CANADIAN MECHANICS MAGAZINE AND PATENT OFFICE RECORD

Vol 5 JUNE, 1877. No. 6.

REMARKS ON THE LATE FIRE, ST. URBAIN ST.

RESPONSIBILITY OF MUNICIPAL AUTHORITIES.

HARDLY had the lamentable catastrophe of the burning of the St. Louis Hotel, in which so many of its inmates miserably perished in the flames, began to fade from our memory, and the horrors which attended the Brooklyn holocaust had ceased to cause a thrill of pain to pass through the mind at the still vivid remembrance of the picture given of that dreadful night, and its heart-rending description of strong men, women and children struggling and writhing in their agony, still apparently ringing in our ears, when we are aroused one morning to be horrified—stupefied almost—with the dreadful intelligence that ten of our own citizens had been crushed under the red hot bricks and burning embers of a building in St. Urbain street.

Of the lamentable loss of human life that has been caused from fires during the past twelve months, this, in our city, has been the saddest—would we could say the last. It is the saddest because in such fires as those of the Brooklyn Theatre and St. Louis Hotel, the destroyed went to those places of their own accord and for their own pleasure or convenience; they knew that a certain risk must always obtain in such buildings, and that risk all who seek for pleasure in crowded edifices must, to a certain extent, be prepared to run. But in the St. Urbain Street fire it was different; duty called them there, and the building was known to be unsafe by many. The Building Inspector could not, or should not, have been unaware of the fact, and, therefore, it was his bounden duty to report the same, or to have taken such steps as would, so far as lay in his power, have averted the catastrophe.

Over two years since we warned the proprietor that his building was unsafe, not only in case of fire, but from its imperfect construction; and we also warned the late lamented Chief of the Fire Brigade that should a fire take place in that building and gain sufficient headway to weaken the joists, so as to cause deflection, the walls would be sure to fall. We must do the proprietor the justice to say he felt perfectly convinced that the building was a safe one, and as strongly constructed as it was necessary to make it for the purpose for which it was erected. Deeply, very deeply has he felt for the unhappy result of this great error in judgment, for he is not a man of that kind who would risk human life for human gain. Neither he nor the architect can be held responsible, in one respect, for this lamentable loss of life; it is the result of a loose system of building that has been allowed to go on year after year unchecked, until hundreds of houses have been erected similar to this one that has fallen, under any of whose walls, in case of a fire happening, a whole Fire Brigade may be entombed. The odium and the responsibility should fall upon our city councillors for their imperfect administration of our civic laws, and to the apathy of those representatives of the people who stubbornly oppose the action of such of their confreres who are desirous of rendering more perfect the Sanitary and Building laws of this city. Upon such men rest a fearful responsibility for the loss of life that has taken place in Montreal during the past five years, from small-pox, fevers and diphtheria, and, now, in a form which appears more frightful still, because we can more readily realize the fact. Let the death of our brave firemen and citizens be laid at the proper door. Poor fellows! crushed and burned to death under the red-hot bricks of a building which should have been reported whilst being erected as unsafe, or, if permitted to be erected, the Fire Brigade should have been officially notified of the same.

Of what service will all this long inquiry which is taking place as to the cause of the fire and the construction of the building, be to the families of those who are dead? Of what service will it be to the city? To what good end will it tend? We fear to naught. A few words of censure, and, after a few weeks, all will be forgotten. Was it not known, yes, and well known, that the building was unsafe? What steps did the Building Inspector take at the time, to stop its erection in the form in which it was being built? Is it placed on record? Is there any document to show that the slightest remonstrance was made against the method of erecting this building or of any many similar ones which have been put up in this city? Could the Inspector—if he is not a myth—suppose that a wall, say forty feet in height and only twelve inches thick throughout its whole height, would stand alone if deprived of the joists and beams that braced those side walls together? Would they not fall with the slightest outward or inward pressure? How much less then could it be expected that those walls could stand when the joists, which were built *into* them, became deflected from heavy loading, or when weakened by fire? The joists would then, in bending, become powerful levers to overturn the wall above them. It has been stated in evidence, as some extenuation of the fault of the builder and the architect, that stronger and thicker brick walls have fallen under similar circumstances, and an opinion given that no brick walls of any equal height could resist an intense fire. We say, on the contrary, that if such buildings were properly constructed, brick walls would not fall, and, in fact, would not be in the slightest degree affected by the heat. Had the walls been of different thicknesses from the basement to the roof, and not of one thickness, and had they been corbelled out so that the joists and girders could have rested free of the walls, the burnt timbers would have fallen through into the cellar without in any way affecting their stability. A building of the description of the one burnt down should have had hoop iron running the whole length of the walls at every four feet in height, and angle irons at each story extending at least five feet each way; besides the walls should have been braced and stayed from side to side with iron stays.

It was remarked by some who were called upon to give evidence, that wood was safer in case of fire than stone or iron. A wooden story-post, or bress-summer, may be safer than iron or stone, when so situated that water can be played upon it, but of little use when placed in the centre of a building, or in such a position as to be destroyed or loosened by fire in a few minutes. For any one to pretend that two high brick walls, merely held together by wood joists inserted four inches into the walls, and their ends resting on continuous plates of wood $2\frac{1}{2}$ inches by 4 inches in section, is a strong building, can have little care for his professional reputation, or know very little of the theory and practice of building houses in a safe and proper way. A wall of twelve inches in thickness built in this way is in fact only a wall of eight inches, and as soon as the wood inserted into it is burnt away, would naturally fall from its own weakness alone.

The building law of Great Britain requires that in a building, say 50 feet in height, the first story should be three bricks thick, the two next two and a half bricks thick, and the fourth two bricks thick; and in addition to this standard of strength, the exterior walls must be tied and strengthened with cross walls two-thirds of the thickness of the external ones. English bricks, too, are larger than those made in Canada.

So little rigidity had the burnt building, that when a centrifugal machine for drying clothes would be in operation in the laundry in the rear, and in no way connected with the building destroyed, the walls vibrated exceedingly from the street floor to the upper story.

The question now arises as to what is the surest remedy to guard against future evils of this kind? What system shall be adopted for the future to put a stop—not only to the erection of dangerous buildings, but to the vile and unsatisfactory sanitary system that is still in force in this city? The surest remedy to this deplorable and imperfect state of affairs is to make the Building Inspector answerable criminally in a court of law for every dereliction of duty of which he can be convicted. Let him, however, be well paid for his services for such a responsible situation, and have assistants, if necessary; but make him examine and report upon every house and drain built in this city; and let every person be liable to a fine who does not notify him, in writing, when he intends to build.

We consider that the English system of making the builder of every house or drain pay a small fee to the Inspector, which shall form part of his salary until it reaches a certain amount, is one of the surest ways to make him lively in attending to his duties. He should have power to sue summarily any one breaking the law laid down for the erection of buildings and construction of drains, and he should in no way be interfered with in the execution of his duties either by Fire, Water or any other Committee of the Corporation. As he should have the power to sue, so, also, others should have the power to sue him for neglect of duty. Why a London Building Inspector would have been tried for manslaughter for such a calamity as befel us in this city last week.

If we had had a proper law regulating building and sanitary affairs, a tenant would not have lost his suit in a recent action in this city. This party threw up his house on account of bad drainage, and was sued by his landlord for rent and lost the case, and why? Simply beause the witnesses on the plaintiff's side did not smell the offensive odour at the time they visited the house. In London this is all that would have been necessary for the defendant to have done: simply to have notified the Inspector that the drain in his house was defective, and he would have at once proceeded thither and opened up the whole line of drains until he discovered where the fault existed. If the defect in the drain arose from original mal-construction or from decay, the landlord would have had to pay, and that, too, without appeal. If there were obstructions for which the tenant was to blame, then the tenant would have had to pay, and his household effects are liable for the debt. If in a case where the Inspector suspects a foul drain to exist, his duty is to give a week's notice to the tenant that he will, on a certain day and hour, visit the premises, and if, on inspection, he finds the drain imperfect, the party in fault has to pay to the city the costs. If no defect exists, the city puts everything back in place and proper order. Such is the English law—why cannot we have the same carried out in this city? It is true we have some very good municipal laws already, but where is the man who has the courage to carry them out with energy and strict impartiality? The Inspector's appointment, therefore, should be one that the Corporation should not have the power to annul in order that he might be placed beyond the influence of all interested parties.

Let us, by all means, have a sure and sharp remedy to this abnormal state of building and sanitary affairs. There is hardly an issue of this Magazine which does not contain useful information culled from the highest scientific and engineering authorities on this important subject. Let us then rid the city, as early as possible, of fevers, small-pox, diptheria, fire-traps, and drones in office, lest many more noble and worthy men fall victims to the supineness and indifference of inert corporate bodies.

We cannot recall the *dead*—but we should like to see a monument erected to their memory in Victoria Square, and such an epitaph engraved thereon that strangers and passers-by might read words of reproach and shame upon the city which, from apathy and mal-administration of its own laws, made the bodies of some of its bravest citizens a holocaust to their supineness and neglect.

Many months will elapse ere the wail of widows and little children will cease to be heard in the fatherless homes of those brave men who were sacrificed in the execution of their duty; some of whom in braving a dreadful death, in their efforts to rescue the crushed and mangled bodies of their comrades, performed as heroic a deed as any for which British officers receive the highest reward for acts of similar daring, and for which the highest distinction for deeds of bravery—the *Victoria Cross*—is placed upon their breasts by a British Sovereign.

New Device for Raising Water.—M. Th. Foucault has recently produced a new apparatus for raising water by means of ammoniacal gas. The machine depends for its operation on the facts that water at 15° cent. absorbs 743 times its volume of ammoniacal gas, and gives it off again at 60° cent. ; that at 10° cent. the tension of the vapour is seven and a half atmospheres ; the petroleum and ammoniacal gas are without action upon each other ; and that the same is true of petroleum and water. The apparatus consists substantially of a heater, which is partially filled with a strong aqueous solution of ammoniacal gas. This heater is connected by pipe with the upper part of a closed reservoir, the lowest part of the reservoir being connected by means of pipe and suitable valves with the stream or well from which, and the tank to which, water is to be raised. The reservoir contains a small quantity of petroleum, which forms a thin stratum on the surface of the water, and serves to keep the ammoniacal gas from contact with it, and, as the inventor expresses it, forms a fluid piston. The operation is as follows :—Supposing the reservoir full of water, the temperature of the heater is raised by suitable means, ammoniacal gas is given off, and passes over into the upper part of the reservoir, the stratum of petroleum preventing its being absorbed by the water there. A pressure is thus created in the reservoir, which forces the water there out and up to the tank to be filled. When all the water has been forced out of the reservoir the heater, as it cools, reabsorbs the ammoniacal gas from the reservoir and thus creates a vacuum, which the water from the stream or well rushes up to fill, and thus refills the reservoir. The heater is then heated, and so on, as before. The inventor claims that the consumption of fuel is almost insignificant as compared to that of a steam pump of the same capacity.

Rerolling and Reducing Old Rails.—A correspondent of the Chicago *Railway Age* writes from Girard, Ohio, as follows, concerning Mr. J. H. Jones's patent for rerolling and reducing old rails, or restoring them to their original size. The invention consists of an attachment to rolls by which old rails, either iron or steel, can be reduced to any size desired, either with or without steel caps : "Whether a steel cap could be perfectly welded has been a question on which many opinions have been expressed and until now, we believe, it has never been satisfactorily answered. In presence of a large number of persons an old fifty-pound rail was, in six passes, reduced to twelve pounds per yard, steel-capped and complete, with perfect weld, and can be done with one heat. By Mr Jones's invention the rerolling of rails is greatly reduced, as one man and three boys are all the force necessary to a set of rolls, while the advantage of steel and iron rails with reduction in cost, must prove to be of great advantag to narrow-gauge railroads, as the purchase and reducing of old rails of heavier weights to that required on such roads will greatly lessen the cost of construction, now so much less than that of the common gauge. The simplicity of the invention is of itself a recommendation. Any ordinary roller can work it, and from the heating furnace to the straightening bank it requires only six passes of the iron.

PROPOSED FLORAL HALL AND AQUARIUM FOR SOUTHSEA.

(See page 164).

In giving an illustration of a proposed Floral Hall and Aquarium for Southsea, in England, we would call the attention of those who take an interest in such matters, to the pleasure it would afford to the citizens of Montreal, if we possessed, even on a limited scale, a Floral Hall and Aquarium, — erected in a suitable place.

MAYO MEMORIAL HALL, ALLAHABAD.

(See page 165.)

We are indebted to the *London Builder* for the illustration and description of the Mayo Memorial Hall, Allahabad :

This building, intended for municipal and public purposes, was built partly by voluntary subscriptions and partly by a grant from the Municipality of Allahabad. It consists, on the ground-floor, of a hall, 72 ft. by 40 ft., with galleries 5 ft. deep, and a clear internal height of 50 ft. ; a ladies' drawing-room, 32 ft. by 20 ft. opening into the end of the hall ; and a committee room, 20 ft. by 24 ft. On the upper floor is a dining or supper room, 60 ft. by 22 ft. It is built of brick and stone (a white stone from the neighbourhood), with strings and bands of Minton's tiles.

A moulded and carved panel at the entrance contains a slab of Silesian marble, engraved with the following inscription :—"Dedicated to the Memory of Richard Southwell Bourke, Earl of Mayo, K.P., M.A., P.C., LL.D., some time Viceroy and Governor-General of British India, who, after three and a half years of beneficent rule, during which he inaugurated many wise measures, and won the regard of all classes, fell beneath the hand of an assassin at Port Blair, Andaman Islands, on the 8th day of February, 1872." The inscription is surmounted by a carved shield of the Mayo arms, with supporters and the Earl's coronet and motto.

Medallion-heads, in red Mansfield stone, are carved in circles on the façade of the building ; these represent Britannia, Europe, Asia, Africa, America, Polynesia. In the vestibule under the tower there is a floor of Silesian marble representing the sun, the twelve signs of the zodiac, and the four seasons.

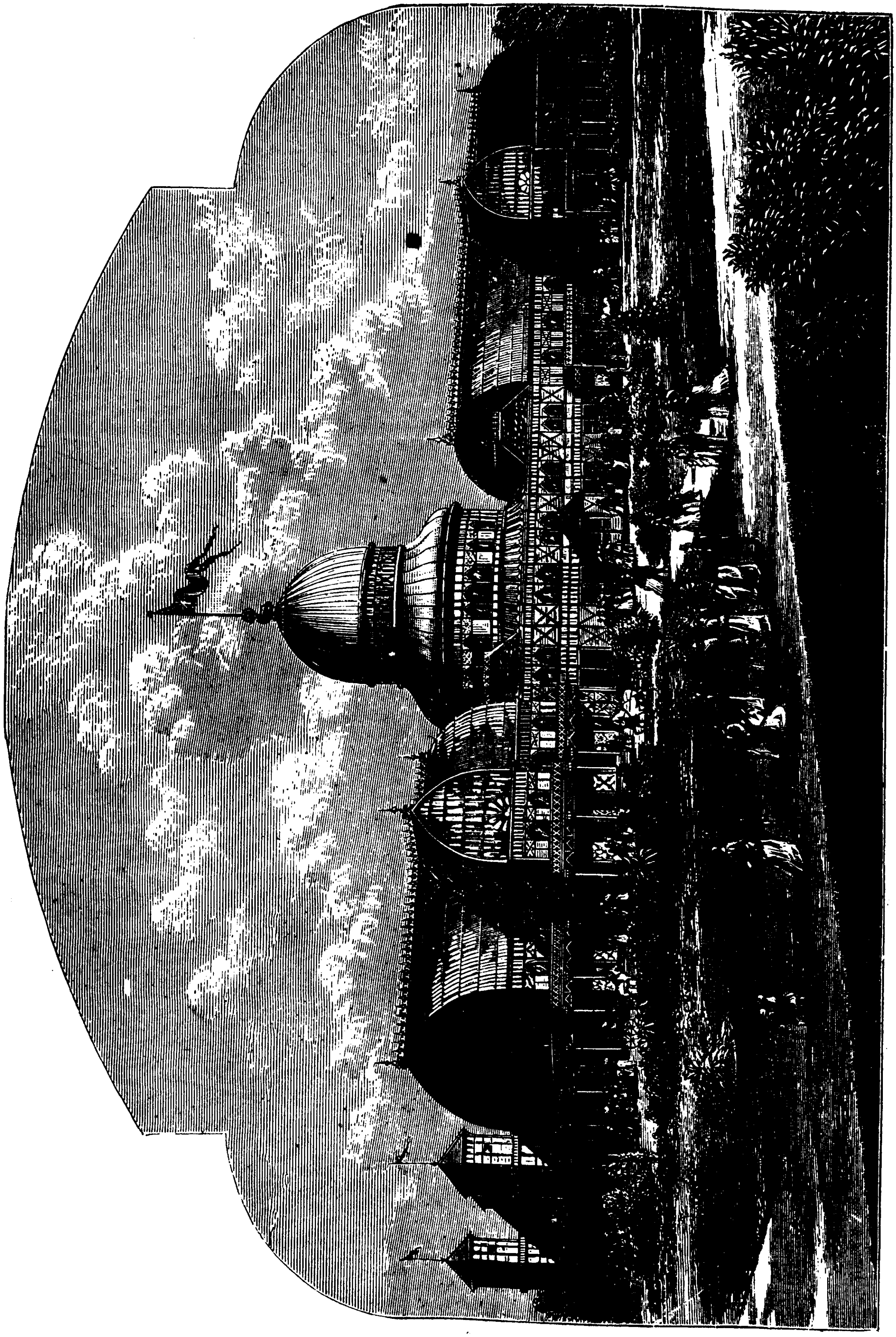
The detached turret is for the use of servants in attendance during a dinner or supper, and as an exit for dishes.

Externally and internally the hall-roof is a pointed arch, the external surfaces keeping the same curve ; the materials of the roof are concrete and cement on flat tiles, resting upon wrought-iron curved ribs without ties ; the thickness is only 7 in. The clear span is 40 ft., the radius of inner surface being 26 ft.

