s. 9d., the amount being made up partly as follows:—Washing gravel, 2s.; two bags of lime, 4s. 6d.; labour, 3s. 6d.; as contrasted with 25s. to 28s. a yard for brickwork.

* We have always considered a certain proportion of sand necessary in the constitution of concrete. The lime used by Mr. Edge is, we understand, the ground Barrow blue lias, from the works of Messrs. John Ellis & Sons, Leicester.

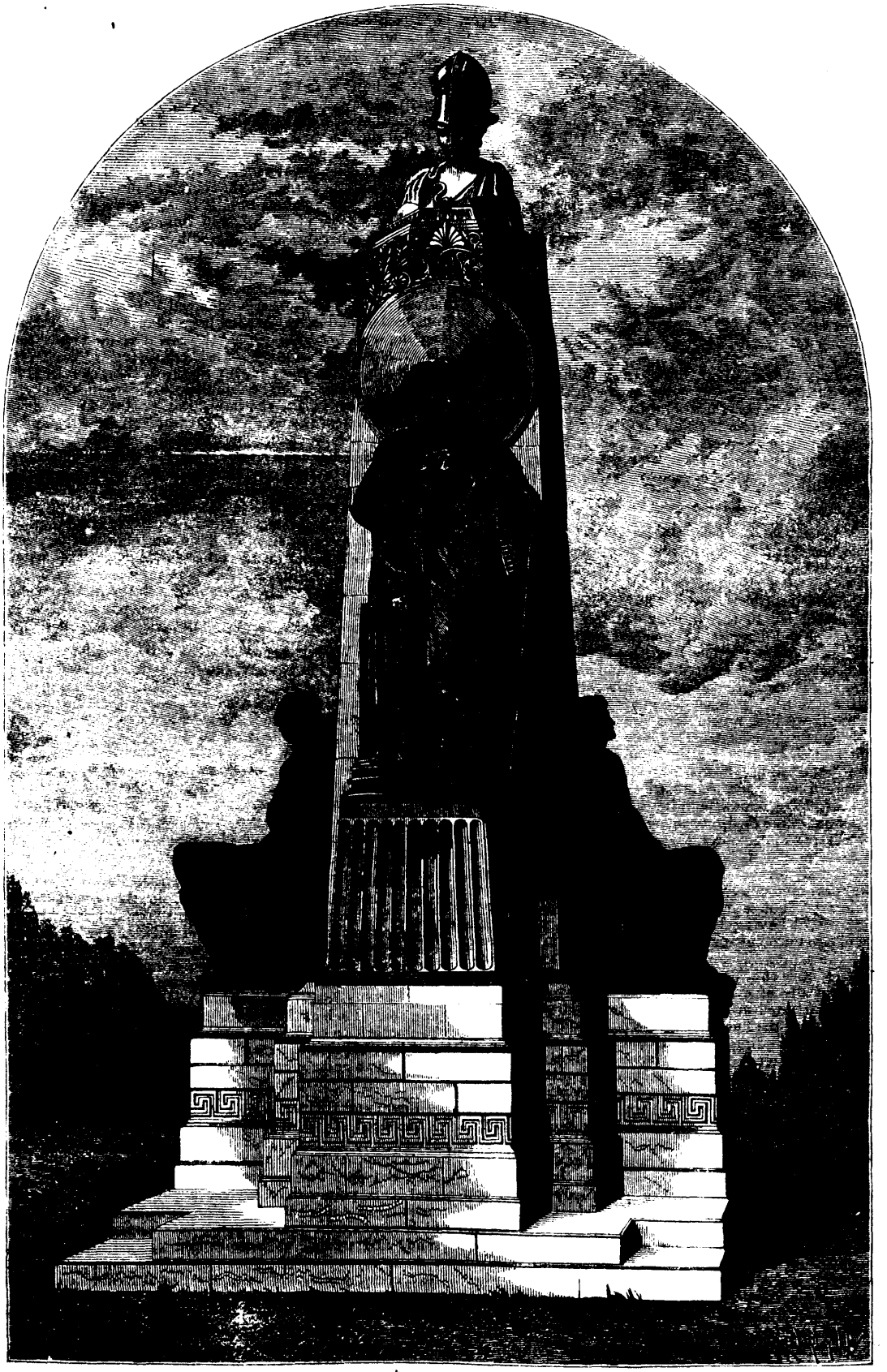
DIE SINKING.—When a die is required for a coin or medals, the engraver takes a piece of soft steel of suitable dimensions, generally three or four inches in length, and about an inch greater in diameter than the coin or other article required; on this he hollows out the exact form of the desired impression by cutting away the steel by degrees, with small, well-tempered, case-hardened tools. As soon as this work is thoroughly accomplished the steel is hardened by being heated red-hot in a crucible with charcoal and oil or bone-dust, and then plunged into cold water. When a great number of coins of one sort are required, the original die is termed the matrix, and copies are made from it by taking impressions from it in soft steel, which is in relief, and is called the puncheon, and from which, when it has been hardened, other dies are produced by pressure exactly similar to the matrix, and in *intaglio*, which are case-hardened in their turn before they are fit to transmit an impression to any metal used for money. The metal used for our coinage, whether gold, silver, copper, or bronze, is stamped in a cold and solid state; but medals and casts can also be produced by a method called casting *en cliché*, in which the metal is used in a soft state. For this purpose an alloy is used, consisting of ¼ lead, ¼ tin, and ½ bismuth, which fuses readily at the boiling point, 212° Fah. When the metal is soft, resembling paste in consistency, the die is placed upon it, and the impression produced by a smart blow from a mallet; the surface of the metal sets instantly, from coming into contact with the cold die, and thus readily retains the form that has been given to it. Copies of medals may be readily made in this way, but each face will be obtained in a separate piece, and these must be joined to give representations of the coin in a complete form. Ornamental work is produced in thin metal for gasfitting, cornices, parts of cruet-stands, trays, &c., by means ot a pair of dies, on one of which the pattern is formed in relief, and on the other in *intaglio*, the metal being placed between them, and brought into the desired shape by pressure. Dies are also made in metal for forming articles in gutta-percha and leather, and producing embossed figures on the cloth covers of books, as well as on card-board, paper, &c.

GERMAN WHITESMITHS' SCHOOL.—On the 26th of May last was laid at Aue, in Saxony, the foundation stone of a large building which is to be devoted to the practical teaching of all arts and mysteries connected with the trade of the whitesmith. The front is 120 feet long and about 32 feet deep, and besides attics and basement, contains three floors, in which, we presume, will be situated offices, dwelling apartments, classrooms, &c. The school workshops form an almost equally large building in the rear, and will comprise lackering, electrotyping, zinc casting, and smiths' shops, storerooms for materials, pattern room, warehouse, and two large rooms for zinc and tinsmiths' work. The facade will carry the name of the building—"Deutsche Fachschule für Blecharbeiter."

A BERLIN TRAMWAY.—A city railroad is now under construction in Berlin. It is to extend from the Lower Silesian terminus to Charlottenburg, and will be seven miles long. It is expected to cost over £220,000 per mile, and as half the right of way and grounds is already acquired and the work has been in progress a year, the estimate should not be very far out of the way. The road is to have four tracks, two for the through traffic of the roads with which it connects, which are six in number. Each of these lines is to have three stations in the city. The other two tracks will serve exclusively for local traffic, and will have six stations at intervals varying from less than half a mile to two and a quarter miles, and probably two other stopping places will be provided.

ELECTRIC ILLUMINATION AT SEA.—The English iron-clad *Alexandra*, supposed to be the finest afloat, has an electric lamp attached to its foremast. The cost of lamp and the necessary electric apparatus was £1,000, a sum which seems enormous at first, but does not appear so very extravagant when we reflect that it is purposed to protect a ship the insurance of which amounts to £600,000. The electric light serves two purposes, first, as a beacon light to point out dangerous reefs of rock or sand, and second, as a protection against topedo boats. The light is thrown out from all sides of the lamp, and illuminates such a large surface of the water that it would be almost impossible for a torpedo boat to approach without detection; especially as the light falling upon the smoke would suffer such refraction as to make the boat's existence even more apparent than if the light had but fallen on its surface. This latter function of the electric light is very important, since ships have heretofore found no protection against the attacks of the torpedo boat.

—*Les Mondes per D. A. Polytech. Ztg.*



DESIGN FOR THE PROPOSED BYRON MEMORIAL: TO WHICH THE COMMITTEE AWARDED THE SECOND PLACE.

THE FAMILY FRIEND.

BIRDS OF PARADISE.

THE BIRDS OF PARADISE.

(See page 337.)

When the Portuguese discovered the Molucca Islands they found there dried birds' skins of so beautiful and strange an appearance as to call forth the admiration of those gold-seeking navigators. The Malay dealers called them *Manuk-Dewata* or "Birds of the Gods," which was translated by the Portuguese as *Passaras do Sol*. The Mohammedan conquerors of that country invented the legend that these birds, which nobody had seen alive, came from Paradise, that they lived exclusively in the air and never alighted on the earth. Speculation added to this story that these birds had neither feet nor wings, and the dried skins which were brought to Europe strengthened this belief, as the wings and feet were really wanting, having been removed by the natives.

Antonio Pigafetta, who took part under Magellan in the first circumnavigation of the globe, and who returned in the year 1522 to Spain, relates in his diary that Bachiun, the ruler of the Molucca Islands, had given them two very beautiful dead birds as a present to the King of Spain. These birds were, according to Pigafetta, about the size of pigeons, had small heads, long bills, legs as thin as a quill and as long as a hand. They had no wings, but in place thereof long feathers of different colors, similar to large plumes. It thus appears that Pigafetta had given, shortly after the discovery of the Moluccas, a truthful description of the bird of Paradise, but the prejudice of the times in favor of the supernatural did not accept his statement. All the skins brought to Europe were without feet, and therefore Pigafetta must be in error. Such was the conclusion of the naturalists of the 16th and part of the 17th century.

Though the home of the bird of Paradise had been discovered about the year 1512, and was frequently visited by the Portuguese and other European navigators, no reliable information was obtained concerning them. The knowledge of the coast of the country was only of a hydrographic nature, as into the interior no European foot had as yet penetrated. Only in the third score of this century careful and reliable information of the bird was obtained through the efforts of the French physician and naturalist, Lesson, who was stationed during his circumnavigation of the earth in the harbor of Dorey, and who secured about a dozen well preserved skins. Additional information was furnished after 1860, by the Dutch traveller, G. v. Rosenberg, and by the English traveller, A. R. Wallace, who remained for a period of five years in the Malayan archipelago.

The bill of the bird of Paradise resembles that of the crow, and the bird has been placed by naturalists in the same class. Not even the humming bird of tropical America surpass these crow-like birds of the Moluccas in the metallic hue of their colors. With many of them, long tufts of delicate feathers extend from the sides of the wings, forming long fan-shaped tails; with others the breast feathers spread like shields of enamel, while the neck feathers form fantastic collars. Besides those, two long thread-like feathers extend far beyond the remaining tail feathers; and similar accessory feathers, as they have been called, extend from the head, back, and shoulders. The species *paradisea* is recognized by largely developed, plume-like feathers that grow out from below the wings. The so-called feetless bird of Paradise is the largest of the class and species. Body, wings, and tail are coffee-brown, head and neck of a velvety-yellow, the breast and front head of emerald green. The two long middle feathers of the tail form spiral windings, like wires, from two to three feet in length. At the sides, below the wings, is a heavy bundle of delicate orange-colored feathers, with whitish ends, which are tinted with a brownish-red. This bundle of feathers may be instantly raised and spread out so as to surround the body of the bird like a halo.

The Papuan bird of Paradise is somewhat smaller than the one described, but very much resembles it. It differs by being a brighter brown and a deeper yellow color, which extends over the entire upper part of the back and over the coverings of the wings, another difference being the terminating of the bundles of orange feathers in a clear white. The beautiful plumage is a characteristic of the male only, the female being with very plain plumage. It has neither the long downless feathers of the tail, nor even a single yellow or green feather on the head. The young males are, in the first year, like the female, and only after four years of age does the bird assume his entire brilliant plumage.

The birds of Paradise are very lively and continually in motion. Their voice sounds like a long "wak" or "wok, wok," and can be heard quite a distance. It is not known how they build their nests. They live on fruits and insects.

The natives obtain the birds in different ways. As soon as they find a tree that serves as their meeting place they build a shelter of palm leaves among the branches, where the hunter hides himself before break of day. A boy is in waiting at the foot of the tree. As the birds congregate, the hunter shoots the birds with an arrow that has a blunt point. As the birds drop they are caught and killed by the boy. The birds are prepared by the natives in the following manner: The wing feathers are drawn out and the legs cut off, the skin is drawn over the body to the bill, and the brains then taken out. A round stick, that extends for a few inches from the bill, is inserted in the skin, and the same dried in the smoke in their huts.

The first live birds were brought to Europe by Wallace, in 1862, who bought them at Singapore for £200 sterling. The larger kind, with one species of a smaller kind, was brought alive to Europe for the first time in the summer of 1875. Both birds were obtained by the Berlin Zoölogical Garden.