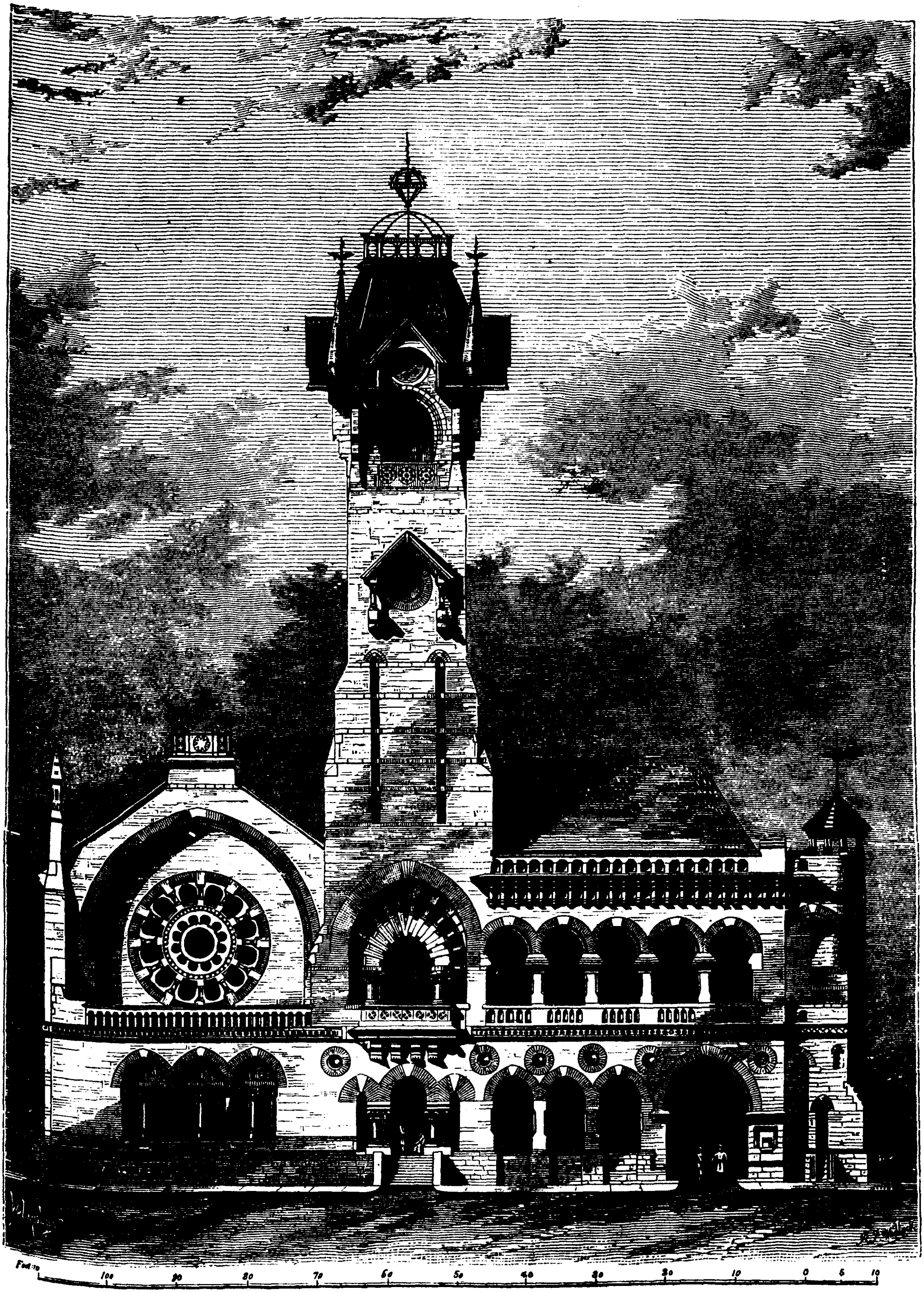
The front upper verandah and that over the ladies' drawing-room have flat terrace roofs ; the roof over the dining-room is covered with slates from Rewaree, near Delhi.

The shallow gallery fronts are of brass wire netting, with small gilt flowers at the intersections. These galleries are only intended for ladies, taking a single row of chairs loosely placed, not fixed

Reference was recently made in this column to a curious Parisian clock. *The Scientific American* contains the following :—M. Cadot, of Paris, has recently invented a curious clock which deserves a prominent place among the number of similar ingenious devices which we lately described. It has two apparently free hands placed in the centre of a double pane, the two sheets of glass composing which are held in an ornamental frame. The clock is operated by concealed mechanism in the frame, which once a minute causes a slight and nearly invisible motion of one of the glasses. This causes the movement of the minute hand, and a minute train of gearing concealed in the pivot of the latter actuates the hour hand. Mr. Robert Heller, the conjurer, has lately been exhibiting a clock of his own invention, the mystery of which no one, we believe, has yet fathomed. It is a clear disc of glass, marked with the usual numbers. The hands have no bulb or other enlargement at the centre, where it might be imagined mechanism could be concealed, and appear to be simply pivoted to the face. A ring like that of a watch suffices for the support of the clock from two cords suspended from the ceiling. At the command of its owner, the clock marks any hour, moves backward or forward, and otherwise behaves in an astonishing manner. The use of the cord naturally suggests concealed wires and electricity, which is probably the secret of the movement. But this theory is somewhat damaged when the magician removes the clock from its cords, and, holding it with two fingers at arm's length, carries it in the midst of his audience and causes it to continue its performances under the very eyes of the people, allowing the closest inspection.



PROPOSED SOUTHSEA FLORAL HALL AND AQUARIUM, ENGLAND.



THE MAYO MEMORIAL HALL, ALLAHABAD, INDIA.

THE ENGLISH PATENT BILL.

In our last number we reviewed somewhat generally the principles of the bill introduced by the Attorney-General for the amendment of the Patent Law. The bill had only been before the public for a day or two, but the criticism which it has aroused in the short period which has elapsed between that time and the present, testifies as fully as we expected, to the interest which the subject excites in the country. We propose this week to consider one of its salient points—a feature, indeed, which we are in a position to say, the Government is resolute to embody, at least in principle. We allude to the preliminary examination. The subject is divisible into two heads—the expediency of an examination, supposing it can be satisfactorily conducted in point of procedure, and the procedure itself.

The proposal to institute an examination, for novelty or otherwise, amounts to a proposal to introduce into our law something that is entirely new to us. It is no doubt based to a great extent upon the fact that a similar practice obtains in America, but it is also argued that such an examination would be an obstacle to the re-patenting of old inventions, a possibility under the existing law which, it is contended, is injurious to the manufacturing interests of the country. Now it is somewhat unfortunate that the existence of the system in the United States should be cited as an argument in favour of its adoption here, because it is a matter of common notoriety among those who have taken the trouble to inquire, that the fact of a preliminary examination being required is in truth not an obstacle to the re-patenting of old inventions ; and the further fact, which we have already pointed out, that during the years 1872, 1873, and 1874, from 212 patent actions reported in the United States, there resulted the destruction of no less than fifty-three patents on the ground of want of novelty, is very significant. Moreover, the American technical press has constantly complained of the serious defects of the system followed by their patent office, a system which, it should be borne in mind, has been in process of elaboration ever since the year 1836, a period which may be regarded as almost coincident with the history of invention in that country. There is, however, to our mind, a vital objection to any system of preliminary examination. It is an objection which no refinement of practice can remove, because nothing short of infallible wisdom or omniscience in the examiners would neutralise it. We allude to the possibility of the destruction of an invention almost in its inception, in consequence of the difficulty or impossibility of inducing an examiner, or the Court, to perceive in it the one, perhaps delicate, distinction between it and something that has gone before—a distinction which may be the means of building a great success upon the ruins of many previous failures. This is not a novel objection, but it cannot be too strongly urged. To take an example : In his able paper on the expediency of a Patent Law, Mr. Bramwell alluded to Watt's invention of the separate condenser. If we imagine to ourselves a reference of Watt's application to an examiner, fully informed for the period at which the invention was made, is it not more than conceivable that the examiner would have pronounced against Watt on the score of novelty ? His engine resembled other engines, but he separated his condenser from his cylinder, a change which in all probability the examiner whould have said was a mere detail introduced for the purpose of setting up a claim to invention. Again, we have a still more striking illustration in the case of the regenerative furnace, a patent for which was refused to Mr. Siemens simply because in an old house belonging to an order of mediæval knights it had been found that the hall was warmed by means of air drawn through heated stones. The actual apparatus, we believe, consisted of two chambers under the floor filled with stones. Each was alternately heated by a furnace and alternately cooled by a current of air, which, after it had abstracted heat from the stones, was turned into the building. No other such apparatus had been known to exist, but the authorities found it out and judged Mr. Siemens's stove to be an old invention. Fortunately, the doors of the English Patent-Office were open to him, and we know the result. How often do we find that the novelty of an invention is only determinable after prolonged and costly litigation—litigation which is generally in proportion to the value of the patent ? It should be remembered that the law is satisfied with the barest amount of novelty, and if that little is often so difficult to discover, it is fair to ask what the examiners will do for us, and what estimate we may make of the costs of an elaborate argument on appeal from them. It is very easy to reduce a portion of the stamp duties, but if we are to be subjected to the working of a system upon which Lord Cairns has so evidently bestowed his approval, it is, at least, desirable that the machinery by which it is to be worked shall be as satisfactory as present experience can make it. The evils of the system may, no doubt, be diminished by skilful handling, but unfortunately the bill does not lead the world to suppose that much practical knowledge has been called to the assistance of its framers. For the last two years we have pointed out, almost *ad nauseam*, the absurdity of attempting to start such a scheme with "not more" than six examiners in all. If the practice of examination is to be initiated at all, let it be with the best chances of success. Let us see what will be expected from the examiners. At present there are annually about 4400 applications for patents, out of which 3000 in round numbers are completed. Under the proposed arrangement both the provisional and final specifications are to be examined, so that the six examiners would have divided amongst them 7400 documents to be dealt with. The search is to be restricted to the specifications and publications preserved in the Patent-office : about 100,000 specifications of English patents, about 180,000 claims and drawings of American patents, and 180 volumes of French specifications, together with a library of upwards of 50,000 volumes, which may, it is hoped, grow larger. Supposing that no examiner ever required a holiday, there would be allotted to each about four specifications per day of six hours ; so that the unfortunate official would be expected to do in an hour and a-half what very frequently employs an experienced agent days, weeks, and even months. In addition to their duties as examiners, these gentlemen will be required to prepare indexes and arrange and abridge the specifications. The staff of examiners should most certainly not be limited by statute. The Commissioners would be surely competent to decide how many men would be required to do the work of the department, and unless the Government anticipate an enormous reduction in the number of applications for patents as the result of its measure, the staff proposed cannot but prove utterly inadequate. It is sufficiently obvious why it was considered necessary to provide that examiners should act by rota known only to themselves ; but this provision, if adhered to, will render impossible any system of dividing subjects into classes presided over by examiners specially qualified for each. It does seem a waste of resource to refer a specification relating to a chemical process to an engineer, or one describing a complicated lace machine to an examiner specially qualified to consider mathematical or musical instruments. In addition to an examination for novelty, an application is to be considered with regard to its sufficiency within the Statute of Monopolies. This, we think, raises a point. The Attorney-General, upon the introduction of the bill, disclaimed any intention to extend the principle of examination to "utility." It is very questionable whether, under clause 9 of the bill, such an examination might not be legally necessary. Prior to the passing of the Statute of Monopolies, public utility was, by common law, an absolutely necessary quality in the invention. The statute did not make any change in this respect, and although "utility" is not expressly mentioned in that Act, the 6th section does require that grants of privilege shall not be "contrary to the law," and concludes by declearing that such grants shall be of the same force as if the Act had not been passed, and no other. Consequently, a grant of a patent for an invention possessing no utility has always been held contrary to the Common Law, and contrary to the law within the statute. This being so, if only for the purpose of setting a doubt at rest, it certainly would seem advisable to require the insertion in the bill of a proviso to the effect that the examiner shall not report upon the public utility of any invention.

These are a few observations which it is desirable at this season to offer. The bill was to have been read for the second time last night, but it was postponed. Meanwhile there is a notice upon the paper of an intention to ask for a Select Committee to consider it, and it is also announced that its rejection will be moved by Mr. Anderson or Mr. Biggar. Meetings are being held in various parts of the country, many of which result in petitions to the Legislature. Unfortunately, as we last week took occasion to remark, the technical nature of the subject hinders the due appreciation of many most important details. Still, inventors must not despair. Their criticism cannot but have some effect, as past experience has shown. But let their criticisms be based on a clear recognition of the fact that in return for the grant of a patent the public has a right to look for fair return. This kept in view, there will be less fear of exaggeration, a slight tendency to which occasionally makes itself apparent, and which, if it were stronger, could not but operate adversely to their interests.—*Engineering.*

HINTS TO PATENTEES.

The following extract from a small pamphlet published by Messrs. Barlow & Co., Patent Solicitors, London, we commend to the serious attention of all persons contemplating taking out patents. The remarks are especially applicable to persons contemplating to take out patents in this country :—

"There are to be found every day persons who for the first time in their lives consider themselves inventors; that is, they imagine they have discovered something not previously known. Such persons are of all ranks and classes; peers, clergymen, doctors, lawyers, manufacturers, farmers, tradesmen, artisans; and in numerous instances they have little or no practical acquaintance with the art or manufacture to which their inventions relate. It may be that the clergyman has hit upon a new firearm, the lawyer devised a new form of hydraulic press, or the farmer in his leisure hours worked out improvements in looms, or that the nobleman has invented improvements in locomotives or steam fire engines. In such cases there is, of course, a lack of that practical knowledge of the subjects treated of, that alone can warrant the securing a Patent without hesitation or consultation of any experienced person. It is not to be assumed that the inventions of amateurs or non-practical men are to be despised or mistrusted, for experience teaches that men who have been treading in a beaten track for years are distanced by others who, as it were, see at a glance how to invent or improve. An idea of much value sometimes strikes a person suddenly, which never occurred to those who had more frequent opportunities of observing what was required. However, this will be granted by most persons practically acquainted with inventions—that caution is necessary to guard against the chimera which are oftentimes conceived by imaginative men, and which when pursued bring loss and vexation to themselves as well as to others. Obviously the first duty is to endeavor to ascertain if the idea be really an invention, in the sense of being something new and commercially useful. At the very outset of this inquiry the inventor is confronted by this difficulty: viz., that he cannot prudently disclose the nature of the matter to the very persons who, from their knowledge of the art or trade, could best give him the information he requires. Common sense shows the folly of disclosing his secret, or supposed secret, to those who have the means and perhaps the inclination to put into profitable use themselves the secrets confided to them. Neither can he in general safely construct a model to test the efficacy of the improvement when that is applicable. What is he to do, then? The more his mind dwells on the subject, the more he is convinced of its feasibility; the more he reads, the more he is confirmed in a belief of its novelty. Without developing the secret, he may inquire of his friends or acquaintances as to the probable success of the plan or arrangement he has thought of, and, as generally happens in such cases, he is assured of its value and importance, if, as they sceptically say, 'it can be accomplised.' We need not describe what is often done under such circumstances, for generally an injudicious course is adopted. It will be more to the purpose to consider what ought to be done. There can be no possible harm in first of all endeavoring, by every means short of disclosing the secret, to ascertain the novelty and utility of the idea, or when practicable, of experimenting and testing; and when these things have been done, the next step should be to take an opinion."

MOWING MACHINES.

(See page 169)

We this month illustrate an efficient and successful mowing and reaping machine, as made by John Williams and Son, of Rhuddlan. It is called the "Princess" in the small sizes, and the "Victoria" in the larger sizes, and both descriptions have been rewarded gold and silver medals in several of the agricultural shows and trials. This should mark them as successfully designed machines, though there is a very strong family likeness and but small differences of detail amongst all the various best mowers and reapers.

Some of the most important points of construction are simplicity, tightness of draught, strength, durability and ease of management, in all of which points these machines are distinguished. The lowness and cleanness of cut are most necessary qualities where a thick crop of grass has to be operated upon to the best advantage. A special arrangement of finger bar is made in these machines; with these objects in view the grove is planned on the bar to admit of the bottom sections being riveted upon the planned face of the under bar and not inside the finger. This arrangement gives always a sharp cutting resistance similar to shears, since the top knife works upon a dead true face. As the bottom section is also independent of the finger, it can be sharpened when required. In the case also of a finger being broken, the bottom sections remain intact on the bar. In order that the finger-bar may cut as low as possible and yet accommodate itself easily to unequalities of surface, it is attached to a wrought-iron hinge, which is fastened to the frame of the machine, an arrangement which enables the finger-bar to rise and fall independent of the frame. This special finger-bar arrangement, from its cleanness of cut and perfect freedom from clogging, has received two extra special silver medals.

As cast iron is proved to be so unsatisfactory a material, and so untrustworthy for use in such machines subjected to the shock and wear and tear of regular work, we are pleased to see that Messrs. J. Williams and Son use malleable cast iron in the main shoe that receives the principal working strain, and also in the mower shoe, and for all the fingers.

The finger-bar is supplied with the usual lifting bar which can be worked by the driver without effort by one hand, whilst seated. Care is taken that the pole and machine are perfectly balanced both in reaping and mowing, so that there is no weight on the horses' neck

The gearing is so proportioned that the driving-pace need not be faster than that used for ploughing, which enables the horses to work with the greatest ease. A useful introduction in this machine is a ball and lever within reach of the driver's foot, and which can be thrown over without the driver using his hands, putting the machine immediately out of gear.

The driver's and raker's seats are conviently placed, and are supported by springs for easy riding. The disc wheel working the connecting rod is self-lubricating, being made hollow to contain a quantity of oil, which thus continuously discharges itself on the bearing, and is of great value, as the speed is high.

TRAVELLING STEAM CRANE.

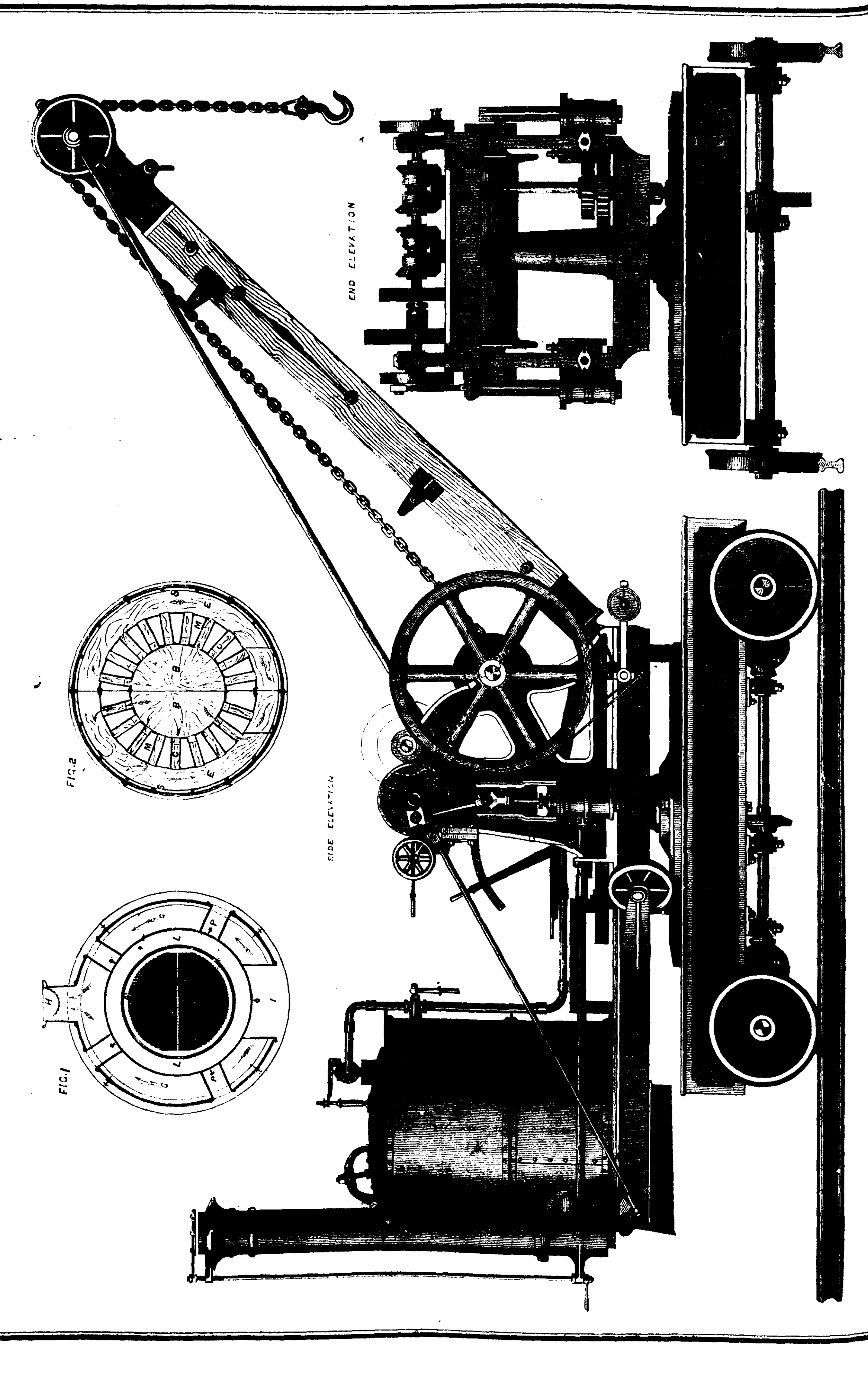
(See page 168.)

We illustrate at page 168 a steam crane manufactured by Mr. T. Smith, Steam Crane Works, Rodley, near Leeds. The engraving explains itself to a great extent. The design is one which, while presenting no very novel features, is generally satisfactory. The proportions are good, and the arrangements for enabling the attendant to manipulate the machine are excellent.

The boiler is of a somewhat peculiar type; it is shown in sectional plan in Figs. 1 and 2. It will be seen that the boiler has a circular fire-box and grate A B, and is surroundded by a sheet iron casing. Fig. 1 is a plan at the level of the ash-pan, Fig. 2 is a sectional plan through the water space, H is the chimney, P P tubes to admit air to the fire, M M water, C C tubes through which the products of combustion escape. Mr. Smith claims the following advantages for his boiler :—(1) Its effective heating surface, which absorbs all possible of the heat produced before entering the chimney. (2) Its extent of space in fire-box for combustion. (3) The flame being equally distributed over the water containing portion of boiler, an efficient circulation of water is obtained, whereby unequal expansion with its attendant evils are entirely overcome, and priming rendered impossible under ordinary circumstances. (4) Its provision for super-heating the steam by hot air, without the direct action of the flame on boiler-plates about water line. (5) Its facilities for examination, cleaning, or repairs are not possessed by any other boiler; any part of the outer shell or brickwork being easily taken to pieces or replaced. (6) Its economy in producing the largest amount of steam with the least possible quantity of fuel.

An Instrument for reducing or enlarging drawings, called a *planigraph*, has been invented by M. Marmet, of Versailles. It consists of a rule carrying two scales which have different graduations, and are placed end to end in opposite directions. At the common origin of the scales is a needle about which the rule can freely turn. Reading on one side the vector radii of the different points of a given figure, and marking on the other side the points designated by the same numbers, you obtain a figure reduced or enlarged in the proportion resulting from comparison of the scales. These scales are fixed to the rule by screws. There are five for each side, among which choice is made according to the reduction required.—*Eng. Mcca.*, xxv, 107.

TRAVELLING STEAM CRANE.



TRAVELLING STEAM CRANE.—(*Continued.*)

FIG. 1.

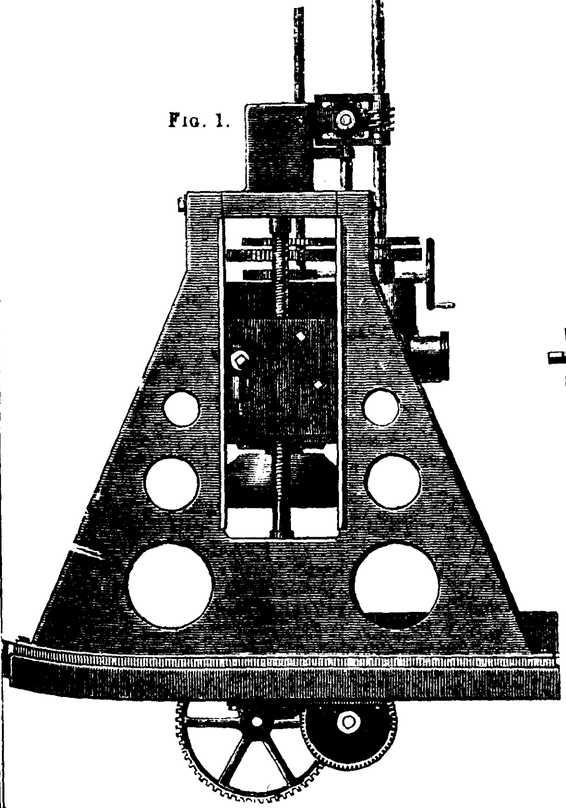
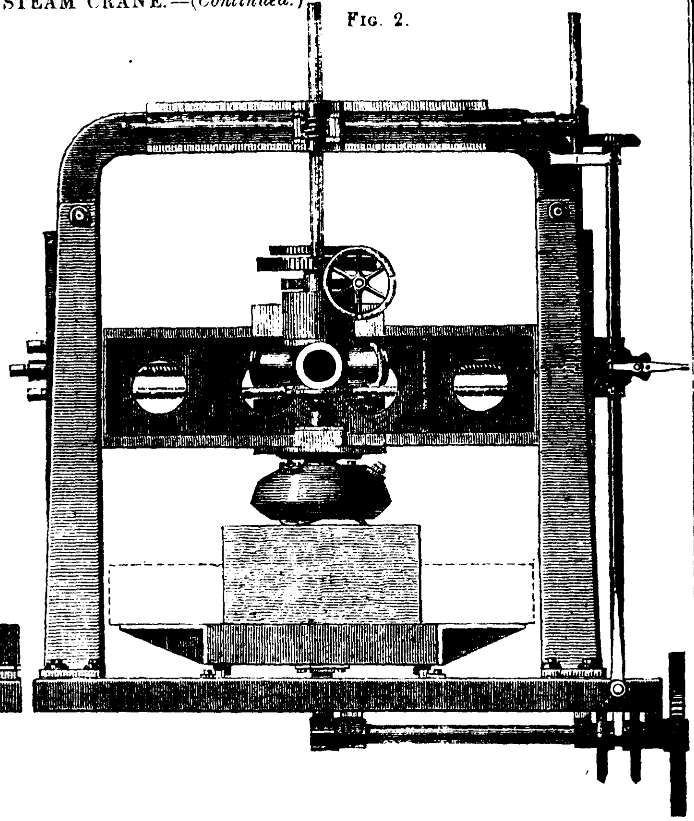
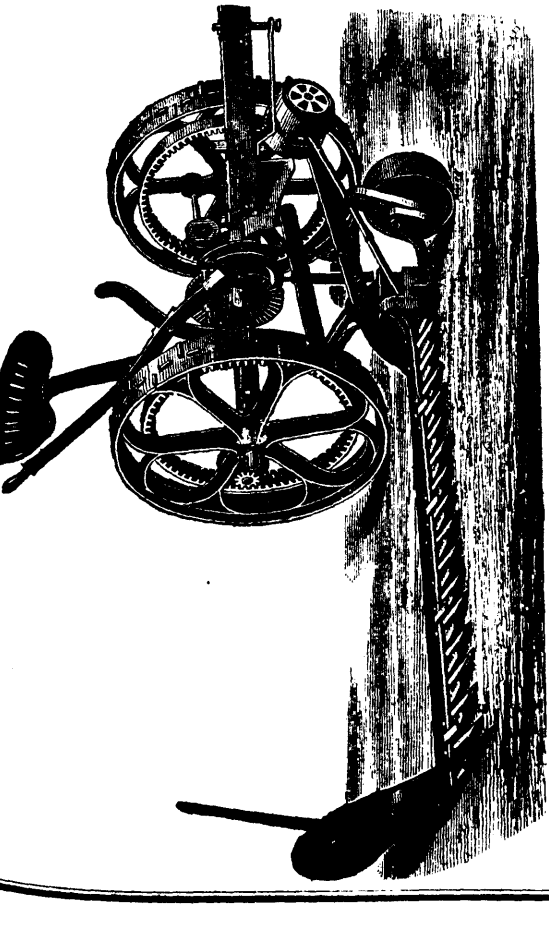
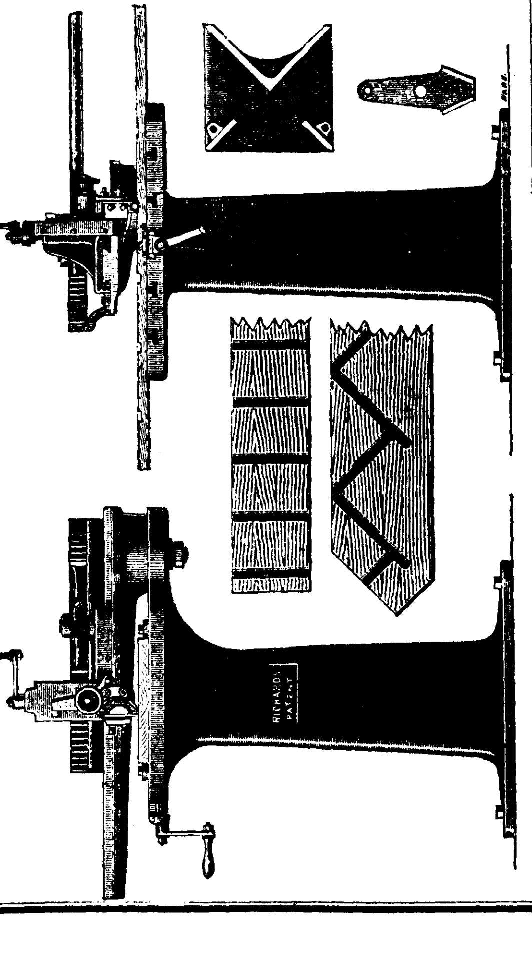


FIG. 2.





MOWING MACHINE, MADE IN ENGLAND.



WOOD-GROOVING MACHINE.

STRAIGHTENING SAWS.

(See page 173.)

In the manufacture of saws, the straightening forms a large proportion of the manipulative processes. The cutting of the teeth, the grinding, the polishing, the tempering, and the finishing: each of these processes is accompanied by a straightening operation; for in insuring an equal amount of tension at all parts of the blades lies one of the principal elements necessary to the production of a good saw, and a blade can hardly have any mechanical operation performed upon it without affecting its tension and straightness. In the use of saws, it is found that band and frame saws are, under ordinary conditions, comparatively easily kept true and straight; whereas hand and circular saws are readily affected by several causes, among which the most prominent is the setting of the teeth. The blades of circular saws, moreover, frequently become hot, and the heating of a blade is almost certain to impair its straightness, and hence the equilibrium of its tension.

The set of a saw tooth should all be given to the tooth itself, and in no case should it extend below the bottom of the tooth into the solid blade; because in that case it affects the straightness of the same and renders it liable to break. The harder any cutting tool is, the more cutting duty it will perform without becoming dull. On the other hand, the strength depends upon the degree of hardness or temper. In a saw, the temper is made to conform to the requirements of strength and elasticity, the latter element including its resistance to becoming bent or taking a permanent set, if bent much out of the straight line; and this degree of temper (which is shown by a blue color) is found to be the highest which it is practicable to give to the saw teeth: which, being formed out of the plate itself, are necessarily of the same temper as the plate. Furthermore, the blue shows the highest temper which it is practicable to give to the teeth, and still allow them the capability of being bent to obtain the set. Indeed, it is only from the fact of their being weakened by the spaces between them that they will permit of being set without becoming broken; for were we to attempt to set the solid edge of a plate or blade, it would break, if properly tempered. If then, in setting saw teeth, we allow the setting to extend below the tooth, the strength of the latter is destroyed, and the straightness of the plate or blade is impaired.

What is commonly called a buckle or a bend in a saw plate is known to the trade as a tight or a loose place, meaning that the want of straightness is produced by parts of the blade being unduly contracted or expanded; and all the efforts of the straightener are directed to the end of removing the contraction or of accommodating the expansion, so that, the unequal tension or strain being removed, the plate will be true and straight. If we take a saw plate that is quite true, and lay it upon a truly planed iron plate and allow it to become first heated and then cooled thereon, we shall find that it has become warped by the process, and it is apparent that the warping has been produced by the expansion and contraction of the plate, and possibly mainly from irregular heating and cooling; for it is impossible to insure that the heat can be imparted to and extracted from the plate equally in all parts. The varying widths, the extra exposure of the teeth due to their partial isolation (and hence their increased susceptibility to heat and cold), and other elements, would all cause inequalities in heating, against which it would be impossible to provide. The circular saw affords the best example of the vicissitudes caused by unequal tension, as well as the most striking instance of the minuteness and skill in mechanical detail required in the saw straightener's art.

Suppose, for example, that we have a circular saw of three feet diameter, and that it is made straight and true, and with an equal degree of tension existing all over it. Let its circumference travel at a speed of 2,500 feet per minute: it is obvious that the centrifugal force generated by the motion will tend (and actually does, to a slight extent) to expand the saw plate, and it is equally obvious that this expansion decreases in amount as the center of the saw is approached. The equality of the tension on the plate is destroyed; and though stiff and true when in a state of rest, the saw is loose on the outside (or, in other words, center-bound) when rotated, the looseness of the plate decreasing from the circumference towards the center as the radius shortens. As a consequence the extreme edge will, when in motion, flop over from one side to the other, according to the side on which the duty offers the most resistance; and this resistance will vary, from the curves in the grain in the wood, from knots, and from a variety of more minute causes. It follows, then, that the sawing cannot bs smooth, and that, as the saw bends or flops over on one side, the opposite side of the blade will come into close contact with the work, entailing friction and, as a result, heating; the latter will cause the saw to dish, and to remain permanently dished.

The method employed by the saw straightener to compensate for the expansion due to the centrifugal motion is to place upon the saw a tension insufficient to dish the saw when at rest, and yet sufficient to accommodate the expansion due to the centrifugal force. This he does by the delivery of blows upon the plate, the effect of which will be to create a tension sufficient to tend to enlarge the plate without overcoming the resistance to enlargement offered by the plate itself until such time as the centrifugal force diminishes this resistance: when the tension follows up the advantage afforded by the centrifugal force, and holds the plate from becoming loose on its outer circumference. If from an error of judgment the tension is insufficient to accommodate the centrifugal force, the saw becomes loose in the middle, or, in other words, it becomes rim-bound when in motion; and the result is that it dishes, as shown in Fig. 1. So that one side contacts with the work; and if the saw teeth meet with different resistances on its two sides (which may occur from the waves in the grain of the timber, or from other causes), the dish will jump from one side to the other of the saw, because, from being rim-bound, it is impossible that it remain straight. And as soon as it is forced over the straight line, it springs to the dished form, which is the only one capable of accommodating the tension. Now when it is remembered that cutting out the metal to form the teeth weakens the saw, rendering it more susceptible to expansion from the centrifugal force, and that the number and the depth of the teeth, and the temper, thickness, and size of the saw, as well as the speed at which it rotates, are all elements tending to vary the force and effect of the centrifugal motion, it will be readily perceived that it requires unusual judgment and skillful manipulation to enable the workman to give to a saw the exact amount of tension called for by the particular circumstances under which it is to operate. Yet so skillful are some of the straighteners that they have been known to remedy a defect in a saw from the delivery of a single light blow.

The blows delivered are in no case quick ones, nor are they sufficient to leave an indentation or impression upon the saw blade or plate. Each is given with a view either to create or remove tension, and not to give to the metal a permanent set; and although in explaining the method of manipulation it will be necessary to show, in the illustrations, the hammer marks, it is to be understood that those marks are not visible upon the work, and are only employed to denote where the blows were delivered.

In Figs. 2 and 3 are shown the hammers used by the saw straighteners. The first is called a "doghead." Its weight is about 3 lbs., its diameter is about 1⅝ inches, and its length is about 5½ inches. Its handle which is about 14 inches long, stands at an angle of 85° to the body of the hammer. Its face is rounding, and of an even sweep. That shown in Fig. 3 is called a blocking hammer; the face at A is slightly rounded. In Figs. 4 and 5 are presented the straightening blocks; that shown in Fig. 4 is of iron faced with steel. The face is bright, smooth, and slightly rounded. Fig. 5 represents a wooden block upon which the straightening of the finished saws is performed.

The doghead hammer, Fig. 2, is used mainly for stretching, that is, for removing a tension. The reason for its handle being at an angle is that by this means the handle of the hammer stands, when the blow is delivered, in the line of the hammer's motion; hence the blow delivered is a dead one, that is to say, it has as little spring or rebound as possible. By this means the effect produced by the blow is kept at a maximum; and the speed of the hammer being comparatively slow, it does not leave hammer sinks or marks upon the saw plate or blade.

The part of the saw plate being operated upon must always be kept flat upon the anvil, so that the blows will be received on a solid; otherwise they would distort the blade by bending it instead of stretching it. The motion of the doghead hammer, shown in Fig. 2, is sometimes such that it strikes the plate or blade fair, so that its effects extend equally in all directions, as shown in Fig. 6, at A, in which the dark center shows where the hammer fell, and the radiating lines denote the stretching effects of the blow. At other times, the direction in which the hammer falls is aslant, as shown in Fig 6, at B, in which the hammer, while failing, travels also in the direction denoted by the arrow, C, the stretching effects of the blow being denoted by the radial lines around the center, at B. The motion of the hammer, however, is never varied so as to travel towards, but always away from, the operator, the saw (if not a circular one) being turned end for end upon the strightening block when necessary.

The method of using the blocking hammer, shown in Fig. 3, is as follows: The shape of the face of the hammer, in conjunction with the line of motion in which it falls, determine the direction in which the effects of the blow shall extend. If, for example, the face, A, of the blocking hammer were flat, and the blow fell vertically true, the effect of the blow would radiate equally on all sides of the spot which received the blow. If, however, the face, A, of the blocking hammer, while falling, traveled also laterally, the effects of the blow will be greatest on the side towards which the lateral travel took place. Thus, in Fig. 7, if the hammer, in falling, traveled from B towards the hammer mark shown, the effect of the blow would be as denoted by the radical lines; while if the position of the hammer face were turned to a right angle, and blow were struck with the hammer traveling laterally from C towards the hammer mark shown, the effects upon the plate would be in the direction denoted by the radial lines, shown at C. The curve of the face of the blocking hammer, at A, also has an influence in extending the effects of the blow forward; and the result of these combined elements is that the blows lift the plate in front of them, so that, if blows were delivered as shown in Fig. 8, at A, the plate would bend upwards, assuming the shape denoted by the dotted lines at that end: while by blows delivered in the direction indicated by the marks at B, the plate or blade would curl up, as shown by the dotted lines at that corner of the plate.