A REMARKABLE and valuable discovery has just been made by Dr. William Kerr, formerly of Paisley, Scotland, but now of Galt, Ont., Canada West. After long and laborious investigation, he hit upon a new combination of known medicines, with some others derived from Canadian wild plants, not hitherto included in the pharmcopœia, which has been proved a safe and efficient cure for dysentery, and also for many of the grievous ailments which arise from indigestion. This great and most important discovery has already been described, carefully tested, and favorably reported on, by the *Canada Lancet*, the *Montreal Medical Chronicle*, and the *Edinburgh Medical Journal*.

To enable the reader to judge of the careful and scientific nature of Dr. Kerr's investigations, at this stage, we quote the following paragraphs from the *Edinburgh Medical Journal* (as far back as June, 1865), first premising, that a combination of six plants has subsequently being varied, and the proportions of the opium and the aloes changed, in order to adapt the curative power of the ingredients to the particular form or phase of the disease to be combated:—

"Twelve years ago an accidental circumstance led me to attempt an improvement in the treatment of dysentery. Commencing with camphor and henbane, added to opium, I experimented on every officinal narcotic, coming to the conclusion that of these the most efficient combination was one of opium, henbane, hemlock, stramonium, and digitalis. I had cause to be better satisfied with this than with any previous combination; but from time to time failures or tardy success induced the conclusion that something still was wanting—that something, if to be found at all, was therefore to be discovered in plants not yet admitted into the Pharmacopœia. After a long search, Cicuta maculata, Sium lineare, and Conio-selinum canadense, indigenous to the swamps and woods of Canada, supplied the deficiency better than any others I happened to try. Sium lineare supplanted hemlock (Conium maculatum), on account of the combination containing the latter occasionally producing pain in the bowels and failing, while that with Sium lineare gave relief; and dulcamara supplanted henbane, as experience showed it to be better adapted to act beneficially along with the other members of the combination. Its constituents, when the investigation was concluded, were as follows:—Four officinal—namely, opium, stramonium, dulcamara, digitalis; three non-officinal, Sium lineare, Cicuta maculata, Conio-selinum canadense—all are more or less narcotic; and digitalis, dulcamara, and Sium lineare are also diuretic. So many are necessary, evidently from each possessing some peculiarity in the way in which it affects the system; the combined effects of these peculiarities being required to combat the disease.

"Without opium, the combination is slightly asperient, improves appetite, promotes sleep, and according to experience gained in dysentery and other diseases, heals ulceration of the mucous membrane. In dysentery, opium is necessary, apparently to check the frequent motions of the bowels, the strictly curative power depending chiefly, if not altogether, on the other ingredients. In infants generally, and also in a few adults, digitalis does not act favorably. In such instances I have substituted squills with great benefit. Adults generally require the combination with digitalis; of a very few infants the same may be said; and to many adults the combination with digitalis, or that with squills, may be given indifferently. Excepting opium, the part employed is the leaf. Digitalis and squills are combined in the proportion of half a part each—all the others in that of one part. For infants, opium is reduced to a half-part. The usual dose to adults is six and a half grains, digitalis or squills being each half a grain, and all the others one grain each.

"Between five and six years were spent in determining the components. Beginning with three, I never afterwards, either in adding or substracting, changed more than one plant, till I had as fully as lay in my power ascertained the result of each change. In this manner I have experimented on thirty-two plants or their products. I have pulled down the combination and built it up again, and thus done my best to ascertain the necessity for each component. For upwards of seven years the combination has been used with very great success; but as my own experience may be suspected of being biassed, I shall confine myself to the reports of others."

Finding these new curative agents acted powerfully on the membraneous tissues, Dr. Kerr was led to vary the proportions of each ingredient, and painstakingly to continue his experiments. These have resulted in the successful treatment of several bad cases of puerperal fever; and, what is more to our point, and still more remarkable, in quite a number of recent striking and well-authenticated cases, he has succeeded in completely restoring patients who had already been pronounced hopelessly insane.

RECIPE FOR MIXING AND APPLYING VERMILION.—*The Hub* gives the following recipe for mixing and applying vermilion: For carriage parts or panels, prepare the work by coating with pure white lead, sufficient to form an even and clean surface. Mix the vermilion in an earthen vessel, using a stick or wooden pallette-knife to stir it with equal parts of Japan gold size and hard-drying body varnish. Mix to a stiff paste, and add sufficient turpentine to thin it for spreading evenly with a camel's hair blender. The vessel should then be set away in a clean place to allow the mixture to assimilate, for vermilion, owing to its sensitiveness, should never be ground in the mill or come in contact with metal surfaces. When it has set a few hours, it should be stirred well, and its application may then be begun. It must be laid on evenly and rubbed no more than necessary. Frequent stirring is necessary, that the heavy globules of color may not fall to the bottom, leaving near the surface those which are lighter and which have an orange tint. Two thin coats are generally necessary, but the surface should not be rubbed, not even with the dusting brush. When the second coat is dry, put a little of the color into a cup of hard-drying varnish, to form color and varnish, which should be applied with a fitch hair varnish brush. This process produces a pure vermilion job. If it is to be glazed with carmine, it is best to add a little carmine color to the second coat of vermilion, and to the color and varnish, to make a purer carmine-glazing. Carmine tends to prevent the darkening of the vermilion by partially excluding sunlight, but of course the painter does not always desire to use carmine with it. The brilliancy of vermilion is heightened and rendered more permanent by an association with other colors. Red has its complementary in a mixture of the two other primaries, blue and yellow, which form *green*. A neutral color, white or black, harmonizes with it, but the color is not so intensified as it is by green. A stripe of green over red will not only attract the eye, but will make the matter less likely to look less faded or dark, because its complementary color being present and intensifying it, the eye would not so quickly discern any change that might take place.—*Western Manufacturer*, iv, 518.

THE HIGHWAYMAN'S REWARD.—In 1769 a gentleman was passing one night over Pont Neuf (Paris) with a lantern. A man came up to him and said, "Read this paper!" He held up the lantern and read as follows:—

"Speak not a word when you've this read,
Or in an instant you'll be dead!
Give us your money, watch, and rings,
With other valuable things—
Then quick, in silence, you depart,
Or I, with knife, will cleave your heart!"

Not being a man of much pluck, the affrighted gentleman gave up his watch and money, and ran off. He soon gave the alarm and the highwayman was arrested. "What have you to say for yourself?" inquired the magistrate, before whom the robber was ushered. "That I am not guilty of robbery, though I took the watch and money."

"Why not guilty?" asked the magistrate.—"Simply because I can neither read nor write. I picked up this paper just at the moment I met this gentleman with a lantern. Thinking it might be something valuable, I politely asked him to read it for me. He complied with my request, and presently handed me his watch and his purse, and ran off. I supposed the paper to be of great value to him, and that he thus liberally rewarded me for finding it. He gave no time to return thanks, which out of politeness I was ready to perform." The gentleman accepted the plea of the robber, and withdrew his complaint.

THE BOX TORTOISE.

(See page 340.)

"Land turtle" is the appellation by which this chelonian is commonly known. Its correct herpetological name is *cistudo clausa* (Gmelin). Dr. Holbrook describes it under the name of "*cistuda Carolina*—Edwards" ("North American Herpetology," 1842, vol. 1., page 31), and Professor Agassiz, the *cistudo Virginea*, of Grew.

Few reptiles vary in color so greatly. I have examined individuals of this species which were of a uniform blackish-brown color, entirely spotless; others bright yellow, with black blotches and rays; others black, with yellow spots; and still others, reddish yellow, with black and brown spots, lines, and dashes. It is impossible to find two idividuals of this species exactly similar in coloration.

The box tortoise is polyphagous. I have known it to eat berries of many kinds, apples, mellons, tomatoes, earth worms, and carrion, and, in captivity green corn, and meat, both raw and cooked. I believe *it* might subsist entirely upon "buns and water crackers." I emphasize the "it" for this reason: A tender-hearted lady, a member of the Society for the Prevention of Cruelty to Animals, having observed the boa constrictors at our Philadelphia Zoological Garden were fed with living pigeons and rabbits, suggested "buns and water crackers" be substituted, and thus avoid cruelty to animals! I suppose the old lady thought the very sight of the food named by her would cause the boas to smack their labials in wild delight, and cause them to exclaim in the ophidian tongue, "Oh buns! yum—yum—yum!"

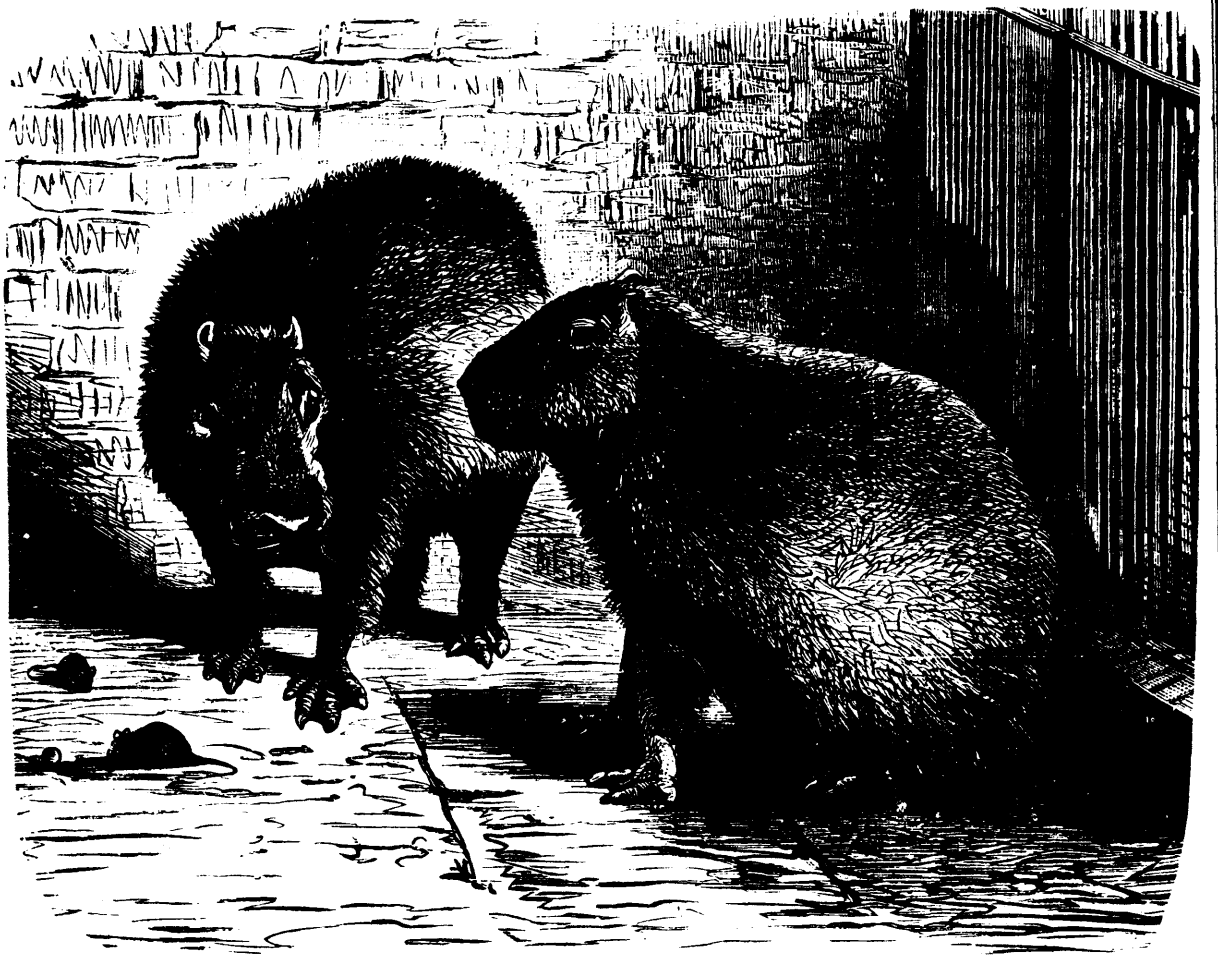
The female box tortoise, when young, lays one or two eggs; when older, six or more. The eggs are nearly globular in form, and are of a dirty or yellowish white color. Like the eggs of serpents, they are covered with a tough skin, not with a hard shell as in the birds. The eggs are deposited in holes in the ground, which the female tortoise excavates with her hind legs and feet only, using them alternately, throwing out the loose earth with her feet. One or two eggs are laid in each hole, and are carefully covered over before she quits the spot. The whole number are generally laid in the immediate vicinity. This tortoise is irregular in its time for going into hibernation. So long as the weather is warm it remains above ground, but when the weather grows cold and unpleasant it creaps beneath the surface of the soil. A late or early going into hibernation does not foretell the mildness or severity of the winter following. The winter of 1875 was extremely cold, yet our *cistudos* did not go under the ground until November 3d, 1874, while they buried themselves about the middle of October in preceding winters, which proved to be moderate.

In the female *cistudo* the under shell (*plastron*) is concave, while in the female it is flat. The specimen from which my sketch was made, is an old male, weighing a small fraction less than one pound. The little crustacean in the foreground is common in the ocean about the sandy beech of Atlantic City, N. J.