A sawplate or blade may have a bend in it that is not discernible to the unpractised eye; and yet the expert workman will readily detect the defect as the saw lies upon the straightening block; and all the coarser defects can be attacked and remedied without sighting the plate at all. But when the finer part of the straightening is to be performed, and the tension of the blade, as well as its straightness, is to be perfected, the workman casts his eye along the blade nearly in a line with its length, when, the light coming in front of the operator, any unevenness upon the blade will be denoted by shadows, as shown in Fig. 9. which represents an ordinary handsaw being sighted, the shadows showing the want of straightness. Having detected the part of the blade which is out of true, the workman reverses the position of the blade, holding it in his hands as shown in Fig. 10, and he then bends the plate slightly backwards and forwards, the object of which is as follows: The defects in the plate exist by reason of some part being either unduly expanded or contracted, thus creating undue local tension in one place, and removing the natural tension in another. Tha workman, when bending the plate backward and forward, finds that the loose place (or, in other words, the expanded part) moves easily, while the contracted part offers a resistance to the bending movement; so that, by noticing the amount of the movement during the bending, the workman discovers where the contracted part is, and he proceeds to remove it by stretching the blade in that spot. Thus while straightening the blade its tension is also equalized, giving to the plate a uniform resistance to its becoming bent or sprung. During the hammering process, the straight edge is frequently applied to the blade as a guide to test the work by. If, while attacking the necessary places, the saw blade does not lie solid upon the straightening block, the hammer will drum, as it is called; and the effect of the blow will be to stretch the outside skin of the saw blade, causing it to rise up because of its being elongated. Thus, were the blade to be hammered all over one face without bedding solid on the block, it would become bow-shaped, the face struck being the convex side.

In Fig. 11 is shown a saw blade having a loose place in the middle, as denoted by the shade shown upon the face. The method of attack here would be to deliver the blows denoted by the marks shown at A and B, using the doghead hammer for the purpose. The parts so struck would be stretched, giving room for the loose place to flatten, and taking the undue tension from the outer surface and imparting it to the loose place, the saw becoming slightly elongated by the process. If, however, the bending process or test showed the contraction to be in the middle of the blade, the doghead would be used to deliver the blows shown in Fig. 12, at A, which would stretch the metal there, removing the contraction and equalizing the tension. Suppose, however, that the saw was atwist, as shown in Fig 13: the method of attack would be to take the blocking hammer, and deliver the blows denoted by the marks shown, using the hammer so that, while falling, it would travel laterally slightly from the workman. The blade would be placed upon the block with the drooping side downwards, because the effect of the blows of the blocking hammer is, as before noted, to lift the plate in front of them.

If one edge of the saw blade had a kink or wave in it, as shown in Fig. 14, the method of procedure would be as follows: The blade would be placed upon the block with the hollow side of the kink downwards, as shown in Fig. 14, and the blows shown at A would be delivered. The effect of these blows will be to stretch the metal of the plate, removing the tension behind the kink, and producing a tension tending to lift the part kinked. The plate is then turned upside down, and the blows denoted by the marks shown in Fig. 14, at B, are delivered, which will remove the kink.

In performing any one of these operations new contractions or expansions of parts may be induced; and it not unfrequently happens that a kink and a twist, or a twist and a loose place, may be attacked at the same time. Numerous combinations of contracted or expanded places may of course exist in a blade, and the process for removing one may be modified or carried on in conjunction with that necessary to remove another; the principles employed, however, are in all cases those explained above, the application being varied to suit the circumstances.

In the edge view of Fig. 15 is shown a circular saw dished; and here it may be noted, that in this case as well as when the saw is out of straight, the first thing to do is to get the dish out, and afterwards, proceed with the straightening. To remove the dish, the saw is placed upon the block with the concave side uppermost; and the blows are delivered with the doghead in the places denoted by the marks shown on the face view of the saw in Fig. 15. The testing of the saw is made by bending it, by sighting it, and by applying a straight edge to its surface. Some circular saws are too thick and strong to be easily bent, and in that case the bending test is omitted. If a circular saw is atwist or has a kink in it, the method of attack is the same as that already described for similar defects in hand or frame saws: except that, as before explained, a slight tension is left upon the outer diameter so as to allow for the expansion of the saw created by the centrifugal motion and force. J. R.

WOOD-GROOVING MACHINE.

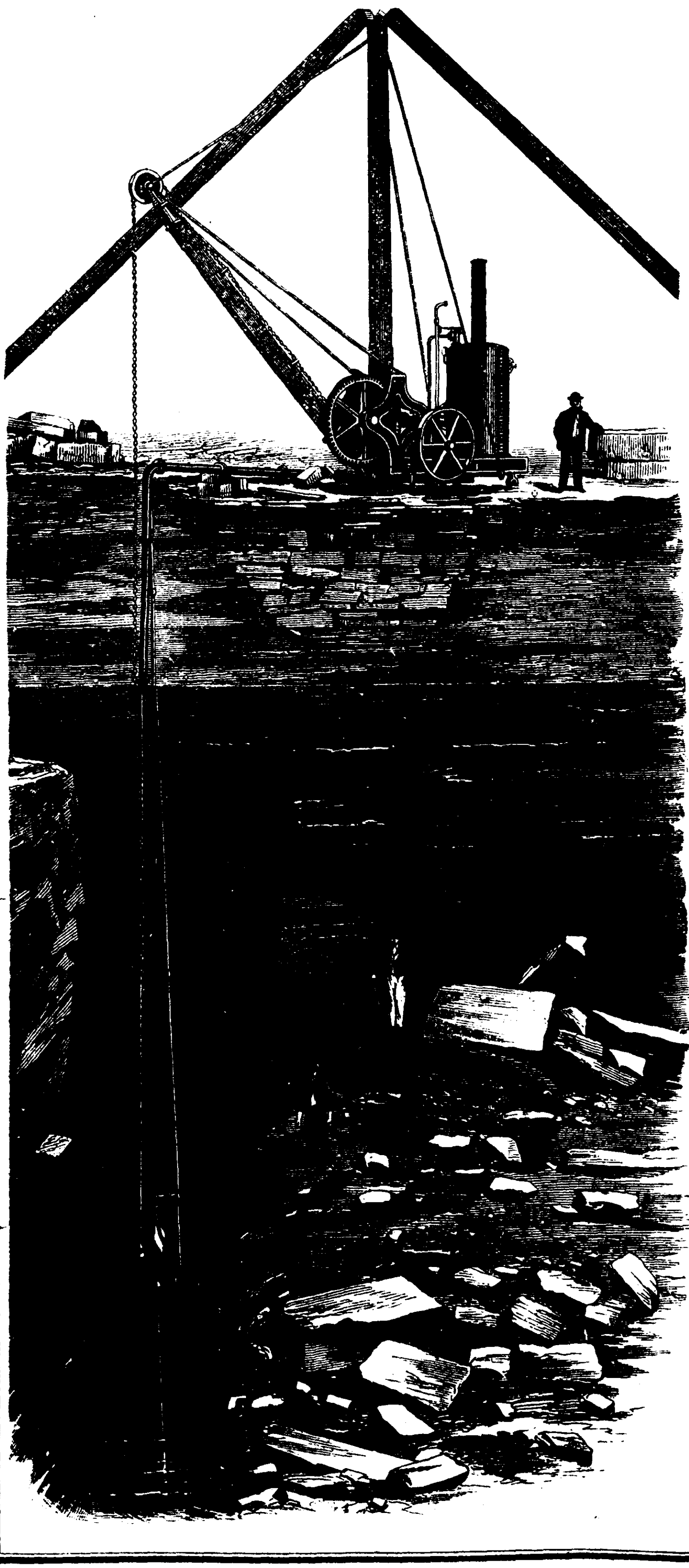
(See page 169.)

The above illustration shows two views of a machine designed by Mr. J. Richards, London, and constructed by Richards, London, and Kelley, Philadelphia, engineers. The machine is intended for cutting the grooves for steps and risers in stair strings, and for preparing casework of any kind requiring grooves to be cut either at a right angle to the pieces, or diagonally as shown in the details. The same machine is arranged so as to be used for mitre-cutting when not required for grooves. The details on the right shows the mitring table and the double-edged cutter employed for the last-named purpose.

The machine, as shown, is provided with spurs and grooving cutters to be operated by hand, the tools sliding on the pivoted bracket, which can be set to any angle across the lumber. The cutters are moved forward and back by means of the lever seen in the front view, and are fed down at each stroke by means of the crank on top. In mitring the grooving cutters are replaced by the double cutter before mentioned. The machines can be constructed to operate by power with rotary cutters, but this, considering the small amount of wood to be cut away, offers but few advantages over hand movement, and complicates the machines; besides in most cases machines of the kind are most conveniently used in joiner shops in connexion with the bench-work where power is not at hand.

Turkish Armaments.—The British steamer J. B. Walker, Captain Duncombe, has arrived in the Bosphorus from New Haven, United States, with a large cargo of arms and munitions of war for the Turkish troops, which has since been landed at the Artillery Department at Tophaneh. This cargo forms part of an order given by the Turkish Government to the Providence Tool Company, Rhode Island. It is valued at 170,000*l*. sterling, and consists of 33,400 Martini-Henry rifles, 4,700,000 Martini-Henry metallic cartridges, with the same number of balls fitting them, and 10,000,000 Snider cartridges. The Seraskierate expects the speedy arrival from Liverpool of 7000 revolvers of the Smith and Warren partern. These weapons are provided with self-acting mechanism which instantly expels the discharged cartridge cases from the chamber, and they have the advantage of being usable with the same cartridges as the Winchester carbines with which the Turkish cavalry is at present armed.

THE PULSOMETER, AT A QUARRY.



FRICTION GEAR FOR DRIVING PUMPS.

FIG. 1.

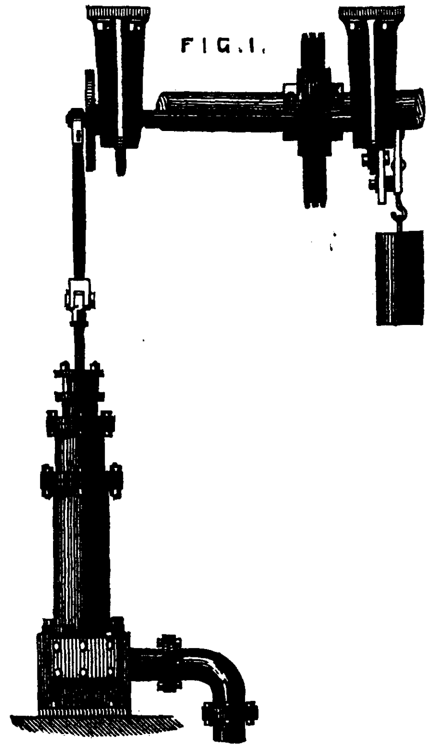
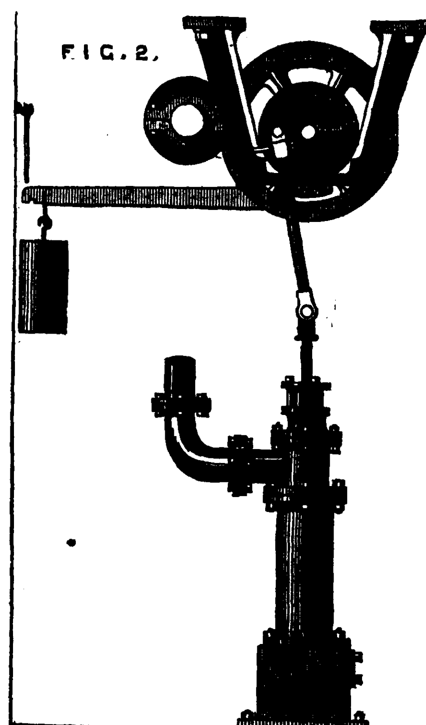
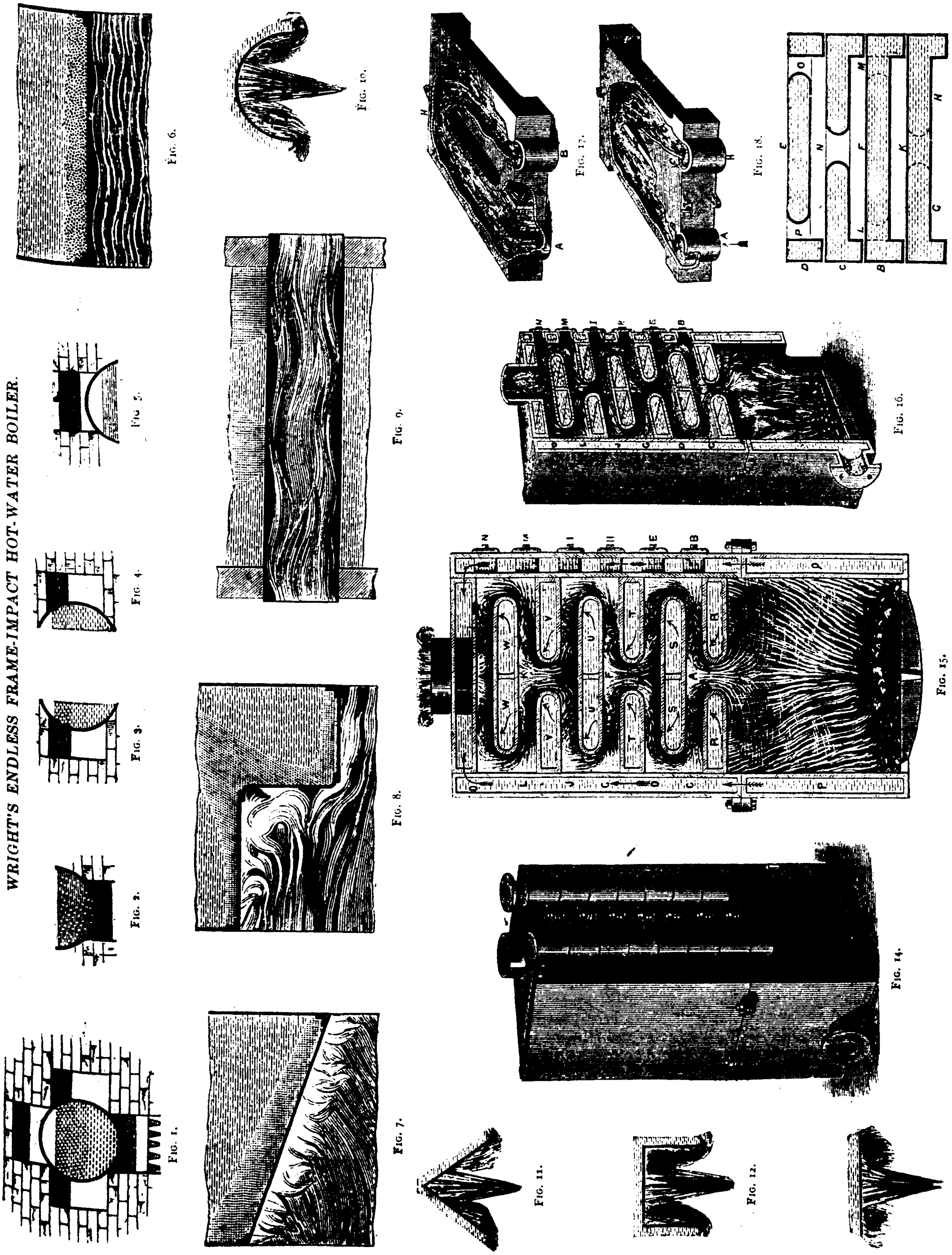


FIG. 2.



WRIGHT'S ENDLESS FRAME-IMPACT HOT-WATER BOILER.



WRIGHT'S ENDLESS FRAME—IMPACT HOT-WATER BOILER.

(See page 173.)

Of late years the construction of hot-water boilers has become quite a specialty. Nor is this to be wondered at, for the dissimilarity which exists in the requirements of a hot-water boiler from the ordinary steam-boiler has completely excluded the proper construction of the former in our boiler-makers' yard. Though this way appear rather paradoxical at first sight, yet it is not so in reality, for let us only consider the duties of the two. Evidently the one is merely for heating water, whilst the other is for the generation of steam—that is to say, whereas water possesses but very little elasticity, when compared with steam, so that little structural strength is necessary for a hot-water boiler, yet strength is so indispensably requisite in the construction of the steam-boiler that we are bound to use the strongest form we are in possession of for producing iridiate glass, similar of arrangement in the construction of the latter. The cylindrical form being next to the spherical in point of strength, and superior to it in respect of superficial area or heating surface, this form is generally adopted in steam-boilers, where a flat horizontal surface, not too far above the layer of fuel, is usually considered the most favourable for raising steam. Thus, amongst our steam-boilers, we generally meet with the following configurations, shown in our figs. 1, 2, 3, 4, and 5. It will be observed that in fig. 2 the heat is driven principally into the bricks, whereas in fig. 3 and 4, the effective heat is only found in a thin stratum at the top, acting only on a few inches of boiler surface ; and lastly, in fig. 5, the heat lies along the top—in short, all the best furnaces offered for the heat absorption are those of the bricks, while those of the boiler are the smallest and most worthless. These bricks form the outside flues ; and it has been repeated so frequently without contradiction that brick flues and setting "draw" the heat out of the ascending products of combustion that stream over them, and reflect it or otherwise return it or its effect to or upon the boiler, and so save the escaping heat for its necessary purpose, and prevent its going up the funnel, that it has become a settled article of our faith, that the thicker we can pile bricks around our boilers, and increase the size and extent of our flange about same, to secure the deposition and accretion of heat where wanted, and prevent its flow into the atmosphere, the more did our conduct in doing so appear praiseworthy, and in strict accordance with plain facts and well-known scientific researches. We do not make this statement for the sake of controverting it, for it is incontrovertible, and we quite agree with it, as far as it goes. What we desire to do, however, is to give due prominence to a collateral fact with which it is indissolubly connected, viz., that the conduction and radiation increase with the increase of surface area, so that when we add course to course, and pile to pile of bricks around our boilers to keep in the heat, we are at one and the same time increasing the outside area, by which means a largely increased surface is offered for the loss of conduction and radiation into the atmosphere. To show more clearly the action of the flame in the ordinary steam-boiler, furnace-boxes, and in the fluid, we append the figs. 6, 7, 8, 9, as by these we shall be better able to understand the guiding principles adopted by Messrs. Wm. Wright and Co., of Airdrie, in the construction of their so-called "endless impact hot-water boilers." In fig. 6 we have an illustration of the flame-action sliding along the plate, thus raising steam very slowly, because there is no impact or time allowed for the flame to drive its heat through the plate. In this case, the particles of heat are very shallow above the frame-plate, while in fig. 7, the frame being an angle, the contrast is obvious, and this difference is still more expressed in fig. 8, giving an illustration of the action of flame against a plate at right angles to the line of progression, thus raising steam most rapidly, because the blows from the impact drives the heat through the plate without cessation. In a nearly similar manner boiler flues are operated upon inside, as illustrated by fig. 9, showing the unequal conversions of steam, and the loss therefrom, by the flame acting on about two-thirds of the tube surface only ; in these horizontal flues, the heated currents, instead of filling the entire flue, mainly float along the top, and the expensive stream of "made" heat, instead of closely hugging the top flue surface, in reality only lightly touches about one-third of that surface, its undulating outline and mode of progress being the very worst that could be desired.