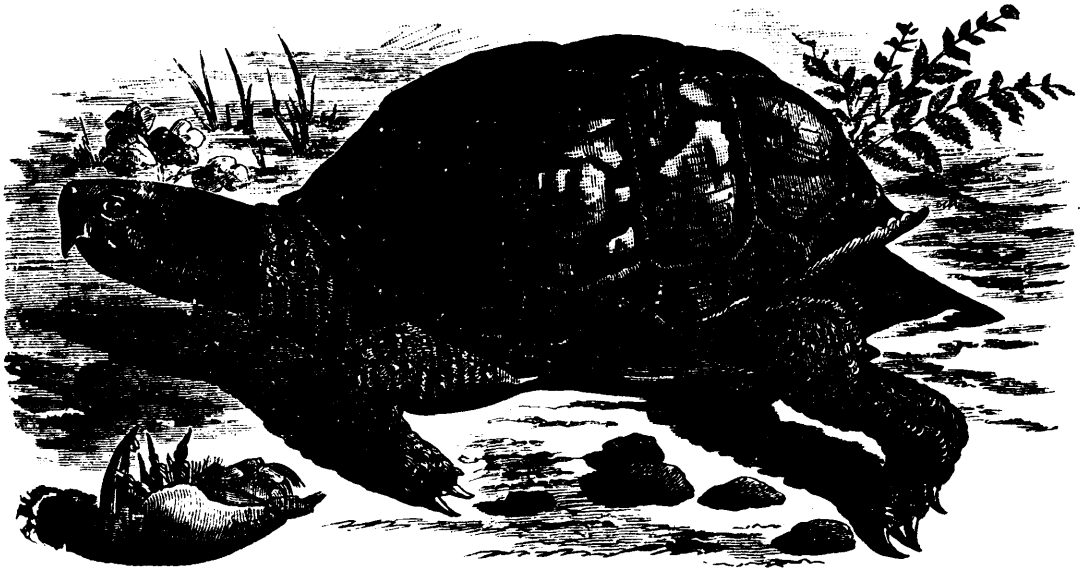
WATER HOGS.

(See page 340.)

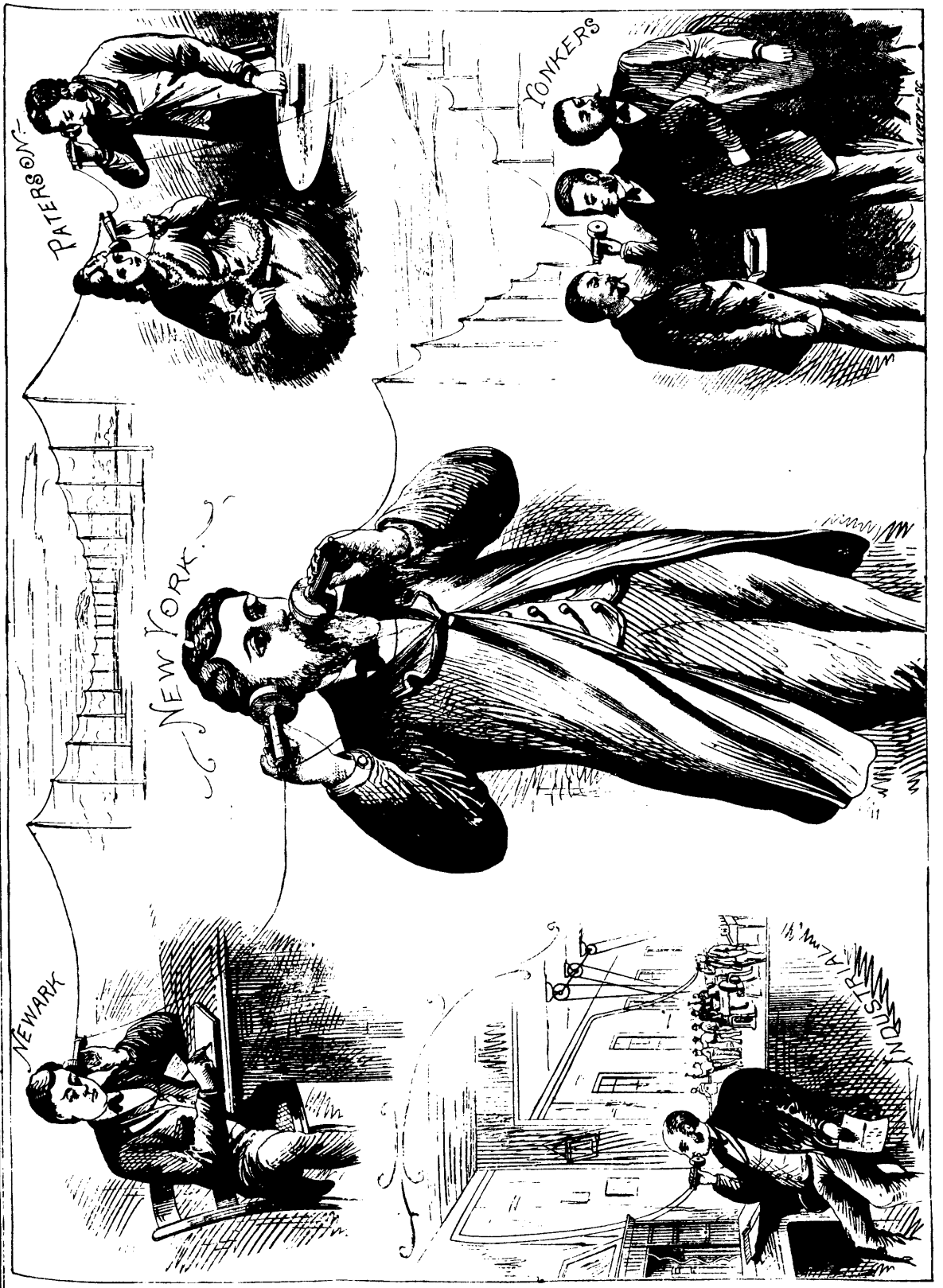
The South American capivari or capybara (hydrochoerus capybara) is called water hog, on account of superficial resemblance with the hog. It is the giant of the rodents, and for this reason is an interesting subject for the zoologist. The two London specimens are of about the size of half grown hogs. Their color is a dirty grayish, which changes on the back into a reddish or grayish-brown. The bristle-like hair has a length of from one to two inches, and hardly covers the body. It is thickest at the hind portion of the back. The nose is flat, the eyes are expressionless and set back a considerable distance, forming the main features of the head. The neck and body are strongly built; the hind legs have three and the fore legs have four toes that are provided with broad, rounded-off nails and connected by webs. The tail is only indicated by a short, horney protrusion. According to Burmeister, Rengger, and Darwin, the capybara is found frequently in the rivers and waters of Brazil and Paraguay. It is hunted for its meat and skin. It forms the main pray of the jaguar. The food of the water hog consists of water plants and roots. It lives singly and in herds; takes refuge in case of danger in the water, and swims with ease for a considerable length of time. The largest specimen obtained by Darwin had a weight of over one hundred pounds, and the length of the largest water hog measured by Burmeister was about five feet long; but it is not unfrequent that dry skins of the animal are sold by dealers of much greater length.



WATER HOGS



THE BOX TORTOISE.



APPLICATION OF PROFESSOR BELL'S NEW TELEPHONE.—(See page 342.)

THE NEW BELL TELEPHONE.

(See page 341).

Professor Graham Bell's telephone has of late been somewhat simplified in construction and also arranged in more compact portable form. It consists now of but three metal portions and is contained in a casing of wood or light hard rubber, but five and five-eighths inches in length and two and seven-eighths inches in diameter at the enlarged end. It will be remembered that this telephone differs from all others in that it involves the use of no battery nor of any extraneous source of electricity. The only current employed is that generated by the voice of the speaker himself.

The simplicity of the construction is clearly shown in Fig. 1 of our engravings, in which both sectional and exterior views of the device are given. Referring to the sectional view, A is a permanent magnet, held by the screw shown in the rear. Around one end of this magnet is wound a coil, B, of fine insulated copper wire (silk covered), the ends of which are attached to the larger wires, C, which extend to the rear and terminate in the binding screws D. In front of the pole and coil, B, is a soft iron disk, E. Finally the whole is enclosed in a wooden casing having an aperture in front of the disk, and which, besides serving to protect the magnet, etc., acts somewhat as a resonator.

The principle of the apparatus we have already explained in some detail, but it may be summarized here as follows: The influence of the magnet induces all around it a magnetic field, and the iron diaphragm, E, is attracted towards the pole. Any alteration in the normal condition of the diaphragm, produces an alteration in the magnetic field, by strengthening or weakening it, and any such alteration in the magnetic field causes the induction of a current of electricity in the coil, B. The strength of this induced current is dependent upon the amplitude and rate of vibration of the disk, and these depend in turn upon the air disturbance made by the voice in speaking, or in any other similar source. Therefore first a wave of air throws the diaphragm into vibration; second, each movement produces a change in the magnetic field; and third, an induced current is generated in the coil wire. Now if, to the binding screws, wires be attached, communicating in like manner with an apparatus precisely similar to that described, it will be clear that there will be a closed circuit of wire, and our induced current will pass through the second telephone and back again to the first one. But in passing through the coil in telephone No. 2, it modifies the magnetization of the magnet and increases or diminishes its attraction for the diaphragm. Hence every vibration made by the first disk is repeated by the second one, and whatever sound produces the vibration of one is transmitted to and reproduced by the other.

Our large engraving, Fig. 2, affords an excellent idea of how the instrument is used, and also of about the extent of circuit over which it is known to be capable of successful operation. We suppose the closed wire circuit to extend from New York to Newark, thence to Paterson and Yonkers, and back to New York, a distance of about 50 miles air line, or 70 miles by railway. The figure marked New York may be considered as a public speaker delivering a lecture to be heard in the towns mentioned. He talks in one telephone while he holds another to his ear, in order, for example, to hear the applause, etc., of his auditory; or he may be maintaining a discussion or debate, and he then hears his adversary's replies or interruptions. Now, at Newark there is simply a reporter, who takes down the speech phonographically; the words pass on through that telephone and reach Paterson. Here we show two persons, each with a telephone, the two instruments being connected. Each hears from his own instrument. Perhaps, in the future, operatic or concert companies and lectures, instead of travelling over the country, will simply send out telephones enough to present each person of their audience in a distant city with an instrument apiece, and do their talking and singing once for all in the metropolis. In Yonkers we show three persons listening to a single instrument, which may be done in a very quiet room. Finally, in a side sketch we show how the telephone is arranged to serve as a speaking trumpet between office and shop in a factory. Of course for long circuits there would be earth connections instead of the wire loop.

The telephone has advanced considerably beyond the status of a "beautiful scientific toy," which many hastily pronounced it, and is now in constant use in numerous private lines in New York, Boston, and Providence. Professor Bell recently exhibited it before the British Association at Plymouth, England, where it attracted great attention. It is at present manufactured by the Telephone Company, of New York, Mr. Charles A. Cheever, Manager, 32 Tribune Building, New York.

A FEAT IN PHOTOGRAPHY has been accomplished in San Francisco in photographing a race-horse while trotting at the rate of 36 feet in a second; during the exposure the rider's whip did not move the distance of its diameter.

TO MAKE CRAYONS FOR DRAWING.—Mix to one pint of boiling water three ounces of spermaceti, one pound of fine ground long ash with the colouring matter a sufficient quantity; roll out the paste, and when half dry cut it in pipes.

FEELING THE PULSE BY TELEGRAPH.—Some months ago Dr. Upham of Salem, Mass., in order to explain to his audience the variations of pulse in certain diseases, caused the lecture-room to be placed in telegraphic communication with the city hospital of Boston, distant 15 miles, and by means of special apparatus the various pulse beats were exhibited by a vibrating ray of magnesium light upon the wall. These experiments have lately been repeated at Paris with success.—*New Remedies*, vi, 244.

RAILWAY BUILDING AT PER MILE.—The crooked nature of the railway from Galatz westward, parallel with the Danube, is a peculiarity which there is nothing in the surface of the land to account for.—An American paper gives the following explanation:—"The Roumanian Railway was undertaken by Strousberg. One of the stipulations of the contract was, that there should be a certain subvention per mile, and this was accorded before the line was laid out. The contractor accordingly lengthened his line with curves to the utmost possible extent."

OVERPOTTING GERANIUMS.—As the season is now at hand for potting, I wish to say a few words against overpotting zonal geraniums for greenhouse decoration. It is very well if you want to grow them for exhibition to give large shifts, but not without; they never throw up a quantity of bloom, but all leaves and strong growth, which makes your greenhouse look very green through the summer. Now, if you want abundance of flower, shake all the old soil from the roots, and pot them in clean pots, with three parts loam, two parts leaf-mould, and a little silver sand, in small pots, according to the size of the plant. When the pots are full of roots feed them with liquid manure, but clear water given at first, and place them on a shelf near the glass.—WILLIAM DODGSON.

THE ALDERMAN AND HIS PORTRAIT.—Sir Peter Lely, a famous painter in the reign of Charles I., agreed for the price of a full length picture, which he was to draw for a rich alderman of London, who was not indebted to Nature either for shape or face. When the picture was finished, the alderman endeavoured to beat down the price, alleging that if he did not purchase it, it would lay on the painter's hands. "That's your mistake," replied Sir Peter, "for I can sell it for double the price I demand."—"How can that be?" said the alderman, "for it is like nobody but myself."—"True," replied Sir Peter, "but I will draw a tail to it, and then it will be a capital monkey." Mr. Alderman, to prevent his being exposed, paid down the money agreed on, and demanded and carried off the picture.

BOXWOOD.—The wood of *buxus sempervirens*, which is almost exclusively used for the best kinds of wood-engraving, has been for some years becoming more and more scarce. Wood of the largest diameter is the produce of the forests of the countries bordering on the Black Sea. Large quantities are produced in the neighbourhood of Poti, from which part the wood is shipped direct to England. The supply, however, from this port is, we learn, becoming fast exhausted; and it is said, unless the forests of Abkhassia are opened to the trade, it must soon cease altogether. The quantity exported from Poti during the year 1875 amounted to 2897 tons, of the value of £20,621; besides this, from 5000 to 7000 tons of the finest quality annually pass through Constantinople, being brought from Southern Russia and from some of the Turkish ports of the Black Sea for shipment, chiefly to Liverpool. An inferior and smaller kind of wood supplied from the neighbourhood of Samson is also shipped at Constantinople to the extent of about 1500 tons annually. With regard to the boxwood forests of Turkey, the British Consul at Constantinople reports that they are nearly exhausted, and that very little really good wood can now be obtained from them. In Russia, however, where some little Government care has been bestowed upon forestry, a considerable quantity of choice wood still exists; but even there it can only be obtained at an ever-increasing cost, as the forests near the sea have been denuded of their best trees. The trade is now entirely in English hands, although formerly Greek merchants exclusively exported the wood. In the province of Trebizonde the wood is generally of an inferior quality; nevertheless, from 25,000 to 30,000 cwts. are annually shipped, chiefly to the United Kingdom.

STEAM POWER IN FRANCE.—It is computed that France now possesses steam engines of an aggregate force of 1,500,000 horse-power. This is equal to the effective labor of 31,000,000 men, or about ten times the industrial population of the country.

WHOOPING COUGH.—It is some years since Letzerich affirmed that whooping cough was due to a special fungus. The assertion has been lately confirmed by the researches of Tschamer. In the spittle of children who are suffering from the cough, there are little corpuscles, about the size of a pin's head, of a white or yellowish color, which pass through a series of characteristic changes, and which seem to be identical with fungi which are found on the peel of oranges, apples and some other fruits. By inoculating rabbits with these fruit fungi, and by causing men to inhale them, Tschamer produced convulsive coughs of many days' duration, with all the characteristics of whooping cough.

THE USES OF THE LEMON.—As a writer in the *London Lancet* remarks, few people know the value of lemon juice. A piece of lemon bound upon a corn will cure it in a few days; it should be renewed night and morning. A free use of lemon juice and sugar will always relieve a cough. Most people feel poorly in the spring; but if they would eat a lemon before breakfast every day for a week,—with or without sugar, as they like—they would find it better than any medicine. Lemon juice used according to this receipt will sometimes cure consumption: Put a dozen lemons into cold water and slowly bring to a boil; boil slowly until the lemon are soft, but not too soft, then squeeze until all the juice is extracted; add sugar to your taste, and drink. In this way use one dozen lemons a day. If they cause pain, or loosen the bowels too much, lessen the quantity and use only five or six a day until you are better, and then begin again with a dozen a day. After using five or six dozen, the patient will begin to gain flesh and enjoy food. Hold on to the lemons, and still use them very freely several weeks more.

OATMEAL IN THE HOUSEHOLD.—In Great Britain, children of all ranks are raised on an oatmeal diet alone, because it causes them to grow strong and healthful, and no better food can possibly be found for them. It is also quite as desirable for the student as for the laborer, and for the delicate lady as for her hard-working sister; indeed, all classes would be greatly benefitted by its use, and dyspepsia, with all its manifold annoyances, can be kept at a distance. Oatmeal is more substantial food, it is said, than veal, pork or lamb, and quite equal to beef or mutton, giving as much or more mental vigor, while its great usefulness consists in one's not becoming weary of it, for it is as welcome for breakfast or tea, as is wheat or Graham bread. It can be eaten with syrup and butter as hasty pudding, or with cream and sugar, like rice. It is especially good for young mothers, upon whose nervous force too great a demand has been made, and they lose the equilibrium of the system, and become depressed and dispirited. Oatmeal requires to be cooked slowly, and the water should be boiling hot when it is stirred in.—*Baldwin's Monthly.*

HEAD TO FOOT WASHING.—At the recent Domestic Economy Congress, held at Birmingham, Mr. Edwin Chadwick, C. B., said the effect of cleanliness was not sufficiently recognized. He found evidence of its effects in various ways. Dealing with the animal creation, he said the pig that was washed would put on one-fifth more flesh with the same amount of food than the pig that was unwashed. The same effect was observable in other animals. They had seen the horse washed from head to foot to give it additional force. The same argument applied to the human creature. He knew the case of an army hemmed in by the enemy and put upon half rations. They were regularly washed, and it was found after a time that the men who washed were equal in force to those who were unwashed and put upon full rations. Head to foot washing was not only important in the matter of economy in food, but also for the prevention of contagious disease. Nurses who attended scarlatina cases and other cases of contagious disease had found out that, by washing twice a day, and sometimes by changing their clothes, they might withstand the dangers resulting from the practice, and doctors who were similarly engaged had come to the same conclusion. As a defense against an outbreak of epidemic disease he would have the whole population tubbed. He mentioned that in a prison containing 1,200 persons washing was enforced, and instead of using 70 to 80 gallons of water for each bath, and causing a large expenditure of time, a very simple method was devised for giving the prisoners a thorough good bath. Each man was placed in a recess, with a spray of tepid water overhead, which completely cleansed him. Schools at which unwashed children attended were centers of children's epidemics.

THE FIRE IN THE U.S. PATENT OFFICE.

(See page 344.)

On the morning of September 24, a fire broke out in one of the attic model rooms of the Patent Office, in Washington, which destroyed part of the upper portion of the west and north wings of the building. It is not known how the fire originated, but spontaneous combustion among patented chemicals in the upper part of the building is assigned as a probable cause. The edifice above the third story was filled with printed documents and models, the latter made of light inflammable wood. The roof was also of wood. The fire, therefore, had abundant material whereon to feed, and made rapid headway.

It is gratifying, however, to know that all the lower portion of the building, which is fire-proof, and in which the active affairs of the Patent Office are conducted, escaped permanent injury. None of the original patent documents were lost: all drawings, specifications, files, &c., remain intact, together with all caveat, assignments, and pending applications for patents. Consequently there will be no interruption of business.

The fire merely swept away a portion of the upper works of the edifice, and, perhaps not unfortunately, destroyed a great accumulation of rubbish. The re-roofing will be rapidly pushed forward, and it probably will be so carried out as to render the business facilities of the Office better than before the fire.

MESSRS. DOULTON'S PREMISES, LAMBETH.

(See page 325.)

In our present issue we give a view of the block of offices and studios erected at Lambeth, by Messrs. Doulton & Co., of London, England, manufacturers of Terra Cotta and Stoneware, from the designs of Messrs. Tarring, Son & Wilkinson, architects. The building is that which led to the strike of bricklayers, concerning which much was said last year.

The building when completed will be very lofty. The materials are chiefly red brick and terra-cotta, but black brick is also extensively introduced, the whole of the lower plinth and base being of the latter material, which, being highly vitrified, is calculated to resist the wear and tear of passing traffic better than ordinary brickwork.

Messrs. Doulton have of late years introduced and brought to great perfection the manufacture of a stoneware now generally known as "Doulton ware." This, as affording an indestructible medium for the introduction of coloured and artistic work, has been used by the architects for the decoration of reveals, cills, and panels, and as bosses. Terra-cotta blocks are prepared with sinkings and half-rounded hollows, which are keyed to hold the Doulton-ware tiles, rolls, or bosses, set in cement.

It has been the care of the architects to design the terra-cotta details so as to show that these objections against the joints and winding of terra-cotta are capable of being removed, the latter obviated, in a great measure, by the use of incised ornament on the plain blocks, and by a careful arrangement of the break-joints.

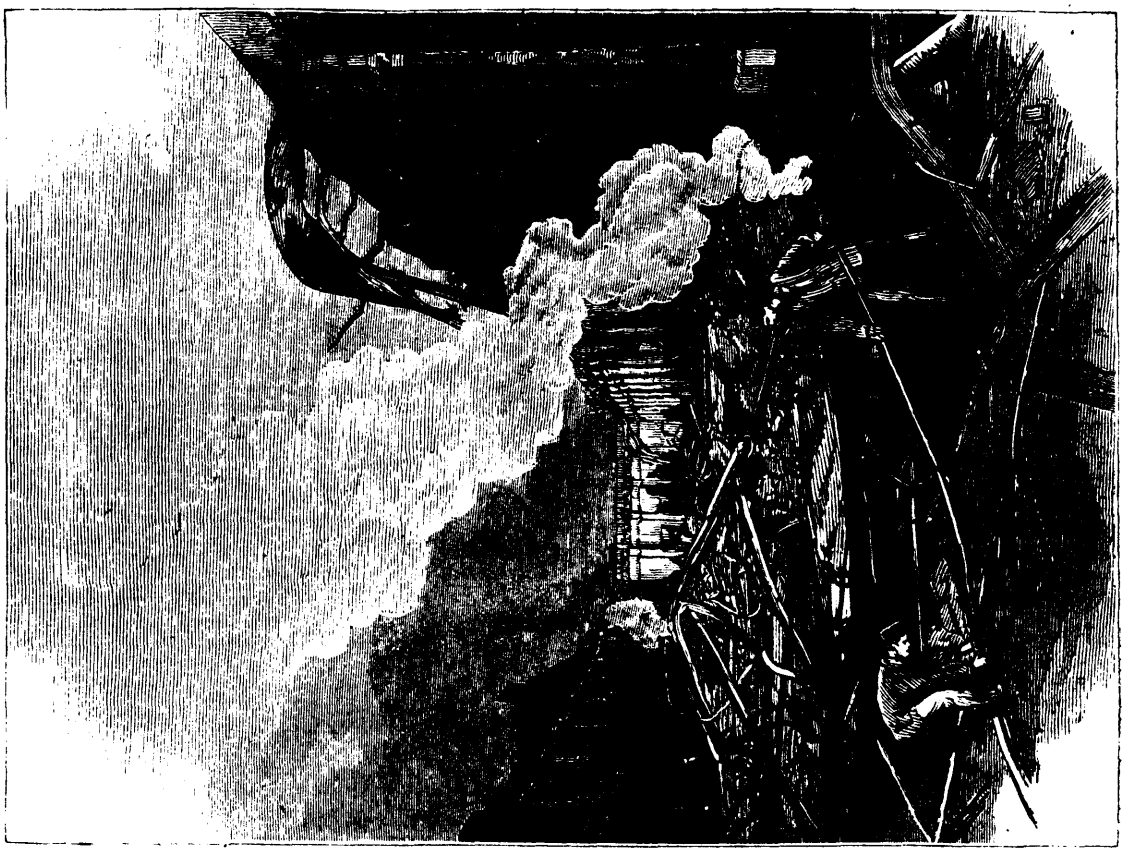
The building is arranged with a basement for stores. A ground-floor, with a highly-enriched triangular porch with doors right and left, gives entrance to the offices. A spacious stone stair-case at the back gives access to the first floor, which will be used as studios by the artists employed in the production of the Doulton and other ware. The entrance for the latter will be for the present a temporary one at the side of the building shown in perspective.

On the studio floors the depth of the window reveals will be used as flower-beds, in terra-cotta and stone-ware sides and fronts, for use in designing ornaments. The fourth floor opens on to a balcony on each elevation, which can be used for drying or other purposes.

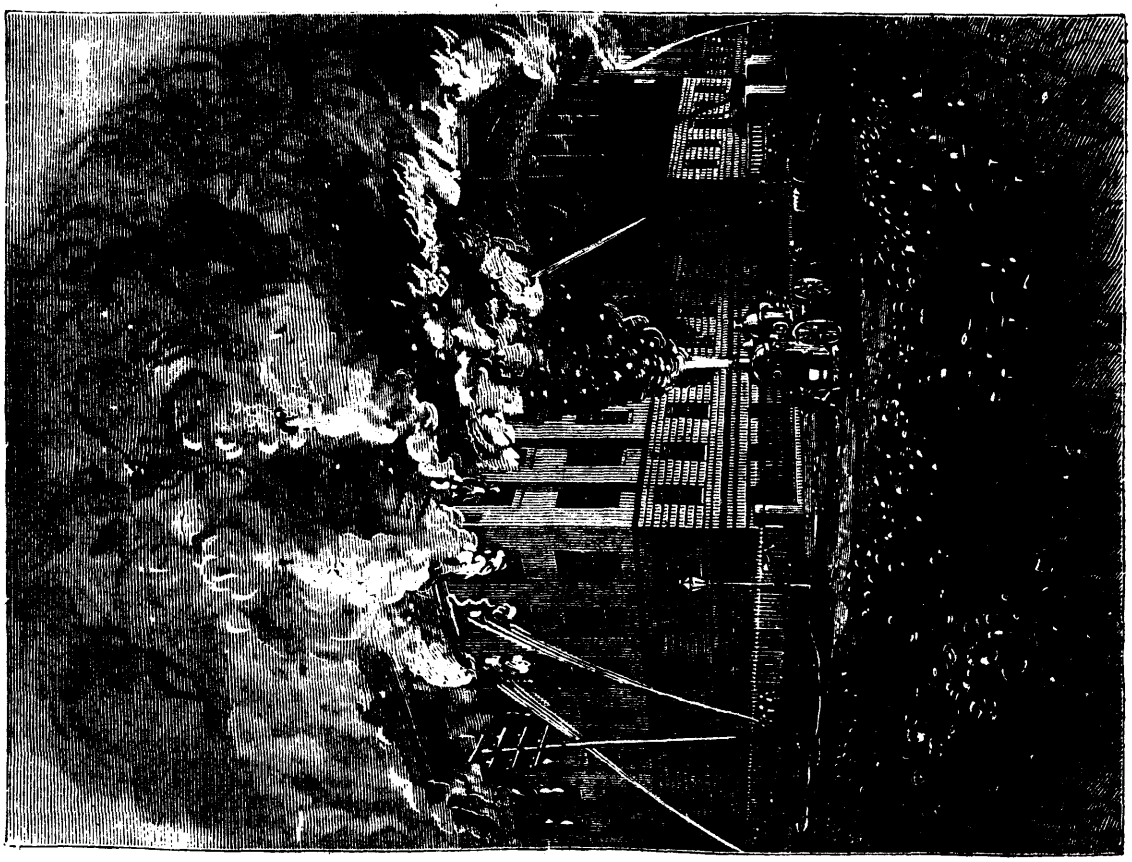
The roof ridge is in the form of a T, the hips and valleys resting on the recessed walls of the balcony level, which are carried internally on the lower floors by terra-cotta columns and arches. The fourth-floor binders also form ties to some of the principals, and hip and valley pieces.