Having so far pointed out that the great waste continually going on in the average steam-boiler, is mainly due to the fact that all the best furnaces offered for the heat absorptions are the bricks, whilst the smallest and most worthless are those of the boiler itself, it is proper to observe at this point that the paramount demands of strength in the construction of steam-boilers, have more and more driven makers into the long cylindrical shape, and, as a further consequence, the flame product is immediately deflected, instead of rising straight up, and passed along far-extending flues. It is exactly owing to these exigencies of strength which, to a large extent, control the shape of a boiler, that there appears little hope of any alteration or much improvement being made in steam-boilers from their present cylindrical shape. On the other hand, hot-water boilers are especially favoured in being untrammelled, at least to any great extent, by such considerations in their efforts after economy, for the little structural strength necessary at once places us at liberty to use the most effective arrangement we can devise. The best and most economical surfaces—though also the weakest in structural strength—are shown in figs. 10, 11, 12 and 13, for surfaces such as these receive the powerful impact of the flame, whilst that time is allowed which is indispensable for the absorption of the heat.

It is this theory of flame-impact which has been applied to the hot-water boiler represented in figs. 14, 15 and 16, the first of which represents an outside perspective view of the boiler, with the cold column on left side feeding cold water to all the central sections (figs. 15 and 16), and drawing it from the bottom, whereas the hot column is represented on the right hand taking hot water out of all the central sections and delivering it to the hot floor at top. This circulating action will be best understood on reference to figs. 15 and 16, showing respectively flame-action in the interior, and half-back view in section ; the centre-flame strokes are denoted by A P K, the impact being at right angles. It will be seen that the heat is precipitated in never-ending currents against large flat surfaces exposed to its direct action, not less than seventeen distinct strokes being given to these surfaces by each volume of the heated products in their ascent to the stalk ; the smallest volume of heat, therefore, that passes through the boiler not only strikes upon one effective surface, but one after the other discharges itself full and square upon the whole seventeen surfaces. The figs. 15 and 16, moreover, show that the double currents continually being formed by the rise and dispersion into opposing currents, are as often drawn together, and again and again violently precipitated against each other ; the consequence is, that the flue-passages in this boiler are always full of flame, striking and commingling again and again, thereby insuring the combustion of the gases and their thorough admixture with each other, and of the injected air. The soot-holes are shown at B, E, H, I, M, N, and the circulation inside is shown by the arrows. In the central sections with flame openings in centre, R R, T T, V V, &c., the water flows down the one side and up the other, whereas in the closed central sections, S S, U U, W W, the water flows down the one side of central rib and up the other. The cold water is fed from the cold column on the outside, and the hot water is carried away into "hot" column also outside. The arrangement of the central section is rendered clearer from figs. 17 and 18. In the former A is the cold-water column, B the hot-water column ; the cold water entering at A flows down to H, and returns hot to D D, the short central rib, E, divides the sections into two, except the passage left at H. In fig. 18, in contradistinction to fig. 17, which represents a central section with flame-opening in centre, we have a central section with flame-openings at sides ; here the cold water enters at A, flows round the central rib, E, to D, then returns hot to C. The first section (fig. 19) has the smoke-opening through the centre ; the second has the openings at each side. These openings have been specially designed to give the greatest amount of impact. Another advantage is, that such large flat surfaces placed over the opening of the bottom section (F), and repeated several times in the rise of the heated products (E, &c.), has quite as good an effect as if the whole were closed, moderating the rush of flame, and insuring its being sent over every part of the surface, by which means every inch assists and does its duty, having the heat sent over it, and plenty of time for its absorption. To simplify the castings, so as to insure good ones at reasonable prices, the sides are cast separate, but the surfaces are all as shown. The outlet of the heated water is a few inches higher than the inlet of the cold, so that the current has an appreciable and decided rise in its passage through the furnace. It will be seen that the whole is surrounded by two thicknesses of metal and several inches of water, so that is a great point gained, because by cutting off any of the sources of loss, we are already well on the way to a truly economical boiler ; in othes words, this boiler is entirely water-jacked. The connections of the various sections is accomplished by means of indiarubber rings, lying in recesses purposely formed to receive them; the sections being bolted firmly together, a perfectly watertight joint is secured, while the indiarubber gives every allowance for contraction or expansion.

A testimony as to the merits of the boiler, with which Messrs. Wright and Co. ought to be well satisfied, was shown in the award of judges at the Philadelphia Exhibition.

LANDS BELOW THE OCEAN LEVEL.

In an article treating on some remarkable results of evaporation and rainfall, we described one of the instances of the great excesses of evaporation over rainfall, namely, the Caspian Sea, on which the surface is as much below the ocean level as our Lake Champlain is above the same, namely, more than 80 feet. There are, however, two still more remarkable cases of the same sort, the Dead Sea in Palestine, and the Great Desert or Sahara in Africa. The former is remarkable for the great amount of the depression, and the latter for the immense surface depressed, being in fact the bottom of an extensive inland lake, totally dried up by the heat of a tropical climate, aided by the absence of feeding streams, and by the rainless area which covers its greatest portion. It is, on an average, 80 feet below the ocean, about as much as the Caspian Sea; but it is remarkable for its extent, being nearly 2,000 miles square, or nearly 4,000,000 square miles.

The French government, having an eye to the colonization of Northern Africa, with Algiers as a starting point, has for some time favored a project for restoring this sandy waste to its primeval condition by cutting a communication with the ocean, and so transforming it into a salt water inland lake. The effect of this on the climate of the surrounding country, and especially on the colony of Algiers, would undoubtedly be most beneficial, because the south wind, instead of blowing, as it does now, over a sandy desert, would become a sea breeze; this would increase the rainfall, and change a rainless district into a fruitful region. In a commercial point of view, moreover, the benefits of such a change could not be over estimated. The introduction of water transportation is especially advisable in this tropical region, where the miserable and utterly inefficient caravan is now the only mode of carrying goods; and without doubt commercial cities would soon spring up around the shores of the proposed inland sea, which would become the scene of a mighty travel and traffic, as the lake would give easy access to the surrounding countries, and develop this part of Africa to an extent thus far utterly undreamed of.

But it is well to look also at the disadvantages of this gigantic scheme. In the first place, it will rob the ocean of such an enormous amount of water that its general surface will be lowered to an appreciable extent. In order to realize how much this lowering will amount to, let us consider that the total terrestrial surface is, in round numbers, 200,000,000s quare miles, of which the ocean occupies three quarters, or 150,000,000. If the estimate given of the Desert of Sahara, 4,000,000 square miles, is correct, it occupies $\frac{1}{38}$ part of the ocean's surface, and, therefore, every foot of depth of water abstracted for the Desert will diminish the ocean $\frac{1}{38}$ part of a foot; and withdrawal of water for a lake 80feet deep would leave the ocean level $80 \times \frac{1}{38}$ or more than two feet lower, which would be plainly perceptible in the many harbors where careful tidal observations are made, and in some cases changes may influence the shipping, robbing as it would do all parts of the world of over two feet depth of water, which would be very bad in those localities where the harbors are shallow.

This much as to an immediate result; but the ultimate consequences would be much more serious. It should be considered that this large inland lake, if once established, would have no fresh water supply, by rivers; but the sea water would certainly rush in through the channel, to make up for the large evaporation, which we way safely set down at 1,200 lbs. of water per year for every square foot. This would lower the level 20 feet per year, which is one quarter of the whole quantity of the lake. This, for a surface of 4,000,000 square miles, or 100,000,000,000,000 square feet, gives 2,000,000,000,000,000 cubic feet of water to be replaced annually from the ocean, or nearly 6,000,000,000,000 cubic feet per day, or 250,000,000,000 cubic feet per hour, or 4,166,666,666 cubic feet per minute, or 69,444,444 cubic feet or 525,000,000 gallons per second. As the German Rhine carries only 1,000,000 gallons of water per second, on an average, the channel bringing the supply to the Desert of Sahara from the ocean would have to carry as much water as is carried by 525 rivers like the Rhine; and from the salt water only pure water would be evaporated, leaving the salt behind. As this amount to 4 per cent, or $\frac{1}{25}$ of the sea water, and as nearly 20 feet deep, or $\frac{1}{4}$ of the water in this new lake, would annually evaporate, it would only take 4 x 25, or 100 years, one single century, for all the water to disappear, and a deposit of salt take its place. Then the now sandy desert would be changed into a desert of salt: which salt would fill the whole basin, and would certainly be a more serious affliction to Algeria than the present sand plain can possibly be.

FRICTION GEAR FOR DRIVING PUMPS.

(See page 172.)

We annex illustrations of a friction gear, especially designed for driving pumps, which have to be stopped and started whilst the engine or shafting continues in motion. In the drawing A is the driving pinion on the line shaft; B is a large friction wheel on an independent shaft carried by bearings in the suspended brackets. The bearings nearest to the friction wheel can be moved horizontally on two T-headed studs by means of the lever as shown, and the adjustable weight on the latter is employed to produce the required amount of friction for driving the pump, and when this is not required the weight is supported by a hook as shown. The driving disc is provided with three holes at different distances from the centre, so that the length of stroke of the pumps can be varied. The advantage of this arrangement over that of driving pumps by ordinary toothed gearing, thrown in and out by a clutch, is that all chance of breaking the gearing is removed, and there is no necessity for reducing the speed of the engine before setting the pumps to work. This arrangement has been devised and extensively introduced by Messrs. H. Hind and Son, Queen's-road, Nottingham.

In an article upon the value of lightning conductors carried up high above buildings, the *Scientific American* recently observed:—We must come to the conclusion that elevated points are desirable as upper terminals of lightning rods; and experience fully verifies this conclusion by practical results. The starlike terminations of some lightning rods are injurious. Faraday proved that a single point discharges and absords electricity faster than a bifurcated or trifurcated terminal; if more points are added, still lower becomes the discharge, by their mutual interference; until at last, when the top is surrounded with an infinite number of points, a ball is practically the result, and the silent discharge ceases altogether. But the upper pointed terminal is not the main part of the lightning rod; because it may be omitted altogether, although it is better to attach it. The main part is the ground connection; and as this is out of sight, it is often shamefully neglected. Much ignorance prevails in this respect also; hence it frequently happens that the electric current leaves the rod, to enter the house and pass off by the gas, water, or sewer pipes; and in its course it sometimes causes considerable damage. A connection with a water course, a well—not a cistern—or at least with the moist ground, is not imperatively necessary. If the soil is silicious and naturally dry, it is best to drive some pointed iron bars into the ground in such places as they are most likely to reach moisture, and connect all their upper ends with the conducting rod. The rule that requires a conducting surface equal to that of the roof to be protected, to be buried in the ground, given by some would-be authorities, has no foundation either in theory or practice. All reported failures of lightning rods may be traced to defective connections, especially ground connections.

Munition of War.—Turkey is reported to have received from the Rhode Island manufactory, within the last two years, 300,000 breach-loading rifles of a similar pattern to the Martini-Henry. The Turkish Government is stated to expect 200,000 more, together with an immense quantity of cartridges. Russia has also received a large supply of improved arms from the United States.

Yankee Protection.—The *Utica Herald* comments intelligently on the facts in regard to the commerce of 1876, set forth the other day by the *New York Tribune*. Speaking about steel rails, the *Herald* says: "These are figures which defy the sophistry and jugglery of David A. Wells and his school of declaimers against the policy of the Government in fostering native industries; we are richer to-day by all the aggregate of capital and machinery represented in the steel rail manufacture of 1876, than we would have been if the Government had reversed its policy at the close of the war; the American steel rail is not only better than the foreign rail, but it is cheaper."

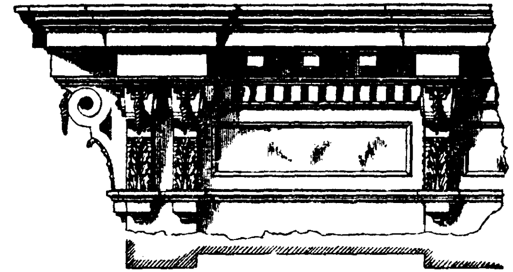
ELEVATION SCOTT BLOCK, ERIE, PA.

SHEET METAL IN ARCHITECTURE.

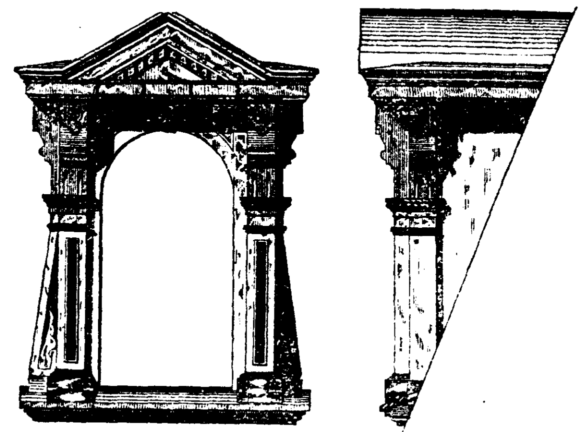
SCOTT BLOCK, ERIE, PA.

This building, of which we present an elevation and details of parts of the sheet-metal finish, is a characteristic example of "trade work" as carried on by the Kittredge Cornice and Ornament Co. The sheet-metal work was put up by Messrs. M. Mayer & Son, of Erie, and for straight lines, close joints, and thorough construction, it is claimed that few jobs of sheet-metal work equal it.

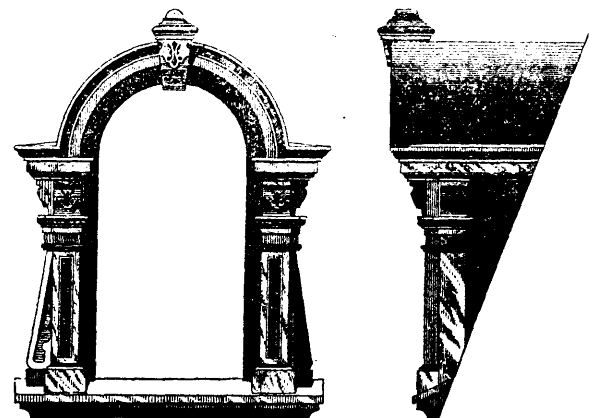
The architects of the structure were Messrs. Porter and Watkins, of Buffalo. The front is of cast-iron. The sheet-metal work commences with the main cornice and includes the dormer windows, balustrade, deck finish and hip moulding. The mansard is covered with slate, and the deck with tin.



MAIN CORNICE.—Scale ¼ inch = one foot.



DORMER WINDOW OVER SIDE ENTRANCE.—Scale ¼ inch = one foot.



DORMERS ON SIDE.—Scale ¼ inch = one foot.

THE FAMILY FRIEND.

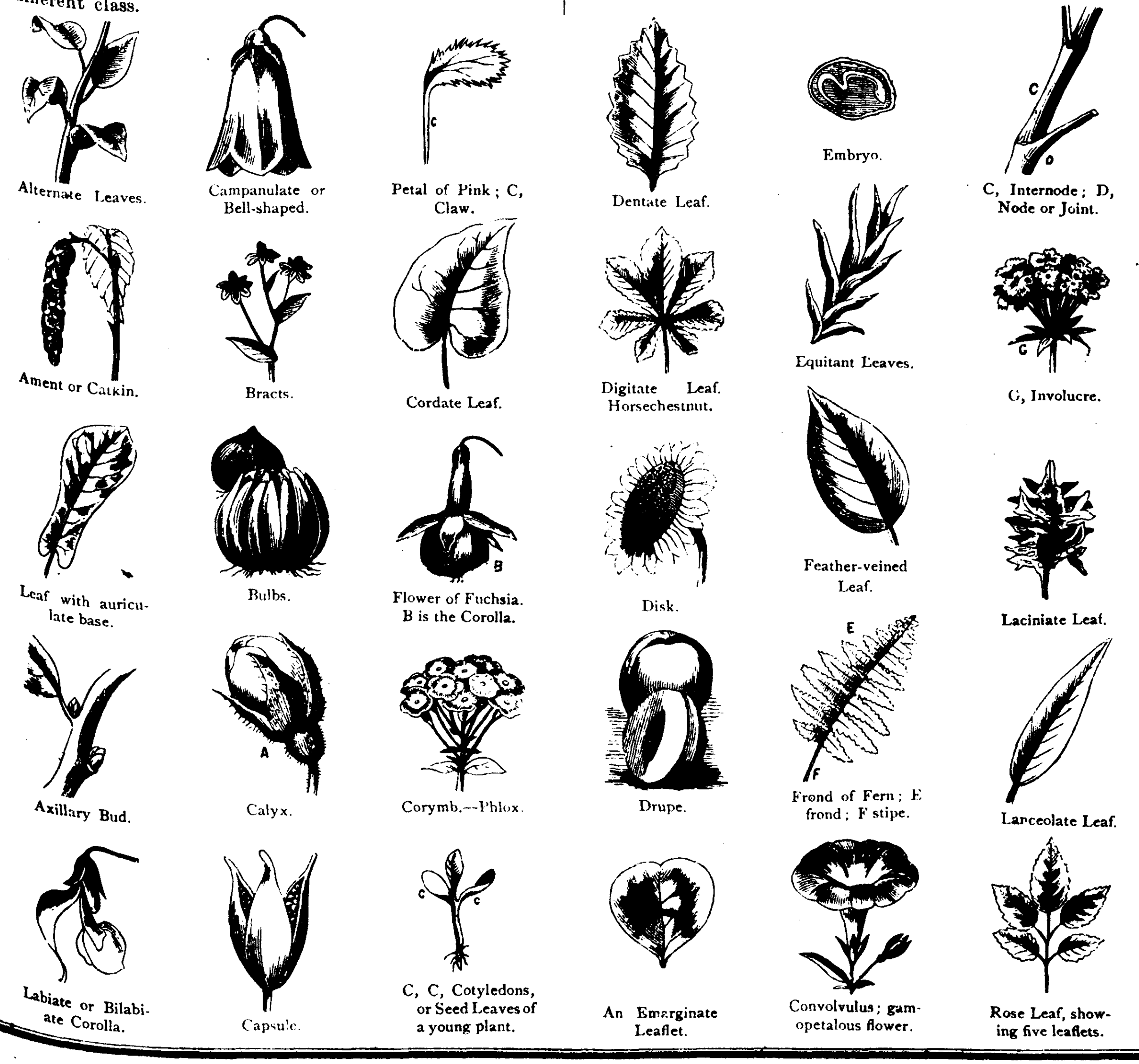
This part of the Magazine, for the future, will be devoted to instructive domestic reading for the *Home Circle*, such as Short Pleasing Stories, Drawing, Music, Botany, Natural History, Popular Games, and amusements for the boys and girls; Needle Work, Amateur Mechanical Pursuits, and all the elements of a *practical domestic education;* also Gardening and Architectural Notes.