The roof will be covered with tiles of a subdued reddish-brown hue. The terra-cotta will be both red and cream colour. The oriel, which forms a feature over the entrance-door, is carried on an enriched terra-cotta corbel, tied to the cross wall and internal pier with L and T irons.

The name and coloured tiles forming a band round the turret will be in faïence tiles set in cement, and keyed to the brick-work backing. The floors will be laid on joists wrought and chamfered on the lower edge, having fillets and wrought boarding between them, to form the ceiling of the room below, and to take pugging between the floor and ceiling boards.



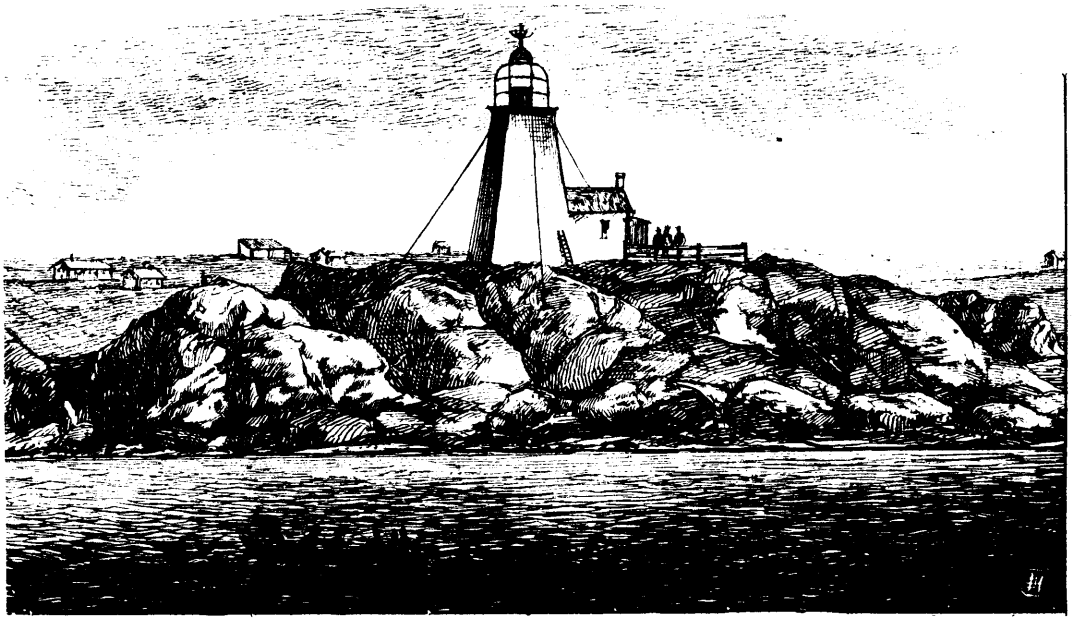
INTERIOR VIEW OF THE RUINS.



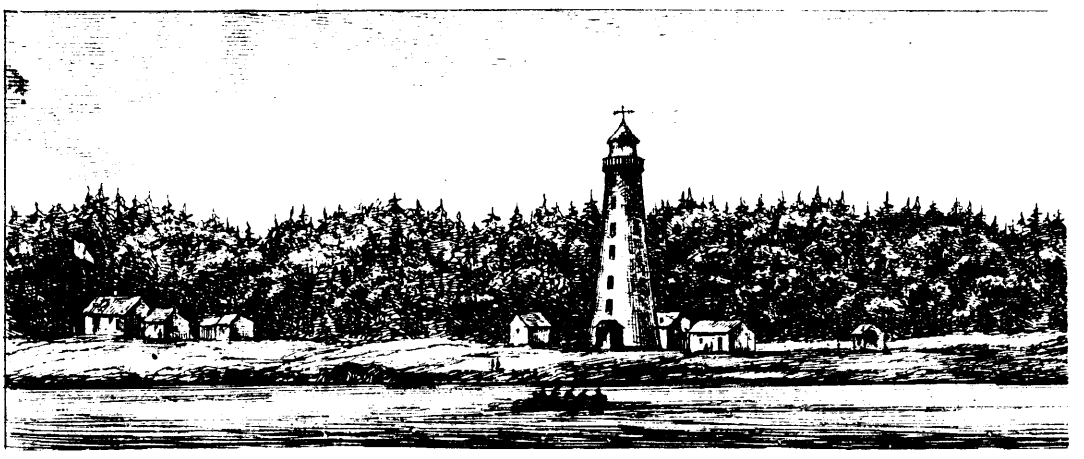
THE CONFLAGRATION.

DESTRUCTION OF THE U. S. PATENT OFFICE BY FIRE, 24TH SEPTEMBER, 1877.

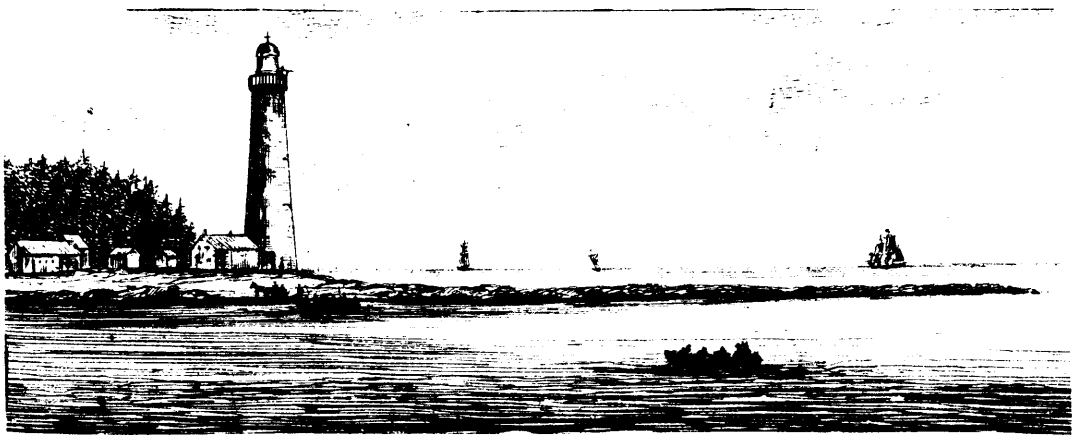
LIGHT-HOUSES IN THE RIVER AND GULF OF ST. LAWRENCE.



BELLECHASSE LIGHT-HOUSE.



LIGHT-HOUSE, POINT DES MONTS.



LIGHT-HOUSE, WEST POINT, ANTICOSTI.

LIGHT-HOUSES OF THE LOWER ST. LAWRENCE.

(See pages 345, 348 & 349.)

Owing to the courtesy of R. S. M. Bouchette, Esq., late Commissioner of Customs, we are enabled to present our readers with a series of light-houses in the Lower St. Lawrence, which, we believe, will be regarded as of very general interest. The letter-press, likewise from Mr. Bouchette, is accurate and reliable.

BELLECHASSE LIGHT-HOUSE, bearing S. ¼ mile. Lat. 46° 56′ north; long. 70° 46′ 00″ west. Fixed light, white, catoptric; tower, hexagonal, white; height of the centre of the lantern above high water, 70 feet; height of the tower from its base to vane, 30 feet. May be seen in clear weather a distance of 13 miles.

LIGHT-HOUSE, POINTE DES MONTS, bearing N. N.W. ½ mile. Lat. 49° 10′ 35″ north; long. 67° 21′ 55″ west. One light, a fixed one, white, catoptric; height of the focus of the lantern above high water, 100 feet; height of tower from base to vane, 75 feet; circular tower, white. There is here a depot of provisions for the shipwrecked, and a cannon is fired every hour during fog or heavy snow-storms.

LIGHT-HOUSE, WEST POINT, ANTICOSTI, bearing S ½ E. 1 mile. Lat. 49° 52′ 30″ north; long. 64° 31′ 40″ west. One fixed light, white, dioptric, 2nd order; height of the focus of the lantern above high water, 112 feet; height of tower from base to vane, 109 feet; tower circular, white. There is here a depot of provisions for the shipwrecked. A cannon is fired every hour during fogs or heavy storms.

LIGHT-HOUSE, S.W. POINT, ANTICOSTI, bearing about S. E. by E. ½ a mile. Lat. 49° 23′ 45″ north; long. 63° 35′ 46″ west. White revolving light every minute; height of the focus of the lantern above high water, 100 feet; height of tower from base to vane, 75 feet. Tower circular, white. Character of apparatus is catoptric.

LIGHT-HOUSE, SOUTH POINT, ANTICOSTI, bearing distance 1 mile. Lat. 49° 4′ 0″ north; long. 62° 15′ 10″ west. Flash light, white, revolving every 20 minutes; height of the focus of the lantern above high water, 75 feet; height of tower from base to vane, 54 feet; tower hexagonal, white; the light is catoptric. A steam fog-horn is here sounded during fogs and storms for 10 seconds in every minute, thus leaving an interval of 50 seconds between each sound.

ESCUMINAC LIGHT-HOUSE, bearing north, distant 2 miles, entrance of Miramichi Bay and harbor. From on board the Government SS. *Napoleon*, July 25, 1877, 2.30 p. m. Lat. 47° 4′ 32″ north; long. 64° 47′ 30″ west. Fixed white light; height of the focus of the lantern above high water, 70 feet; height of the light-house from base to vane, 58 feet. A fog-horn, situated 300 feet west of the tower, is sounded in foggy or snowy weather 10 seconds in every minute, with interval of fifty seconds between each continuous sound of the horn. In calm weather or with a favorable wind, the horn is heard at from 9 to 11 miles; when the wind is unfavorable, at from 3 to 6 miles. The light is dioptric, 3rd order.

SALT AND LIME FOR TOP-DRESSING.

Common salt is very useful as a top-dressing, especially on pasture land; but also on crops of every description. When applied to grass, it greatly improves the quality, besides destroying the worms and other insects. It has also the property of strengthening the straw of cereal plants, and is of great use to crops of mangolds, the roots of which contain a larger proportion of salt. When lime is used it should always be applied to the surface of the soil, as its tendency is to sink with the moisture from above, being worked gradually into the subsoil, which is not the case with vegetable or animal manures, whose decay renders them subject to evaporation instead of subsidence. Both these substances will largely increase, and otherwise improve whatever crops they are applied to. A larger dressing is needed for land that is under improvement, and on which no lime has been bestowed for a long period. Strong clay soils also demand a larger dose than medium or light soils. All our stiff clay soils, old pasture lands, says Brown, peat soils, and all soils containing a quantity of vegetable matter, require a regular manuring of lime, and are much benefitted by it. It is of great utility also on soils resting on the granitic formation. But whilst lime is thus beneficial everywhere it can be applied, it is of special utility to the wheat crop, the goodness of which depends upon the proportion of lime that has been bestowed upon it, or that is naturally contained in it.

SURGERY IN THE FACTORY.

The rules given below, for stopping bleeding in the case of severe and serious wounds, are extracted from a letter by Mr. H. W. Page, M.C., Cantab., in the *Lancet*. A number of tourniquets have been in use for some years on the London and North-Western Railway, and when recently it was found necessary to replenish them, it was deemed advisable to provide the elastic tube or Esmerch's band instead, especially as the tourniquet had been known to fail. During a trial of some months the tube has been found so much superior that further supplies are being prepared, and the following directions have been compiled by Mr. Page, for the guidance of workmen and others engaged in factories and shops where severe accidents are frequently met with. The necessity for some simple appliance is well known, and Mr. Page tells us that men have been brought to the hospital dead, from hæmorrage that might have been stopped by the application of a thumb or finger:—

HOW TO STOP BLEEDING WITH OR WITHOUT THE ELASTIC TUBE.

Rule 1.—When a leg or an arm is severely wounded there may be no bleeding; in this case raise the limb on cushion above the level of the body, and carefully watch the wounded part so that the first bleeding may be seen.

Rule 2.—Should there be much bleeding, put on the elastic tube as soon as possible (see Rule 3); but if you have not got the tube near, raise the limb as high as you can above the level of the body, and act as follows:—

(*A*) If blood seems to come smartly from one point, place your finger or thumb firmly on that point, and stop up the place from which the blood is coming.

(*B*) If you cannot see whence the blood flows, then roll up your handkerchief or cap, and with it press firmly on the bleeding part, not forgetting to keep the limb raised up.

Note.—In case of light bleeding, either of these means just given (Rule 2, *A*, and *B*) will generally be sufficient, the limb being kept raised up.

Rule 3.—There is no difficulty whatever in putting on the elastic tube. Let the limb be held up as high as possible, then stretch the tube to the full, wind it while stretched round and round the bare limb, and fasten the hooks at the ends to each other.

Note.—If bleeding still goes on after the tube has been put on, you may be sure it is not tight enough. You had better, therefore, with the limb still raised, take off the tube and apply it again more tightly than before.

Rule 4.—The tube must be placed above the wounded part—that is, between it and the body.

(*A*) When the leg or foot is injured, apply the tube just above the knee; if the knee or thigh be wounded, then place it higher up on the thigh.

(*B*) If the hand or wrist be wounded, put on the tube below the elbow; if blood come from the elbow or arm, then put on the tube higher up near the shoulder.

Rule 5.—If the limb be wounded so near the trunk that you cannot put on the tube, then you must do your best to stop the bleeding by one of the plans named in Rule 2.

Rule 6.—If the injured man has to be carried far, either to an hospital or his home, bear in mind—

(*A*) To keep him warm with clothing.

(*B*) To keep the limb continuously raised on cushions.

(*C*) To look out for bleeding.

(*D*) Not to give too much brandy, especially if you have not been able to put on the tube.

It may be well to add that the rules are printed in large type for general use and instruction, and that each elastic tube is kept in a small tin case, in the lid of which the rules are to be found.

TESTS FOR BEESWAX.—At a recent meeting of a German Chemical Society, Herr C. Schmidt, after having called the attention of the society to the frequent adulteration of beeswax with resin, described a modification of the so-called Donath's method of detecting the presence of such adulterating compounds, viz: Five grains of the beeswax to be examined is placed in a vessel with five times its bulk of nitric acid (sp. gr. 1.32 to 1.33) and heated to a boiling point, and permitted to remain at this temperature for a moment; an equal volume of cold water and sufficient ammonia to give it a marked ammoniacal odor is then added. If this alkaline solution contains but pure wax, it will be of a yellow color; while if resin be present, it will, on account of the nitrogen compounds formed, be of a more or less intense reddish-brown color. Since this test is a colorometric one, it is well to prepare a solution with chemically pure wax to be kept as a standard.

MISCELLANEA.

Canadian Rock-Salt.—Six beds of solid rock salt were recently passed through in boring at Goderich, Ontario, having an aggregate thickness of 26 ft. A considerable portion of this thickness Professor S. Hunt found to be almost chemically pure, containing over 90¾ per cent. salt, and a shaft is about to be sunk to work these beds. The quantity of salt made in the whole of the Ontario region in 1876, was probably quite equal to that of the previous year, which amounted to between two and three millions of bushels.

Preservation of Eggs.—The most effective preservative for eggs that has yet been proposed, is linseed oil, or cotton-seed oil may be used instead. By carefully coating *fresh* eggs with either of these oils, and packing them, small end downwards, in any dry, porous substance, that is a non-conductor of heat, such as chaff, cork-cuttings, or maple sawdust, they have been kept in perfect condition and without loss of weight for 6 months.

Union of the Caspian and Black Seas.—The present century has witnessed several remarkable achievements in maritime engineering, such as drainage of extensive arms of the sea in Holland, the construction of the Suez Canal, and the deepening of the estuary of the Mississippi; and these not being enough, still more *gigantic* schemes have been projected. It has been proposed to admit the Mediterranean into two extensive tracts of the Sahara, which would give water communication to a large portion of Algeria, and make a sea-port of Timbuctoo. Neither plan is likely to be put speedily into execution.

Ingenious Equivoque. — A prisoner being brought up to Bow-street, the following dialogue passed between him and the sitting magistrate :—"How do you live?" "Pretty well sir; generally a joint and pudding at dinner."—"I mean, sir, how do you get your bread?"—"I beg yer worship's pardon; sometimes at the baker's and sometimes at the chandler's shop."—"You may be as witty as you please, sir; but I mean simply to ask you, how do you do?"—"Tolerably well, I thank yer worship: I hope yer worship is well."

Ebony Stains.—The wood should be brushed over two or three times with a strong decoction of logwood chips, and when it is dry give it a coat of vinegar in which pieces of rusty iron, such as old nails, have been placed. For a polish for the stain, dissolve beeswax in turpentine by setting it in a hot place, and apply while warm with a brush; it must be rubbed till it shines, which will cost some little time and exertion.

Another.—Wash the wood repeatedly with a solution of sulphate of iron, made by dissolving 2 oz. of sulphate in half-pint of hot water. When the wood is dry after the above application, apply a hot decotion of logwood and nut-galls two or three times. When dry, wipe it well with a wet sponge, and when again dry, polish it with linseed oil. Beech, pine, oak, or boxwood will take the stain very well, but box is the best.

Electric Plant.—The *Gazette Horticole de Nicaragua* publishes some information respecting a plant of the family of *phytolaccas*, which grows in that country and which possesses electro-magnetic properties. When a branch is cut off, the hand holding it experiences an electric sensation similar to that from a Ruhmkorff battery, and the electrical influence of the plant has been observed several paces from the plant by the deviation of the needle of a small compass. When the compass was placed by the experimenter close to the plants, the needle turned completely round. The soil is said by the *Moniteur Industriel* to contain no trace of iron or other magnetic metal, so that the property is inherent in the plant itself. The intensity of the phenomenon varies with the hour of the day—at night it is almost *nil*, and most intense during the two mid-day hours or in a wind; during rain it was weak. No birds or insects have been seen to rest upon the *Phytolacca electric*.

Mothers, Study Hygiene.—Writes Mrs. Diaz in her charming little volume of "A Domestic Problem:" "Will not you who know the inevitable influence of the mother upon her children—will you see to it that some portion of the time devoted to her education is spent in preparing for her life-work? Suppose the young women of 30 years ago had been thoroughly instructed in hygenic laws, would not the effects of such instruction be perceptible in our present health rates and death rates? Let us begin now to affect the health rates and death rates of 30 years hence, and it will do no harm to instruct young men in these matters. Even now there comes to me a report from the State Board of Health, in which it is shown, by facts and figures, how our death rates are affected by ignorance—ignorance as exhibited in the locating, building and ventilating of dwelling-houses, drainage, situation of wells, planting of trees, choice of food and cooking of the same, as well as the management of children. Can any subjects compare in importance with these? For humanity's sake, let our young people take time enough from their Latin dictionaries to learn how to keep themselves alive."

Oil Gold Size.—Take of gum animi and asphaltum each 1oz., of red lead, litharge of gold, and umber, each 1½oz. Reduce the coarser of these to a powder, mix, and put them with a pound of linseed oil into a pipkin; boil, gently stirring with a stick till about as thick as tar, strain through flannel, put in a closely stoppered bottle ready for use.

As an illustration of the rapid growth of the now celebrated *Eucalyptus globulus*, we (*Nature*) may mention that in the more elevated parts of Jamaica trees now exist about 60 ft. high, the trunks of which measure a foot in diameter near the ground. These trees have been raised from seed introduced to the island about six years ago. It is proved that in the lowland districts the tree does not thrive, thus upsetting its suitability for regions in which it was at one time specially advocated.

It has been found that the method ef bleaching wool by means of oxalic acid, combined with glycerine, or used alone, has the effect of causing the fibres of the wool to become felted. This is now remedied by saturating the oxalic acid with soda, potash, or ammonia, thus forming a soluble oxalate. The bleaching is effected in the same manner, that is to say, pure water, exempt from lime, and the wool preserves all its suppleness and soft touch.

The rats have made a conquest of Pitcairn's Island in the Pacific. Some of them are as large as rabbits; all of them are hungry, and they have swept across the island, devouring the grain in the barns and the flour in the store-rooms, and attacking the natives with a ferocity that is uncommon. What a harvest for Parisian kid-glovers might be created here!

Picture Frames.—First give the moldings a coat of size. You must then make a template of thin sheet iron to fit the surface of the moldings; make a preparation by mixing gilders' whitening and size to about the thickness of paste, and apply it warm to the moldings with a brush, give each a coat separately, and draw the template lightly over from one end to the other until the surface becomes even. After doing this let them dry; when dry repeat the process two or three times. You will get a nice smooth surface on the moldings, and they will be ready for joining.

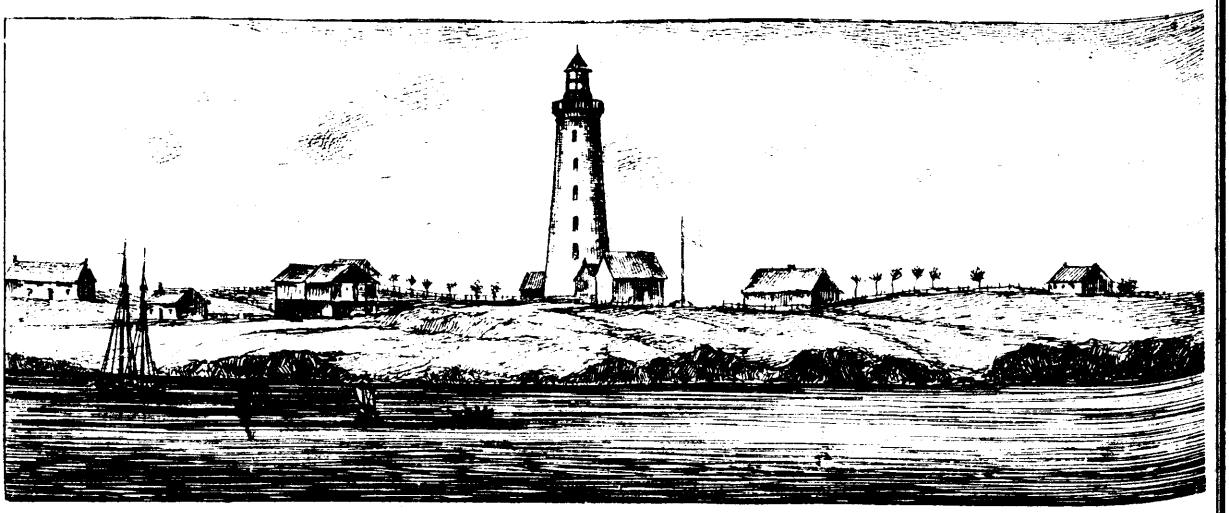
Experiments with killing superannuated horses with dynamite in London have been successful, and it is proposed to slaughter cattle in the same way, as hundreds may be killed instantaneously without suffering. A small primer of dynamite, with an electric fuse attached, is bound upon the animals forehead, and discharged by means of an electric machine, when the animals fall dead without a struggle.

Coloring Zinc Roofs.—Among recent German inventions is a simple process, depending on the use of acetate of lead, by which every kind of color is applicable to sheets of zinc. By mixing black lead, for instance, with the salt, a very agreeable light brown hue is obtained. It is by this process that the cupola of the synagogue at Nuremberg has been painted. A sufficient length of time has already elapsed, it is said, to show that the atmosphere has had no influence on the zinc sheeting of the roof, thus showing the practical value of the process in such cases. By the addition of other coloring matters, light or dark shades of yellow or gray may be produced.

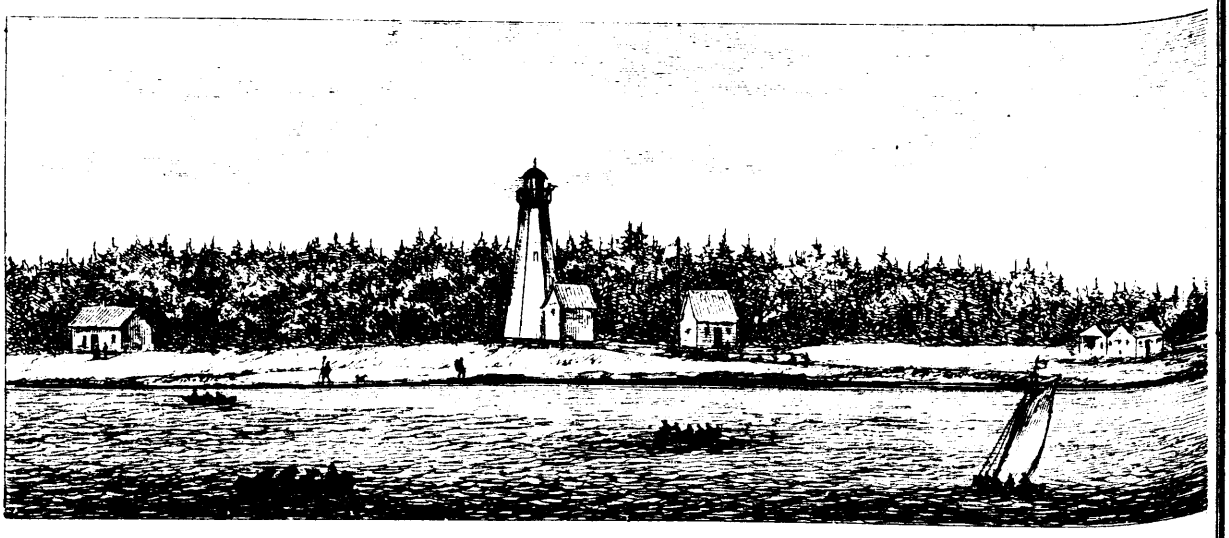
How to Cook Snails.—Throw them in boiling water in which you have put some wood ashes, leave them in till they have thrown their cover wide open, which will take about fifteen minutes; then take them off, put them out of the shell with a fork, place them in lukewarm water and leave two hours; next rub them in your hands, and then soak in cold water; rub them again with your hands, in cold water, two or three times, changing the water each time, so as to take away most of their slimines. Wash the shells in lukewarm water with a scrubbing brush, and drain them when clean. Then put in a stew-pan four ounces of butter for fifty snails, and set it on a good fire; when melted sprinkle in it a teaspoonful of flour, stirring awhile; then add a teaspoonful of parsley chopped fine, two sprigs of thyme, a bay leaf, a pint of white wine, and then the snails, which you have previously put back into their shells; cover the whole with warm broth, boil gently till the sauce is reduced and the snails are cooked, and serve them mouth upward, and filled with sauce.