A LITTLE KNOWLEDGE OF BOTANY.

(*From Vick's Floral Guide.*)

One of the Poets declared a little knowledge a dangerous thing, not, perhaps, because he believed anything of the kind, but because it made a pleasant and easy rhyme, and this sentiment has been repeated ten thousands of time, and by many who would have been greatly benefitted by even a little knowledge. We do not believe a word of it. Ignorance, and not knowledge, is dangerous, and there are few of us who would not be benefitted by a little knowledge on a good many subjects. Some people are naturally wonderfully wise in their own conceit, and when they have this mental disease badly they seldom gain enough knowledge or wisdom to effect a cure. Such persons gain a little knowledge, are elated, think themselves wonderfully wise, draw rash inferences, jump at conclusions, and expect people to believe their inferences and conclusions as facts; or, they get a good deal of knowledge and do just the same. The only difference is, in the latter case, they attract more attention and from a different class.

No one engaged in the business of life can afford time to obtain a thorough knowledge of the sciences. This is a life work; but all can have such a knowledge of the mere rudiments as will give them an interest in the progress of science, and enable them to understand and enjoy current literature. A little knowledge of Botany, just enough to understand the construction of a flower, the different forms of leaves, and the classification of our common plants, makes a visit to the fields and woods doubly interesting. The possessor of such "little knowledge" holds communion with the wild-flowers and the trees. They tell him their nature and history, and gossip about their relations with perfect freedom. It is almost impossible to describe a flower or plant without using words that will not be understood by those who are entirely ignorant of Botany. We endeavor to make our descriptions as plain as possible; indeed, we try to write so that even the children may know what we mean, and yet, as will be seen by the following communication, the words we use are not always plain, and need interpretation:



Alternate Leaves. Campanulate or Bell-shaped. Petal of Pink; C, Claw. Dentate Leaf. Embryo. C, Internode; D, Node or Joint.

Ament or Catkin. Bracts. Cordate Leaf. Digitate Leaf. Horsechestnut. Equitant Leaves. C, Involucre.

Leaf with auriculate base. Bulbs. Flower of Fuchsia. B is the Corolla. Disk. Feather-veined Leaf. Laciniate Leaf.

Axillary Bud. Calyx. Corymb.—Phlox. Drupe. Frond of Fern; E frond; F stipe. Lanceolate Leaf.

Labiate or Bilabiate Corolla. Capsule. C, C, Cotyledons, or Seed Leaves of a young plant. An Emarginate Leaflet. Convolvulus; gamopetalous flower. Rose Leaf, showing five leaflets.

BOTANICAL GLOSSARY.

REMARKS ON BOTANY.—*Continued.*

"JAMES VICK—*Dear Sir*:—For the past two years I have been an interested reader of your FLORAL GUIDE, and the more I read them the more I realize my ignorance in regard to flowers. You were kind enough last year to give us the pronunciation of many names of flowers, which was a great benefit to at least one of your admirers. Now, I want you to do us another favor, that is, give us the meaning of certain names of plants in plain English. For instance, take the Lilies, with their peculiar names, as *Longiflorium, Lancifolium*, &c., &c. To you, I presume these names are thoroughly understood, but a great many of your patrons are entirely ignorant of them; so, please, educate us children up to a higher standard than we now occupy, won't you? It is possible that you may have given the desired information in some early number, but if you have, your circulation has increased to such an extent that it will be doing your old customers *no harm* to repeat it.—C. W. I., *New York City*.

In accordance with the suggestions not only of the writer of the above, but of many others, we have endeavored to give such a brief explanation of Botanical terms as to be liable to include in a few pages most of the words in general use, and also to make the meaning so plain, by the aid of a few illustrations, that those who run may not only read, but understand, and begin to think that Botany is not a very difficult study after all, and that the words that have looked so formidable are really not so hard as they appeared; and, indeed, are interesting and eminently descriptive. For instance, *Longiflorium* denotes the form of the flower, *long-flowered; Lancifolium* describes the form of the leaf, *lance-leaved—florum* always denoting the flower, and *folium* the foliage or leaves. This being known, the matter is not only simple, but very interesting, and once known can never be forgotten. The ease with which we become familiar with these words will be a surprise to all who give the subject a little attention.

A few of our readers think that we should give common or familiar names, but a moment's thought will show that this would be utterly impossible. Many of our flowers are known by a dozen common names, and only by one of these, perhaps, in any one section of the country. Common names come like nicknames. We always give the popular name of a flower in all cases where it has one sufficiently common to be of any use. The PANSY, for instance, is a *common* name, *Viola tricolor* being its true name, meaning, of course, *Three-colored Violet;* but the name Pansy has become known wherever the English language is spoken, at least, and so we give this name, but it has a dozen other common names not so well known, such as *Heartsease, Violet, Love and Idleness, Johnny-Jump-Up*, &c. The Germans call it *Stepmother*, and the Italians *Mother-and-Daughter-in-Law*. Of course if the name Pansy had not become so common, we could have given only the scientific name.

BOTANICAL GLOSSARY.

ABORTIVE: Imperfectly developed.
ACHENIUM: A small, hard, seed-like fruit.
ACULEATE: Furnished with prickles.
ALA: A wing; plural *alæ*; the side petals of a papilionaceous flower. *See Wing.*
ALATE: Winged; as seeds of the Maple, Elm, &c.
ALTERNATE: Leaves are said to be alternate when they are situated first on one side and then on another of the stem or branch, but not opposite to each other.
AMENT: A scaly spike, as the Willow; a catkin.
ANTHER: The head and essential part of the stamen, containing the pollen.
APETALOUS: Destitute of petals.
AURICULATE: Having lobes or appendages, like the ear, as at the base of some leaves.
AXIL: The angle or upper side between the leaf and stem.
AXILIARY (buds, &c.): Situated in the axil.
BELL-SHAPED: Having a bell-form.
BERRY: A fruit, pulpy or juicy throughout; as the Gooseberry, Cranberry, Tomato, &c.
BILABIATE: Two lipped; as the corolla of the Salvia, &c.
BRACT: A small leaf or scale, from the axil on which a flower or its pedicel proceeds. Bracts in general, are the leaves of an inflorescence more or less different from ordinary leaves.
BRACTLET: A bract on the pedicel or flower-stalk.
BULB: A roundish body produced by a plant either above or below the ground, (usually the latter,) and which is really a bud. It consists of a cluster of partially developed leaves, and as it grows it produces a stem and roots; as the Tulip, Lily, &c.
CALYX: The outer covering or leaf-like envelope of a bud or flower, as shown at A in the engraving.
CAMPAULATE: Bell-shaped.
CAPSULE: Any dry seed vessel or pod which opens by seams in a regular way.
CARPEL: A simple pistil, or one of the parts of a compound pistil.
CATKIN: A scaly, decidious spike of flowers; an ament.
CILIATE: Having the margin furnished with a fringe of hairs or bristles like the eyelashes fringing the eyelids.
CLAW: The narrow base of some petals.
CORDATE: Heart-shaped; as a cordate leaf.

HINTS TO FIREMEN.

The *Mechanical Journal* notes some good points in firing for steam boilers, which, although they may not strike the reader as new, may be of assistance to some amateur stokers: "An engineer should allow his fire to burn gradually when commencing to get up steam from cold water, as, by allowing the fuel to burn very rapidly some parts of the boiler become expanded to their uttermost limits, while other parts are nearly cold. Of course a great deal depends upon the time in which he has to raise his steam. An engineer should regulate his fire at a uniform thickness, and not allow any bare places or accumulations of ashes or dead coals in the corners of the furnace, as these places admit great quantities of cold air into the furnace and render the combustion very imperfect. An engineer should avoid excessive firing as much as possible, as it is attended with more or less danger, because the intense heat repels the water from the surface of the iron and allows the boiler to be burned. He should keep about three inches of anthracite coal and about five inches of soft coal on his fires, but he should regulate the thickness of the fire according to the capacity of the boiler. If the boiler is too small for the engine the fire should be kept thin, the coal supplied in small quantities and distributed evenly over the grate, and the grate kept as free as possible from ashes and cinders; but if the boiler is extra large for the engine, the thickness of the fire makes but little difference. If the fire becomes very low, he should neither poke nor disturb it, as that would have a tendency to put it entirely out; but he should place shavings, sawdust, wood or greasy waste on the bare places, with a thin covering of oil; then, by opening the draft to its full extent, the fire will soon come up. If it should become necessary to burn wood on a coal fire, it is always best to make an opening through the coal to the grate bars, so that the air from the bottom of the furnace can act directly on the wood and increase the combustion. He should give great attention to the regulation of the draft in the furnace, as it is one of the most important parts of an engineer's duties, for in fact it is next in importance to the regulation of the water in the boiler."

A LEGEND ABOUT COFFEE.—There is a legend about coffee, a legend of which a pious Mussulman is the hero. The Mussulman used to get sleepy during his devotions, and so he prayed to Mahomet, who came to his aid. Mahomet set to him for advice to a goat herd, who took a hint from his goats. He observed when these animals ate the berries of a particular tree they got frisky and excited—bounded about all the night, in fact. The Mussulman took the hint, ate the coffee berries, slept less, and, no doubt, prayed better. That was the legend. That coffee however, was sold in the streets of Cairo towards the end of the sixteenth century is not a matter of legend, but of history—in fact, it was not only sold, but it was forbidden to be sold. An Arabian historian recounts that in the year 1538 a *café* was attacked by the authorities, and the customers who came found on the spot hurried off to prison, from which they were not liberated till they had each received seventeen strokes with a stick, *pour ençourager les autres*. And, in fact, this raid served that purpose so excellently that five-and-twenty years afterwards the town of Cairo could boast of more than 2000 shops where coffee might be bought. From Cairo to Constantinople was, in those days, a necessary transition, and the new drink once established in Europe, soon made its way to the West. It is recorded that the first cup of coffee known to have been prepared in France was handed to Louis XIV, to drink. It was a royal beverage in those days: a pound of it cost 5*l*. 16*s*. But this extravagance of price must have abated soon, for not long afterwards several shops were opened for its sale, and in 1647, Thévenot, giving a very select dinner party, offered each of his guests, after their wine, a cup of coffee. —*Cassell's Family Magazine.*

MENTAL INFLUENCES ON HEALTH.

Novice writes to the *Phrenological Journal* as follows: Probably there is no hygienic means that has a greater sanitary influence than that of a cheerful and well-tempered mind; and perhaps nothing exhausts the vital energies and disorders the bodily functions so effectually as a fretful and irritable mentality. Let the passions be our servants, and it is well; but let them be our masters, and they will not only rule, but ruin us. The moral and intellectual faculties have a powerful sustaining and preserving influence over the life forces. All who have ever felt the holy influence of love, and the blighting tendency of hatred, cannot fail to appreciate this part of our subject. The passions should be regulated and controlled. They are not to be abhorred, nor an attempt made to annihilate them. There is no faculty or propensity given us that will not contribute to our good when properly used. The use of every human endowment is good; their abuse is evil. A reasonable exercise of the emotions has a beneficial effect. Fame, wealth and power, may honorably command our aspirations. When such is the case, the exertion of the mind and exercise of the body necessar for their attainment are generally rewarded with energy, spirit and health. Let it be known that the legitimate use of all our powers, whether of body or of mind, is conducive not only to our health, but also to our highest good.

Those who have been blessed with health almost all of their lives may think the regard enjoined here to special precautions and directions is puerile. But if health is maintained, a good of the highest value is secured.

Health is the instrument by which wealth, intellectual culture, and fame are attained; the essential to any positive and beneficial work. Health is the chain that unites us to friends, and makes our companionship a source of pleasure and profit. Health enables us to meet the ills, trials, and disappointments of life with fortitude and serenity; to worry not over the past, but to improve the living present with zeal and earnestness. Health enables us to be useful and happy.

With such incentives to the maintenance of health, surely none but the indifferent would be careless in respect to the enjoyment of those means that are likely to guard them against sickness.

WEARING SPECTACLES.

A writer in *Scribner's Monthly* for April gives an article on this subject, from which we condense the following. His views correspond with the generally received opinions of medical men with regard to this matter: It is currently believed that the use of glasses should be put off as long as possible; that a too early use of them is injurious, and that when once begun it becomes, earlier than it should be, a necessity. As the office of the glass is to supply the refracting power which the eye, through age, can no longer furnish, it is evident that so soon as a need of this artificial power is felt, we should resort to it. By failing to do so, we deprive ourselves of much useful work of the organ, while the work it does is done under a disadvantage, and with greater or less risk. Farsighted persons feel the need of assistance very early—often as early as the 25th or 30th year. When one can no longer read with ease the finest print of a newspaper at a distance of 12 inches, glasses are needed. Inconvenience will first be felt in the use of the eyes in the evening, and for a year or more their use may be confined to work at that time. Under ordinary circumstances the first glasses should be weak—say about No. 60, according to the numbering in this country. Such a number, however, should be selected as will enable one to read the finest print at a distance of 12 inches. A pair of spectacles of clear glass, free from defects, and accurately ground, which in a neat steel frame cost about $3 or less, will do as much as pebbles, for which $25 and even more is asked. For cleansing the lenses, use a piece of old, soft cotton cloth. The case in which glasses are kept should open at the side and not at the end. The rubbing of the lenses against the sides of the case soon mars their transparency.

Bare Neck and Arms.—An eminent physician declared: "I believe that during the twenty-six years I have followed my profession in this city, twenty thousand children have been carried to the cemeteries a sacrifice to the absurd custom of exposing their arms naked." And yet it is said the low-necked fashion is coming again. Do not follow it.

An extensive stalactite cavern, consisting of several galleries, has lately been discovered in the neighborhood of the city of Trieste.

Manufacture of Mirrors.—Until the year 1840 mirrors were made almost exclusively by the use of mercury, the poisonous vapors of which made sad havoc among the workmen. Drayton, an English chemist, was the first to use a coating of silver obtained by a reduction of an ammoniacal solution of the nitrate of silver with easily oxidizable oils. This process was improved upon by various chemists, but only achieved practical value by Petitjean substituting tartaric acid as the reducing agent. The glass to be silvered is placed upon an iron table heated to a temperature of 40° C.; its surface is carefully cleaned and the solution of silver tartaric acid poured thereon. In less than twenty minutes the silver begins to deposit on the glass, and in an hour and a quarter is completed. The surplus material is poured off and the surface is washed with distilled water, dried, and then covered over with a varnish. By this means from 60–75 grams silver suffice to cover an area of one square meter, while 1½ lbs. tin and the same quantity of mercury would be necessitated. The former takes but a few hours for the entire process, while the latter takes more than twelve days. On the contrary, the glasses prepared in this manner have a more yellow color than those backed with mercury; the silver film often looses from the glass, especially when placed under the direct action of the sun; and in spite of the protection afforded by the varnish, is often attacked by sulphureted hydrogen fumes.

Mr. Lenoir has succeeded in overcoming this difficulty. The glass often having the silver deposited as above described is covered with a weak solution of the double cyanide of mercury and potassium. Some of the silver takes the place of the mercury in the cyanide and the displaced mercury forms an amalgam with the silver film on the glass, and forms a backing whiter in color and more adhesive to the glass than the silver alone. Glasses so prepared are free from the yellow hue given by the silver alone and are neither affected by the sunlight or sulphuric fumes. —*Bull. d. l. S. d'Enc. pl' Jud, Nat., per Papier Zig.* ii, 219.

Cold Feet.—Cold feet usually result from unequal circulation. The *Phrenological Journal* gives the following hints for avoiding them:

The feet should be washed in tepid water every day or two; but do not put them into water so hot as to make them tender. In concluding the bath, dip them into quite cold water, which closes the pores naturally, and then wipe and rub them entirely dry and warm.

Wear broad, heavy-soled capacious boots with a loose insole. The foot appears smaller and more genteel in a boot quite large for it than in one in which the compression compels the sides to over-jut the sole and look tight over the instep or toes. Ladies should remember this fact, which is so well known to fashionable shoemakers. A stylish dealer was lately complimented about his small feet and nicely-fitting boots; a compliment which his wife also shared among her lady friends. The secret was they never pinched his feet. He wore number eights, while his wife wore the unpopular size of fives. He could put on a six or his wife a four or perhaps a three. By wearing boots of the form of their feet, of ample size, the boots remained in graceful shape. The gentleman's boots were nearly number nines in length, to lend proportion, and add comfort in walking.

Change your boots often. In use they absorb moisture from within and without, and by frequent change and drying will be much warmer. If you have not two pairs, remove the insoles and dry them thoroughly with the boots each night. The patent-covered cork insole is a nice thing for those who can afford them, if they do not sweat the feet. But the smooth, stiff-leather insole is the best for all people, and one good pair will wear out several pairs of boots.

If your feet sweat easily and then chill from the dampness, wear light cotton stockings with your wool socks over them. Just try this expedient and see how nice and warm your feet feel. Ladies who ride will find a large pair of socks, over shoe and all, a great comfort.

Much success has attended the adoption of steam for moving street cars in Paris. Along the grandest boulevard in the city, and winding through some of its busiest streets, turning sharp angles and climbing and descending perceptible grades, the Merriweather engines draw crowded cars from Arc de Triomphe to the Bastile, a distance of seven miles, at a speed of eight miles an hour, and nobody is hurt, and even the horses see it pass with contemptuous disregard. The engine is noiseless and smokeless. It has proved to be far more economical than horse power, and a large additional number has been ordered.

CHOLES.

LIVINGSTON.

FERGUSON.

LYNCH.

BARRY.

PORTRAITS OF MEMBERS OF THE FIRE BRIGADE WHO WERE CRUSHED TO DEATH AT THE FIRE, ST. URBAIN ST.

MONTREAL.—THE GREAT FIRE OF APRIL 29TH. SCENE ON THE SKINNER LADDER WHEN THREE FIREMEN FOUGHT THEIR WAY DOWN THROUGH A SHEET OF FIRE.

DISEASES SPREAD BY TAILORS.