—*New York Tribune.*

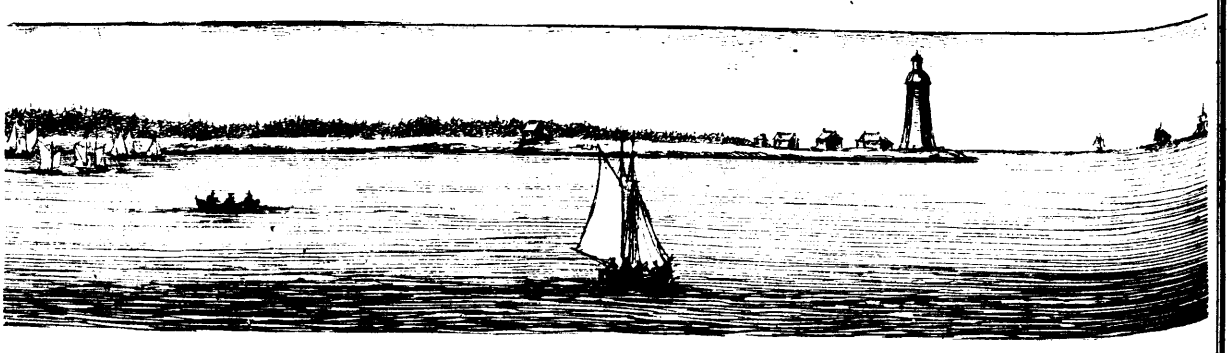
LIGHT-HOUSES IN THE RIVER AND GULF OF ST. LAWRENCE.



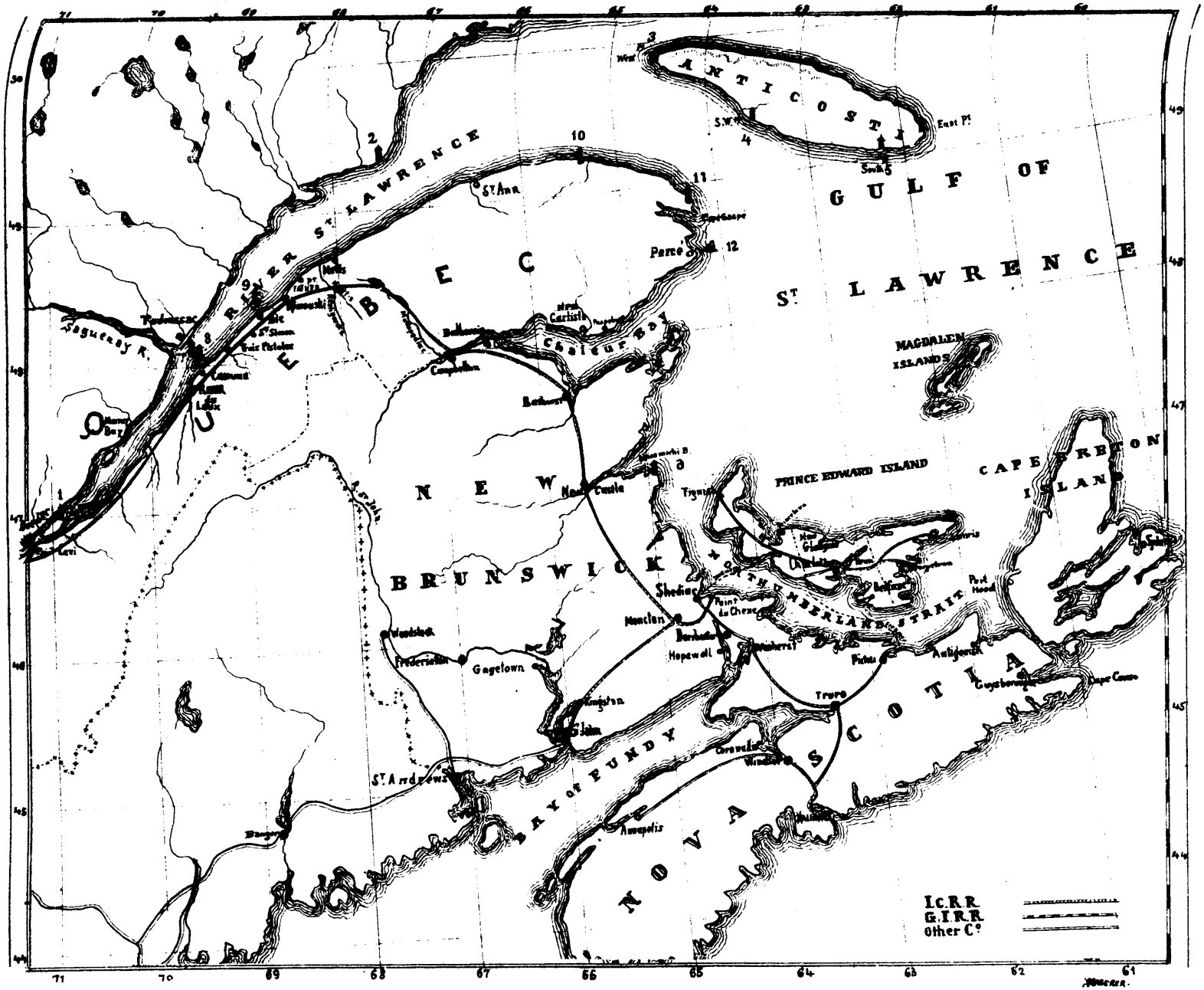
LIGHT-HOUSE, S. W. POINT, ANTICOSTI.



LIGHT-HOUSE, SOUTH POINT, ANTICOSTI.



ESCUMINAC LIGHT-HOUSE.



MAP SHOWING THE POSITIONS OF THE LIGHT-HOUSES ILLUSTRATED.

DOMESTIC RECEIPTS

BRASS LACQUERING.—If you want a good deep gold lacquer you should make up a small stock bottle, holding, say, half a pint, according to the following recipe. You can then add as much as may be required for the tint you wish to get: Alcohol, ½ pint; dragon's blood, 1 dram; seed lac, 1½ oz.; turmeric, ¼ oz. Shake up well for a week, at intervals of, say, a couple of hours, then allow to settle, and decant the clear lacquer; and if at all dirty, filter through a tuft of cotton wool. Mix with the pale lacquer a day or two before you wish to use it.

A GHOST STORY.—A foolish fellow went to the p rish priest, and told him, with a very long face, that he had seen a ghost. "When and where?" said the pastor.—"Last night," replied the timid man, "I was passing by the church, and up against the wall of it did I behold the spectre."—"In what shape did it appear?" said the priest.—"It appeared to be in the shape of a great ass."—"Go home and hold your tongue about it," rejoined the pastor; "you are a very timid man, and have been frightened by your own shadow."

THE MAGIC THREAD.—Soak a piece of thread in a solution of salt or alum, and affix to it a light wedding ring. Apply it to the flame of a candle, and burn it to ash, and it will, nevertheless, continue to support the ring.

TO FIX A COIN TO A WALL.—Privately notch the rim of a shilling, or any other coin, in so abrupt a manner that a sharp point of the silver may stick up. Take the coin in your hand, and clap it pretty sharp against the wall, at the same time press with your thumb the part that you know to be sticking out. By so doing the coin will enter the wood and remain fixed.

MAGIC BREATH.—Put some limewater into a tumbler, and breath into it through a small glass tube. The fluid, which before was perfectly limpid, will gradually become as white as milk; if allowed to remain at rest for a short time, red chalk will be deposited at the bottom of the tumbler.

WET BOOTS.—When the boots are taken off, fill them quite full with dry oats. This grain has a great fondess for damp, and will rapidly absorb the least vestige of it from the wet leather. As it takes up the moisture, it swells and fills the boot with a tightly-fitting last, keeping its form good, and drying the leather without hardening it. In the morning, shake out the oats, and hang them in a bag near the fire to dry, ready for the next wet night.

A REMARKABLE PARROT.—Henry VII. had a parrot which he kept in a room next to the Thames in his palace at Westminster. This parrot had learned to repeat sentences which it had heard the boatmen use. One day it fell into the river by accident, and called out loud, "A boat! A boat! Twenty pounds for a boat!" Immediately a waterman picked it out of the water and gave it to the king, and asked for the promised reward. This was refused, but it was agreed that, as the parrot had offered the sum, the man should again refer to its determination for the reward that he was to receive. The reference was made to the parrot, when it screamed out with all its might, "Give the knave a groat?"

PRESERVATION OF EGGS.—The *Journal of the Medical Academy of Turin*, in a recent number, says: The sure and simple method of keeping eggs sound by smearing the shells with linseed oil has long been practiced. The oil forms a sort of film over the shell, thereby preventing the two immediate causes of decomposition—evaporation from and penetration of air into the egg. A recent experiment in point deserves notice. A dozen new-laid eggs were rubbed over with linseed oil applied with the tip of the finger; another dozen were coated in like manner with poppy oil; two more eggs were left in their natural state. The whole 26 were then laid close together, in three rows, on dry sand upon a shelf, were they were left undisturbed. At the end of three months they were weighed, and again at the end of six months, when they were opened. The two eggs left in their natural state at the end of the three months had lost 11% of their weight, and at the end of six months 18%, and were found to be half empty and the contents rotten. The eggs coated with poppy oil in three months lost 3%, and in six months 4½% of their weight. The eggs were still full and devoid of unpleasant smell. The eggs rubbed over with linseed oil in three months lost 2%, and in six months 3% only of their weight, and when opened were found to be full, with the smell of fresh eggs.

ARE blacksmiths who make a living by forging, or carpenters who do a little counterfitting, any worse than men who sell iron and steel for a living?

PARLOUR CONJURING.

TO OBTAIN FIRE FROM WATER.—A small quantity of potassium thrown on to the surface of a little water in a basin will immediately produce a rose-coloured flame.

LUMINOUS WRITING.—Place a small piece of solid phosphorus in a quill, and write with it upon paper. If the writing then be taken into a dark room it will appear beautifully luminous.

TO LIGHT A CANDLE WITH WATER.—Get a very small piece of phosphorus, and, with a little tallow, place it on the rim of a tumbler; next get a lighted candle, and after having extinguished it, hold it to the glass, and it will at once ignite.

HOW TO MAKE AN EGG DANCE.—Boil an egg hard, and break off a little piece of the shell at either end: then thrust in a quill filled with quicksilver, and seal at each end. As long as the egg is warm it will continue to dance.

THE AFFECTIONATE CARD.—This trick if properly managed will appear marvellous. Having forced a card upon one of the company, after shuffling it up with one of the back, you will know the card by feeling. You then take a small piece of wax and place it under the thumb nail of your right hand, and by this wax you fasten one end of a hair to your thumb, and the other end to the chosen card. By this means, when you spread your cards on the table, by drawing about your right hand, the chosen card will follow you all round the table as though attracted by some magic sympathy.

HOW TO COOK AN OMELET IN A HAT.—Inform your company that you are about to cook an omelet. You then borrow the best looking hat you can see among the audience, and while bringing it to the table, slip in, unperceived, a round tin dishs with a bottom exactly in the center, the under part of which a, it lies in the hat contains pancakes, and the upper part is intended to receive the mixture of flour, eggs, &c., which you have mixed up in a jar, and pour it into the hat, or rather into the tin dish, and while pretending to empty the jar, it is placed in the hat, and pressing its mouth over the sides of the tin dish, it lifts it out, batter and all, leaving only the pancakes.

NOTES AND MEMORANDA.

INGROWING NAILS.—One of the deserved punishments which people suffer from the folly of squeezing their feet into narrow shoes and boots is an ingrowing nail. Mr. South recommends the following treatment for its cure. First get rid of the narrow shoe, so that the toe may be unconfined, and the nail allowed to recover its proper breadth, which, however, it does not do very quickly. Then proceed to relieve the sore skin by the side of the nail of its pressure. It is of no use, however, merely to cut away the pressing nail even freely, and then to press a piece of lint under its edge, which is as painful as it is useless; for the nail, if it is not otherwise managed, will drop, in the course of a few days, upon the old spot, and again render it "angry." The proper treatment is thinning the whole length of the middle of the nail, from its root to its end as much as possible; and this is best done by scraping it perseveringly with the sharp edge of a piece of glass, again and again, till the middle of the nail be as thin as wrinting paper, and will readily bend under the pressure of the finger nail. This is, at first, a rather painful operation; but the scraping must be done with a light hand. As soon as the middle of the nail has been thus thinned, it yields to the upward pressure of the skin on its side edges, readily bends, and offers no further resistance. The sore place being no longer irritated by pressure, the "proud" flesh soon drops down, and the sore heals. If narrow shoes or boots be again nsed, the foolish wearer may expect a repetition of his plague.

AN instance of rare honesty, and showing how a dog may desire to pay his board bill, is said to have recently occurred in Fitchburg. A lady saw a dog frequently about her house picking up odd bits which had been thrown out, and one day she called him in and fed him. The next he came back, and as she opened the door he walked in and placed an egg on the floor, when he was again fed. The following day he brought another egg to pay for his dinner, and on the fourth day he brought the old hen herself, who it seemed had failed to furnish the required egg.

"WHAT are you about? you black rascal! Twice you have roused me from my sleep to tell me that breakfast is ready, and now you've awoke me by attempting to pull off the bed-clothes! What the duce do you mean?"—"Why, massa, if you isn't going to get up, I must hab de sheet anyhow, 'case dey'r wa'ting for de table-clof!"

THE AMERICAN LIFE SAVER OR SURF CAR.

(See page 352.)

Nothing of consequence was accomplished to lessen the loss of life occasioned by shipwreck until the year 1848, when Capt. Douglas Ottinger, of the United States Revenue Marine, presented to the world his "life car." No sooner was the invention introduced than the American Government acknowledged its fitness for the purpose intended, and ordered the life-saving stations along the Atlantic coast each to be provided with one of these cars.

Although so useful, the car is simplicity itself, and its construction such that it can easily be understood. It is made of galvanized sheet iron. In length it is about nine feet and in breadth three and a half. Outwardly it looks much as we would imagine one of our clinker-built boats to appear if it had a slightly curved cover placed upon it. Instead of having a stern and stem, the ends are alike, both terminating in a point. Nearly in the centre of the top is an air chamber, designed for the purpose of righting the car should it turn over. In shape this resembles a hemispheroid, and it is about two and a half feet in length, and ten inches in breadth. Between its end and the further extremity of the car is the entrance. Water is prevented from coming through this by means of a lid securely fastened. Around the circumference of the car a thick rubber band is placed to protect it from damage in case of contact with hard substances. Above and parallel to this is a rope. It is intended for drowning persons to grasp in order that they may be drawn ashore.

The inside of this curious life-preserver is divided into three separate apartments. Those at the end are merely air chambers and are both about one and a half feet in length. Between these is located that portion of the air designed for occupants. Although this space may seem small, in order to prove its capacity it is only necessary to state that it has accommodated a woman and six children, and that three men can get into it without any difficulty. "How can the car be sent to a vessel during a storm, and especically if it be two-thirds of a mile away?" is the question which naturally arises at this point. It has been done and in the following manner: The smallest cord capable of sustaining the force brought to bear upon it is fastened to a copper wire which is bent in form of a spring (to lessen the momentum) and attached to a twenty pound cannon ball. By firing this over a sinking vessel, those on board can grasp the cord. With this a small rope is drawn in and so on until finally the car itself reaches the vessel. In the meantime, those sending the assistance keep their hold of the car by means of another rope. In this way they can pull it back. If once successful, all further trouble is at an end, because the main difficulty lies in getting the rope to the distressed ship. When this is accomplished both parties can retain their own rope, and thus the car may be drawn back and forth without delay. By working continually, fifty lives can be saved in an hour.

Thus does the usefulness and simplicity of the car combine to make it one of the most perfect life savers yet invented. Although recently introduced it still has a record, and a glorious one, as it has already rescued over four thousand persons from inevitable death. Its celebrity, however, is not bound by two oceans. France, ever on the alert for improvements, soon seized this, and her accounts of its perfections are exceedingly flattering, and are sufficient to cause America to be justly proud that one of her sons invented the life car.—*Scientific American.*

Stretching Pictures for Framing.—Make a slight frame of wood, say ⅜ in. or ½ in. thick, to go inside the picture frame, same as gilt slip inside rosewood frames. Then thoroughly damp the picture, and paste it or glue it to the frame; when dry it will be tight as a drum. You can glue it at once on the back of the gilt slip inside any frame. The whole secret is that paper expands while wet, and contracts in drying, so if it be glued up tight when wet the contraction pulls out every wrinkle.

Bessemer's Gold Paint.—Do not mix the gold size and powder, but go over the article to be gilded with the size alone, gaving an even and moderate coating. Let it dry (which will not take long) till it is just sticky or as gilders call it "tacky." Then over a sheet of smooth writing-paper dust on the dry gold powder by means of a stout, soft, sable brush.

Recolouring Brass.—Boil the brass work in a solution of common soda to remove the grease or lacquer that may be on; rinse them quickly through nitric acid, then in clean water, dry in boxwood sawdust, heat on a metal plate until you can bear the hand on them with difficulty, then apply pale lacquer with a camel's-hair brush.

A PROPOSED METHOD OF LIGHTING CHURCHES.

(See page 352.)

It seems somewhat remarkable that, although gas has been now used for lighting our churches and public buildings for many years, no new treatment for arranging the light thus produced has been invented or discovered. We still have nothing to fall back upon except the gas chandelier, the standard, the wall bracket, or the sunlight. Now all these have disadvantages. In the first place, they all have one common disadvantage, and that is, that they ruin decoration, especially gilding. The standard is ugly, inconvenient, and bad for lighting, because it brings the light down too near the eye, makes the building hot, and ruins entirely that effect of solemnity so desirable in places of worship. Many of our modern Gothic churches when lighted up for evening services look more like a Whitechapel butcher's shop on a Saturday night than a sacred edifice. The "dim religious light" which Milton liked is done away with directly a church is lighted with gas by any of the ordinary methods, and it is clear that we wish to have in our churches a subdued and pleasant light instead of a harsh crude glare, destructive of all solemnity, poetry, or artistic effect, some new treatment of gas-lighting must be discovered. Now it has struck us that there are some of the old churches of Germany which suggest hints that might lead to a new treatment of the gas-lighting of churches.

The large hall which bisects the cloister quadrangle at Ratisbon Cathedral has for ages been used as the burial-place for the chapter of the cathedral, and is full of ancient monuments. Projecting from the porch of the curious old chapel of All Saints, and cutting into this hall, is a large old stone lantern inclosing an iron lamp and glazed with small circular panes of glass set in lead. (See fig. 1.) A very similar lantern, but of a far richer description, exists in the south tower of the church of Rothenburg, in Bavaria. (This is shown in fig. 2.) In figs. 3 and 4 we have shown how it seems to us that these large stone lanterns might be applied to the purposes of lighting churches with gas. Fig. 3 represents such a lantern placed in the spandrel of the arches of the nave, and fig. 4 is a section of the same lantern. At the base of the lantern A there would be a pierced aperture to admit a current of air. The lantern would be fitted up with a number of burners, and a kind of flue at B would take up the fumes and smoke of the gas, which would be carried up through a pipe C, into the open air. One side of the lantern would be made to open for cleaning, &c. The advantages of this system would be, firstly, the smoke and the flames of the gas would be entirely taken out of the building. Secondly, the light from the gas would be subdued, and have far more the effect of daylight, as its light would be seen through glazing and stone tracery. The glazing could be decorated with colour, and this would give a new field for the use of stained glass. Thirdly, those lanterns might be made exceedingly fine architectural features, and might be decorated with sculpture carving, tabernacle work, and even mosaic. In the chapel of Castle Transnichts, Landshut, there is a sacraments-house, which has been converted into an altar-lamp, and the effect is very picturesque. This lantern is glazed with small pains of glass similar to those represented in our sketches.

"Don't trouble yourself to stretch your mouth any wider," said a dentist to a man that was extending his jaw frightfully, "as I intend to stand *outside* of it to draw your tooth."

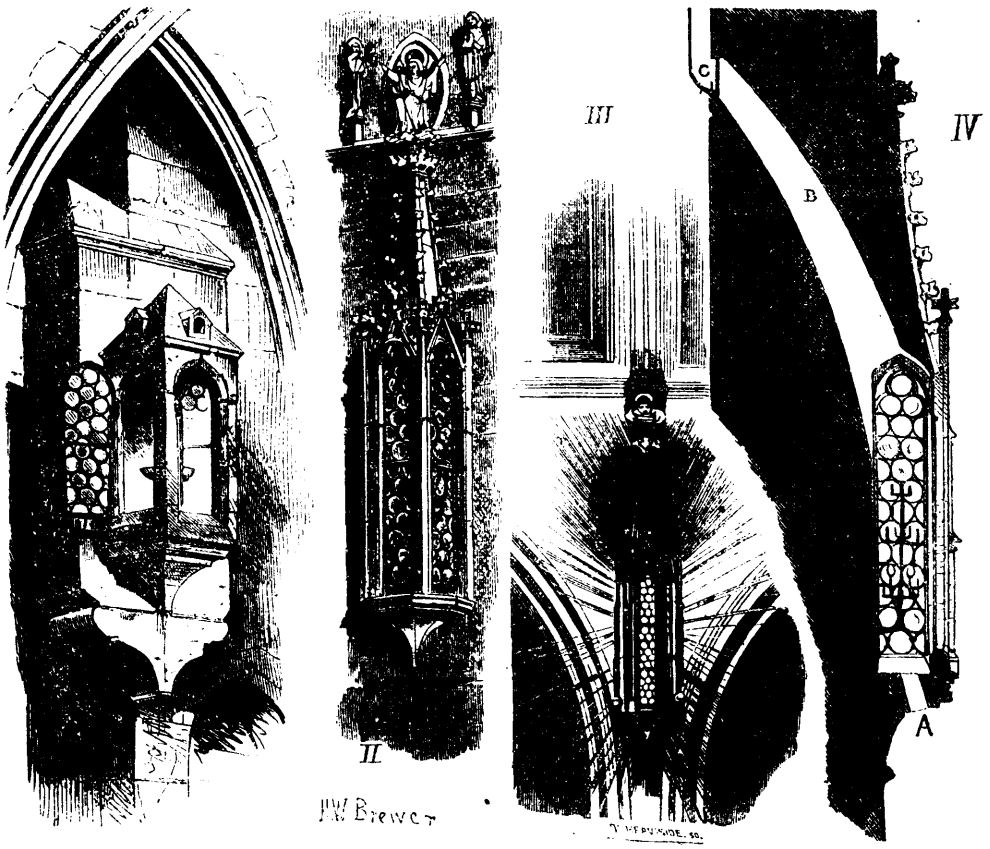
A Darkey left in charge of a telegraph office while the operator went to dinner, heard some one "Call over the wires," and began shouting at the instrument: "De operator isn't yer!" The noise ceased.

Pitiful Case.—A man being asked by his neighbour how his sick wife did, made this answer:—"Indeed, neighbour, the case is pitiful. My wife fears she shall die, and I fear she will not, which makes a most disconsolate house."

"My Brudders," said a waggish coloured man to a crowd, "in all infliction, in all ob your troubles, dar is one place you can always find *sympathy*."—"Whar, whar?" shouted several. "In the dictionary," he replied, rolling his eyes skyward.

An Apology.—A teacher in a fit of vexation called her pupils a set of young adders; on being reproved for her language she apologised by saying that she was speaking to those just commencing arithmetic.

A Nubian Temple.—The temple of Ypsambul, in Nubia, is cut out of a solid rock, and is of vast dimensions. In it are four colossal figures sixty-five feet high, twenty-five feet across the shoulders, with faces seven feet high, and ears about a yard long.



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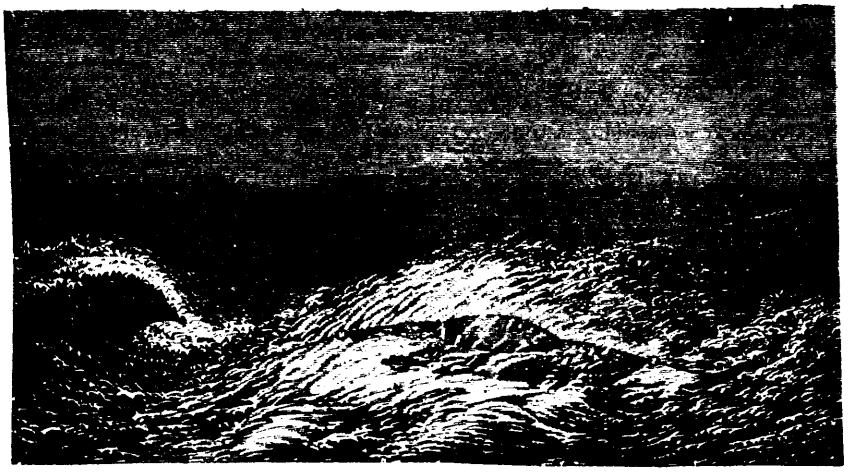

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