We read in an English exchange that the other day a delegation from the Amalgamated Society of Tailors waited upon the British government in the person of Under-Secretary Cross. Their object was to lay before him some facts in connection with was called the "sweating system." One of the delegation said he had seen instances in which garments were lying on a bed in which fever patients were suffering. There were a great many instances in which such things had taken place. They considered that if an employer got people to take work home, he should be bound to get the place to which it was taken registered, and hoped Mr. Cross could see his way clear to make it imperative that every house used as a tailor's workshop, should be so registered by the employer. A delegate from Manchester gave the results of visits to 1,000 homes where this work was carried on, and stated that the condition of things was something deplorable. In some cases four or five persons were in a room nine feet by 12 feet. Sometimes people were making these garments in the midst of their domestic arrangements. From the facts that had come under his knowledge, he had no hesitation in saying that the state of things required alteration, and that the people engaged were in a most unhealthy condition. They found somewhere near 1,300 people engaged in this way, and all the surroundings of the place were such as would foster and spread disease. Another delegate said in some instances in London a man and woman would be at work in a small room at the top of a house in which they lived and slept. The poeple occupied in this were so crowded together that the places could not fail to foster and spread disease. While people went to large shops with showy fronts, they did not know that the clothes they purchased were made in close and unhealthy rooms. He knew a case in which, while the body of a child, who had died from small-pox, lay dead on the table, and two other children lay sick with the disease, the man and wife were at work in the same room, which would be sent all over the town. Mr. Cross said he would introduce a bill after Easter to cover the case.

HARLAND'S DOOR-HANDLE.

The chronic liability of door handles to unscrew themselves and become loose, is an old subject of complaint, and, considering the very evident reason why such should take place, it is remarkable that some efficient simple means to prevent the same should not have come into general use. In Harland's "Lock-nut" principle, however, the wearing strain is not left to the handle—which, by being constantly operated upon, eventually unscrews itself—but by the provisions of the invention is shared by the nut, this and the handle being jammed together and acting, as one lever, direct on the spindle. The plan of the handle is shown in the accompanying cut, and from this it may be seen that after the spindle is passed through the lock, the nut is first passed down the thread, close to the door, and the handle follows, the usual "rose" being screwed on the door round the nut for appearance sake. We understand the simplicity in the construction of this handle makes it applicable to any kind of furniture, and one speciality claimed for the patent is that, if by any means the nut is not in the first place screwed tight enough to the door, a grip on the spindle can always be obtained by screwing the handle up to the nut.

Laughter no Proof of a Merry Heart.—That laughter is by no means an unequivocal symptom of a merry heart, there is a remarkable anecdote of Carlini, the drollest buffoon ever known on the Italian stage at Paris. A French physician being consulted by a person who was subject to the most gloomy fits of melancholy, advised his patient to mix in scenes of gaiety, and, particularly, to frequent the Italian theatre; "And," said he, "if Carlini does not dispel your gloomy complaint, your case must be desperate indeed!"—"Alas, sir," replied the patient, "I myself am Carlini, but while I divert all Paris with mirth, and make them almost die with laughter, I am myself actually dying with chagrin and melancholy!" Immoderate laughter, like the immoderate use of strong cordials, gives only a temporary appearance of cheerfulness which is soon terminated by an increased depression of spirits.

Turnip Seed for Indigestion.—A reader of the *Press* writes as follows: I use turnip seed for medicine in case of dyspepsia or indigestion, and find them much better than the mustard seed, commonly used, besides they are much more palatable. They taste something like a nut kernel.

THE DOCTOR'S STORY.

Deacon Rogers, he came to me:
"Wife is agoin' to die," said he.

"Doctors great an' doctors small,
Haven't improved her any at all.

"Physic and blister, powders and pills,
And nothing sure but the doctors' bills!

"Twenty women, with remedies new,
Bother my wife the whole day through.

"Sweet as honey, or bitter as gall—
Poor old woman, she takes 'em all.

"Sour or sweet, whatever they choose;
Poor old woman, she daren't refuse.

"So she pleases whoe'er may call,
An' death is suited the best of all.

"Physic and blister, powder an' pill—
Bound to conquer, and sure to kill!"

Mrs. Rogers lay in her bed,
Bandaged and blistered from foot to head.

Blistered and bandaged from head to toe,
Mrs. Rogers was very low.

Bottle and saucer, spoon and cup,
On the table stood bravely up;

Physics of high and low degree:
Calomel, catnip, boneset tea;

Everything a body could bear,
Excepting light and water and air.

I opened the blinds; the day was bright,
And God gave Mrs. Rogers some light.

I opened the window; the day was fair,
And God gave Mrs. Rogers some air.

Bottle and blisters, powders and pills,
Catnip, boneset, syrups and squills;

Drugs and medicines, high and low,
I threw them as far as I could throw.

"What are you doing?" my patient cried;
"Frightening death," I coolly replied.

"You are crazy!" a visitor said;
I flung a botte at his head.

Deacon Rogers, he came to me;
"Wife is a-gettin' her health," said he.

"I really think she will worry through;
She scolds me just as she used to do.

"All the people have poohed an' slurred—
All the neighbors have had their word;

"'Twere better to perish, some of 'em say,
Than to be cured in such an irregular way."

"Your wife," said I, "had God's good care,
And His remedies, light and water and air.

"All of the doctors, beyond a doubt,
Couldn't have cured Mrs. Rogers without."

The deacon smiled and bowed his head:
"Then your bill is nothing," he said.

"God's be the glory, as you say!
God bless you, doctor! good-day! good-day!"

If ever I doctor that woman again,
I'll give her medicine made by men.

—*Will M. Carleton.*

DR. HEINRICH SCHLIEMANN.

(See page 185.)

In the *Queen* of the 13th and 27th of January we gave an account of Dr. Schliemann's recent discoveries on the site of ancient Mycenæ, which, following so closely on the find of the treasure of Priam, near the Mountain of Hissarlik, where ancient Troy is supposed to have stood, startled the archæologists of the world. We now give the portrait of the great discoverer, and a sketch of his extraordinary career. Dr. Schliemann is the son of a clergyman, and was born in 1822 at Neu-Buckow, in Mecklenburg. When fourteen years old his father apprenticed him to a grocer, and after having served his time he went to America. Here he started as a porter at 100 dollars a year, and when officiating as a lifter learned Italian of a fellow-clerk, teaching him Spanish in return; then he bought a Russian grammar and learned Russian. In 1846 young Schliemann went to Russia to establish an export business, which within four years made him a rich man. The £100,000 he had accumulated he took to California, and increased there his fortune to double this amount. Thus provided with the sinews of war, he set about to realise the dream of his life—that is, to discover the ancient site of Troy. He prepared himself for this task by an earnest study of Hellenic history and archæology; and frequent travels and residence in Syria, Egypt, and Greece during the years from 1856 to 1863. The ultimate result of his labours is known to the world, and the doubts raised by his detractors about the genuineness of the "Treasure of Priam" may now be considered as disposed of. Of the discoveries at Mycenæ the English archæologists will soon be able to judge themselves, as Dr. Schliemann had the principal objects photographed, and intends to bring out a book about them in English, to be published by Mr. Murray. The personal appearance of Dr. Schliemann is described by an old personal friend of his as being about 5ft. 9in. high, rather stout, with a full, round face, and wearing the air and clothes of a successful merchant. There is nothing of a professor about him, and his ordinary look and talk are more that of a business man and banker who has fought his way in the world than of an enthusiast in exploration. Lord and Lady Salisbury while at Athens went with the King to see the treasures from Mycenæ; but Dr. Schliemann could only show them one-twentieth part of the whole, the rest being stowed away, as the Archæological Society had not been able yet to obtain a suitable locality for exhibition

PLANT-SHELVES IN WINDOWS.

(See page 189.)

Those who keep window plants will find that the following plan for attaching shelves to the windows will be useful in many cases, though of course its applicability will depend much on the manner on which the house is built. The movable strip or "stop," which holds the sash in place, is taken out, and in its place is put one an inch thick, and four or five inches wide, or as wide as the window will allow, as shown in fig. 1 by *B*, *B*. There are of course two of these, and in each is a series of grooves or gains as the carpenters say, intended to admit the ends of the shelves. To make this plain, an enlarged portion is shown in figure 2. By rounding the corners of the shelves, those for the largest pots may be six or seven inches wide, while the side strip, which supports them, is only four inches wide. Figure 1 shows a window thus furnished. When the shelves are no longer required, the side-pieces may be taken out and the "stops" returned, and no part of the window-frame will have been marred or injured in any way. Where it is not practicable to remove the "stops" and substitute side-pieces, then the shelves may be supported on brackets, of the form shown in figure 3. Any blacksmith can make these of a piece of nail-rod; they should be furnished with holes for screws, by which they can be attached to the window-frames, and there should also be a hole at *P*, through which to pass from below into the bottom of the shelf, to hold it firm.—We may add that this suggestion of brackets will answer to support a window-box, which is by many window gardeners preferred to pots. Any rough box, of a length to suit the window, and about six inches high and wide, will answer. Have the tin-man make a zinc lining to fit, and high enough to turn over the edge of the box, so that no earth may get between the box and the lining. The outside of the box may be covered to suit the fancy; strips of bark, or split twigs, will give a pleasing rustic effect, or it may be covered with a bit of floor oil-cloth with a molding on the edges. We had once covered a box with oil-cloth of a mechanical pattern, and it had every appearance of an expensive tile-covered box. Recollect that a box of this kind is very heavy when filled, and the brackets and their fastenings must be correspondingly strong.—*American Agriculturist.*

IMPROVED FIRE ESCAPE.

(See page 185.)

We lately noted the necessity existing for some simple and efficient fire escape, which could be rolled in small compass so as to be conveniently stowed in the traveler's satchel or trunk. The invention illustrated in the annexed engravings aims to supply this need. It consists of about a hundred feet or less of wire rope, one end of which is turned up to form a loop which is secured by wire seizings. In this loop, which is lined with leather to prevent chafing, a spring hook is secured. Along the rope, cross-bars or rests lashed with wire, at intervals of about 15 inches. These bars of iron, having a portion of their surface flattened near the centers on one or both sides, are inserted through the strands of the rope (Fig. 2).

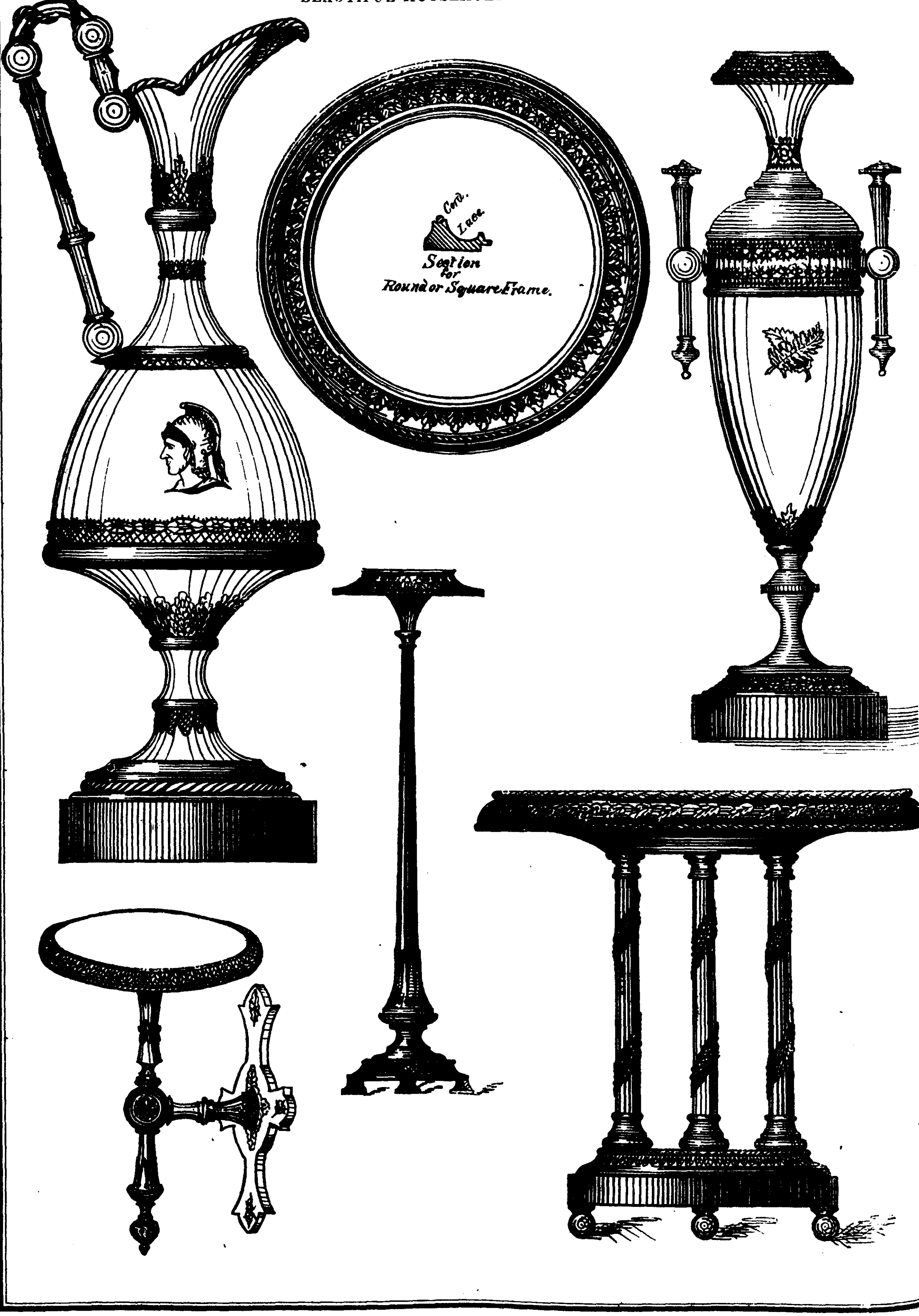
The apparatus can be very quickly got ready for use, as it is only requisite to screw an eye into the woodwork or flooring of the room, attached to snap hook, and lower the escape out of the window, whence it forms a ladder (Fig. 1). The inventor also provides a strap, (Fig.3), which carries a staple to which, after the strap is passed around a trunk, the end of the fire escape rope is attached. The trunk is thus easily lowered; and after reaching the ground, it serves as a means of steadying the ladder. By the same means, women, children, or invalids may be lowered from windows.—*Scientific American.*

The apparatus used for raising one of the heavy iron Atlantic steamers is quite extensive. A correspondent who witnessed the operation writes: Over the entire deck are massive chains, ropes as large as a man's leg, and blocks and falls that seem big and strong enough to move the whole Trasantlantic Company's fleet. This network of chains and cables and blocks and falls resolves itself into five immense hawsers, that lead from the stern and starboard quarter of *L'Amerique* far out into the sea, at the bottom of which they are anchored and held in yet firmer place by other equally large cables, also anchored, which cannot be seen at all. The first of these great hawsers is a 15 inch rope, 206 fathoms in length, and its anchor is made doubly secure by a chain of two and three-eighth inch wire, 15 fathoms long, held by an anchor weighing 4,500 pounds. The second hawser is 200 fathoms long, and is worked by the forward donkey engine. The chain attached to the anchor of this cable drags its own anchor of 4,400 pounds. The third hawser or cable is worked by an after donkey engine, and is 200 fathoms in length and 15 inches in circumference. Bent on above the 4,200-pound anchor that secures this cable is another cable equally large and nearly as long, secured by an anchor weighing two tons. The fourth and fifth cables lead direct from the stern of the steamer, and are each 160 fathoms in length. Each is strengthened by a duplicate of itself, and held by anchors weighing more than 4,000 pounds. The two hawsers leading from the vessel's stern are to pull her straight backward out of the sand she lies in, and the three great cables that are run out from the starboard quarter are to ease her gently outward toward the sea as she is dragged along. At first the cables were all run out one side and anchored, so that they pulled more from the side than the stern, but the high walls of the sand bed in which she has settled were insurmountable. With the present arrangement, the waves that whirl past her stern keep eating out the sand ahead and open a roadway as she moves. In working, all the cables are tightened until they are stiff and straight. They are so flexible and elastic that, with a steady, even strain upon the vessel, they gradually slacken lower and lower, easing the ship along until they sway with their own weight.

Pushing American Business.—A vessel has just sailed from Philadelphia for Italian ports laden with samples of American goods of all descriptions. A special agent will distribute them throughout the kingdom with the view of obtaining orders in competition with European manufacturers. Philadelphia is manifesting a great deal of the commercial spirit which ensures the prosperity of a seaboard community.

Cheap Pig-iron Making.—The wonderful stories that were told early last year as to how cheaply a valuable quality of pig iron could be manufactured in the State of Ohio have been realised by the work of the season. The metal is produced at a cost of only $12 or $13 a ton. They have the iron, limestone, and coal sometimes on the same land, and always near together. Ordinarily the same grade of metal has cost from $17 to $23 to produce. Cheap iron is assured to the United States.—*New York Tribune.*

BEAUTIFUL HOUSEHOLD ORNAMENTS.



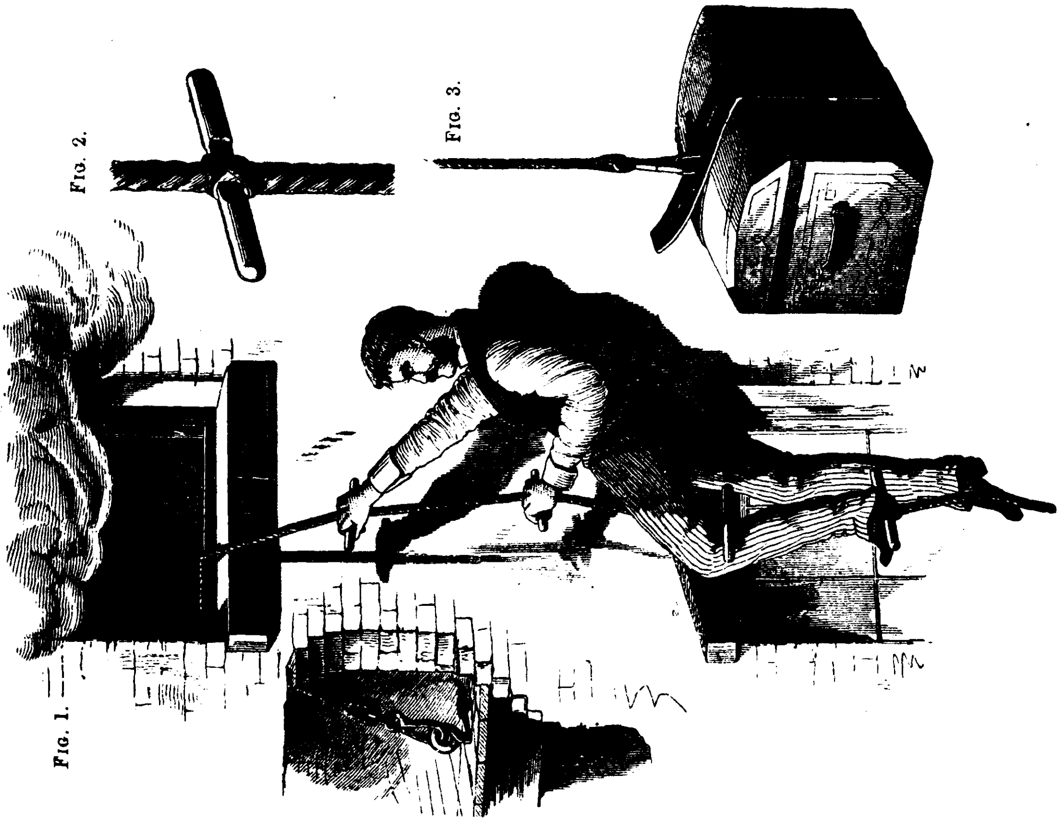


Fig. 1.

Fig. 2.

Fig. 3.

Fire Escape.

Dr. Heinrich Schliemann.

MISCELLANEA

THE GREAT SUSPENSION BRIDGE BETWEEN NEW YORK AND BROOKLYN.--The work of arranging, testing and preparing for the laying of the wires for the main cables is steadily progressing, and is watched with much attention by engineers and others interested in this remarkable work. As a matter for convenient reference, we subjoin the following epitome of principal facts and dimensions:

Construction commenced January 2nd, 1870.
Length of river span, 1,595 feet six inches.
Length of each land span, 930 feet (1,860 feet).
Length of Brooklyn approach, 971 feet.
Length of New York approach, 1,562 feet six inches.
Total length of bridge, 5989 feet.
Width of bridge, 85 feet.
Number of cables, four.
Diameter of each cable, 15½ inches.
Each cable consists of 6,300 parallel (not twisted) steel wires, No. seven guage, closely wrapped to a solid cylinder.
Ultimate strength of each cable, 11,200 tons.
Depth of tower foundation below high water, Brooklyn, 45 feet.
Depth of tower foundation below high water, New York, 78 feet.
Size of towers at high water line, 140x59 feet.
Size of towers at roof course, 136x53 feet.
Total height of towers above high water, 277 feet.
Clear height of bridge in centre of river span above high water, at 50° Fah., 135 feet.
Height of floor at towers above high water, 119 feet three inches.
Grade of roadway, three and one-fourth feet in 100 feet.
Size of anchorages at base, 129x119 feet.
Size of anchorages at top, 117x104 feet.
Weight of each anchor-plate, 23 tons.
Estimated total cost of bridge, exclusive of land acquisition, $9,000,000.
Estimated cost of land, say, $3,500,000.
Total estimated cost, $12,500,000.

FREDERICK THE GREAT AND THE SPARROWS.—Frederick the Great, as is well known, was a great epicure of cherries, but could not obtain them in sufficient quantities from his gardens at Potsdam on account of the depredations committed on them by sparrows. He determined on the utter extirpation of these birds. Sixpence was paid for every couple brought in, and in course of a few months not a sparrow was to be seen for miles around. What was the consequence of this war? The great king not only had no cherries, but no other fruit, the trees were covered with caterpillars, fruitless and nearly leafless. Seeing that he could not violate a law of Nature with impunity, he rescinded the order, and was even compelled to import large numbers of those little cherry fanciers at a great cost.

A CONSCIENCE-STRICKEN SPORTSMAN.—I once killed birds in my wantonness—God forgive me!—merely to test my skill with the rifle. But I received a bitter lesson. While once passing through the woods I carelessly fired at a bird, caring only to discharge my gun, so as to make my next fire sure. I wounded a bird which sat upon the fence. I felt guilt-stricken at once, and tried to catch it. Failing in that, I thought it would be humanity to shoot it. Before I could load my rifle it fluttered across the field, where I followed it, and found the panting sufferer at its nest, and the blood dripping upon its young! My cruelty flashed upon me in all its nakedness, and I cringed under my reflections, like a guilty butcher that I was.—*American paper.*

A CERTAIN bishop in the House of Lords rose to speak, and announced that he should divide what he had to say into twelve parts, when the Duke of Wharton interrupted him, and begged he might be indulged for a few minutes, as he had a story to tell which he could only introduce at that moment. "A drunken fellow was passing by St. Paul's at night, and heard the clock slowly chiming twelve. He counted the strokes, and when it had finished he looked towards the clock and said, "Hang you! Why couldn't you give us all that at once?" " There was an end to the bishop's story.

THE NUMBER OF EGGS IN A HEN.—A German naturalist a short time since instituted some careful investigations, the result of which showed the ovary of a hen contains about 600 embryo-eggs. He also found that some twenty of these are matured the first year, about 120 during the second year, 135 during the third, 114 during the fourth, and during the fifth, sixth, seventh and eighth years the number decreases by twenty annually. Consequently that after the fourth, or at most the fifth year, hens are no longer profitable as layers, unless it may be exceptional instances.

INTERESTING FACTS.—The human brain weighs about 3 lb; that of the whale about 5 lb.; while the elephant's sometimes weighs 10 lb.—The heart propels something like 500,000 tons of blood through its chambers, in the course of an ordinary life.—A man fairly measured is half an inch taller in the morning than at night, owing to the relaxation of the cartilages.—It has been calculated that the human body consumes about a ton and a half of substances during one year.

MUTTON HARRICOT.—Take a loin of mutton, cut it into small chops, season it with ground pepper, allspice and salt, let it stand a night, and then fry it. Have good gravy well seasoned with flour, butter, catsup and pepper, if necessary. Boil turnips and carrots, cut them small, and add to the mutton stewed in the gravy, with the yolks of hard boiled eggs and force meat balls.

MOCK TERRAPIN.—*A supper dish.* Half a calf's liver; seasoned, fry brown. Hash it, not very fine, dust thickly with flour, a teaspoon mixed mustard, as much cayenne pepper as will lie on a half dime; 2 hard eggs, chopped fine, a lump of butter as large as an egg, a tea cup of water. Let boil a minute or two; cold veal will do if liver is not liked.

UNERRING TESTS FOR GOOD FLOUR.—Good flour is white, with a yellowish or straw-colored tint. Squeeze some of the flour in your hand; if good, it will retain the shape given by pressure. Knead a little between your fingers; if it works soft and sticky, it is poor. Throw a little against a dry perpendicular surface; if it fall like powder, it is bad.

FRESH MEAT—TO KEEP A WEEK OR TWO IN SUMMER.—Farmers or others living at a distance from butchers can keep fresh meat very nicely for a week or two, by putting it into sour milk, or butter milk, placing it in a cool cellar. The bone or fat need not be removed. Rinse well when used.

OYSTER SOUP.—To each dozen or dish of oysters put ½ pint of water; milk, 1 gill; butter ½ oz.; powdered crackers to thicken; bring the oysters and water to a boil, then add the other ingredients previously mixed together, and boil from three to five minutes only. Season with pepper and salt to taste.

STAMMERING.—Impediments in the speech may be cured, where there is no mal-formation of the organs of articulation, by perseverance, for three or four months, in the simple remedy of reading aloud, with the teeth closed, for at least two hours in the course of each day.

TOMATO CATSUP.—Boil 1 bushel of tomatoes till they are soft; squeeze them through a fine wire sieve; add 1½ pts. salt, 2 oz. cayenne paper, and five heads of onions, skinned and separated; mix together, and boil till reduced one-half; then bottle.

SOAP WITHOUT LYE OR GREASE.—In a clean pot put ½lb. home-made hard or mush soap, and ½ lb. sal-soda, and 5 pts. of soft water. Boil the mixture 15 minutes, and you will have 5 lbs. good soap for 7½ cents.

BLUING FOR CLOTHES.—Take 1 oz. of soft Prussian blue, powder it, and put in a bottle with one quart of clear rain water, and add ½ oz. of pulverized oxalic acid. A tablespoonful is sufficient for a large washing.

STRAWBERRY SYRUP.—Inclose fresh strawberries in a coarse bag, press out the juice, and to each qt. add 1 pt. water and 6 lbs. white sugar; dissolve by raising it to the boiling point, and strain; bottle and cork hot, and keep in a cool place.

CHEAP VINEGAR.—Mix 25 gals. of warm rain water with 7 gals. molasses and 5 gals. yeast, and let it ferment, you will soon have the best of vinegar, keep adding these articles in these proportions as the stock is sold.

CANDIED LEMON PEEL.—Take lemon peels and boil them in syrup; then take them out and dry.

M. Leverrier has been elected President of the Association Scientifique de France for the fifteenth time. The society spent about £1200 in scientific experiments last year.

Father Secchi has invented a new electric seismograph with moving smoked paper, which indicates the direction, number, intensity, duration of the shocks, and many other details of great value in connection with seismography.

Large Fees for Lawyers.—The St. Louis *Globe* says: "In the Dance will case there are said to be 30 lawyers, and $450,000 to fight over. This is only $15,000 to each lawyer. The Bar Association should protest."

Humboldt observed that in tropical regions the approach of rain is often announced by the twinkling of stars near the zenith. M. Montigny observed the intensity of the twinkling for 300 evenings, and found that it increased if a storm or a barometric depression was approaching. When rain foreboded the glimmer is especially strong.

Experiments have recently been successfully made in Italy on a method of burning petroleum under steam boilers, which consists simply in pouring the oil over a thin layer of asbestos. The petroleum burns with intense heat, while the asbestos, being incumbustible, is not affected, but serves as a means of retaining the oil and acting as a large wick. In the experiments, sheets of paper placed beneath the furnace were not injured, despite the fierce heat from the oil above.

The ironclad frigate Alexandra has a steel wire hawser in lieu of a hemp hawser; it is 150 fathoms long and weighs 1½ tons, and occupies, when coiled, a space 4ft. 6in. by 4ft. 6in. A hemp hawser of the same strength would have to be 19in., and of double the weight of the steel, and would occupy six times the space.

Turkey is reported to have received from the Rhode Island manufactory within the last two years, 300,000, breech-loading rifles of a similar pattern to the Martini-Henry. The Turkish Government is stated to expect 200,000 more, together with an immense quantity of cartridges. Russia has also received a large supply of improved arms from the United States.

The Grand Trunk Railway Directorate, of Canada, proposes to introduce steel cars in which to carry grain. They are to be shorter than the present cars and as much stronger as steel is than wood, which will permit of the grain being loaded higher than at present. The new cars are to weigh six tons instead of ten tons as now, and carry eighteen tons instead of ten. Cars of the new model are being experimented with.

Floating Gardens.—In the beautiful valley of Cashmere, among the Himalayan mountains, lies a lovely lake called Dal. Floating about on its surface, sometimes carried by the winds from one side of the lake to the other, are numerous small islands, on which grow the fairest cucumbers and the most lucious melons known. The way in which these floating gardens are made is very curious. All about the main shores of the lake grow quantities of reeds, sedges and water-lilies. When these grow closely together people cut them from the roots which hold them near the shore. The leaves are then spread over the stems, making a kind of trestlework to support the soil with which it is next to be covered. After this has been done, the seeds are planted, and the floating garden is left to care for itself until the fruits are ready for picking.—*Mines, Metals and Arts*, v, 400.

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

NATURAL HISTORY.

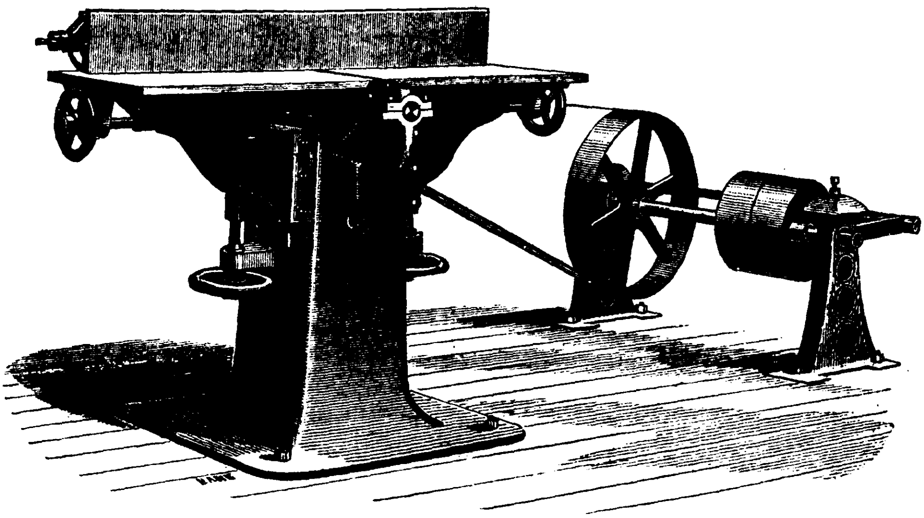
(See page 189.)

THE CUTTLE-FISH

which we give to a canary bird, is often thought by children to be some kind of a dried fish. In the stories it is called Cuttle-fish bone, but it is not properly a bone, but it is really the shell of the cuttle-fish, and when I tell you that the cuttle-fish is not a fish, you will begin to think that the names are very much mixed. The cuttle-fish is closely related to the animals usually called "shell-fish," such as clams, oysters, mussels, and the like; indeed it belongs to a division of these, which have long feeders, or bodies that help them to move about, arranged on their head, hence the class of animals is called *cephalopods*—a rather big word for youngsters—but when you know that it is from the Greek words for *head* and *foot*, and that it describes the peculiar form of these animals, it will perhaps not seem too big a word. These naturalists call the cuttle-fish *Sepia*, and there are thirty or more different kinds found in the sea, in all parts of the world; the portrait of the cuttle-fish here shown will give you a better idea of how they look than a long description. You see that it has a bag-like body, with a sort of wing on each side; the round place near the top is the mouth, and around this are 10 arms or feet, of which two are much longer than the rest, and all have little suckers upon them, which allow the animal to hold very fast to anything it catches, or to a rock if it wishes. The cuttle-fish has a shell to strengthen its soft body, but strange enough, carries it inside; and this shell is what is known as cuttle-fish bone. It is very light indeed, and if you examine it carefully you will see that it is made up of the most delicate little plates of bony matter. The cuttle-fishes walk along on the bottom by their many feet or feelers, and when they swim they go backwards. Their swimming is done in a very droll manner; they take water into their bodies, and send it out in a stream with great force, and thus push themselves, hind foremost, through the water. Another strange thing about them is, that they always carry a bag of ink with them, and when chased by a large fish, they throw out some of this inky matter, and so cloud the water that their enemy can not see them. This coloring matter, dried and made into cakes, is called sepia, and is used in making water-color drawings; it has a fine, rich, brown tint. The cuttle-fish bone of the shops is mostly picked up on the shores of the Mediterranean sea, where it washes ashore from the animals which die, or which are killed by their enemies. The cuttle-bone is put into bird-cages, because the birds like to rub their bills against some such substance, and being, like other shells, mostly composed of lime, it furnishes them with this, which, like all other birds, they need to form the shells to their eggs. The powdered bone is sometimes used for tooth-powder, and it has been used to polish metals. The bone at the right hand of the engraving is about half the usual size; but there is a cuttle-fish in the China seas that has a bone a foot and a half long.—*American Agriculturist.*

Penwipers.—Very pretty penwipers can be made in the shape of butterflies with scraps of silk and satin. Eight pieces of card should be cut into the semblance of wings. These should be covered with silk or satin, firmly sewn over, and then the covered pieces put together and sewn. These four wings must be attached to a piece of black cloth, twisted up to form the body, with a sealing-wax head, and a horsehair put through, touched with a dot of sealing-wax at each end. The butterfly's upper wings should be different to the under ones, and should be raised up a little. The under ones are most effective in plain colours, particularly yellow, and the two upper ones of brocades or fancy silk. The butterfly, when finished, should be sewn on to a cloth circular penwiper. Pretty pincushions may also be made in this way, with the pins put into the edge of the wings. Another easy way of making a penwiper is to cut out a circular piece of red or black cloth about ten inches in diameter, and make a ring of small circles, previously cut out in different coloured cloth. There should be eighteen small circles, and each one should half cover the preceding one, and be notched out round the edge. Any tiny scraps will do, and the effect is excessively bright and pretty. The circles should be about the size of a two-shilling piece, and one should be in the centre, with a smaller one partially covering it, and a small button in the centre as a finish. A tuft of small feathers arranged in a rosette, and gummed with very strong gum on to red or black cloth, looks very well, and is easy to make. Any feathers can be used, and soft white duck ones look well.

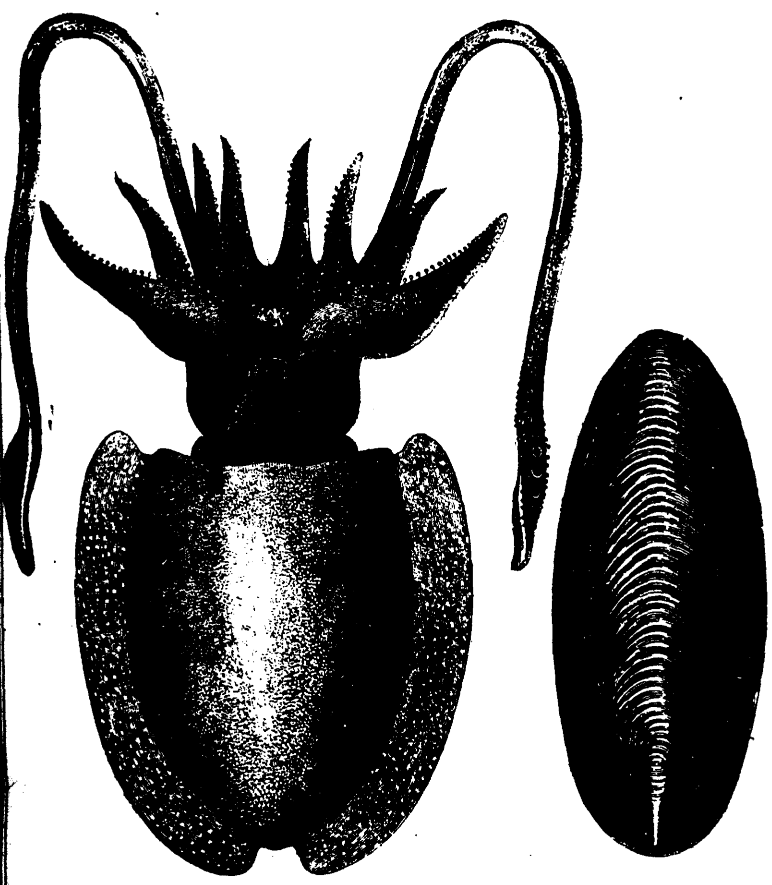
HAND-FEED PLANING MACHINE.



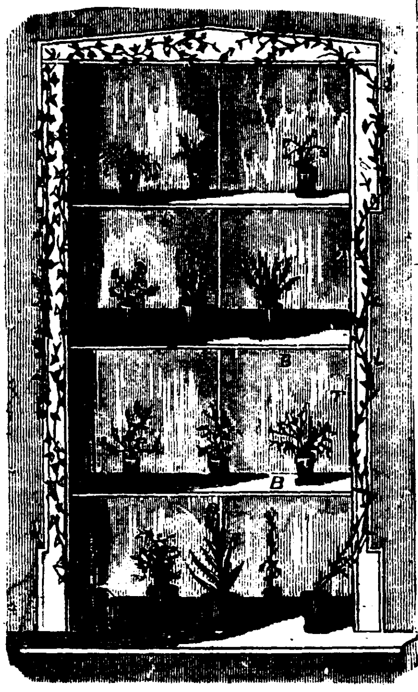
HIGGINS.

PERRY.

PORTRAITS OF MEMBERS OF THE FIRE BRIGADE WHO WERE CRUSHED TO DEATH AT THE FIRE, ST. URBAIN ST.



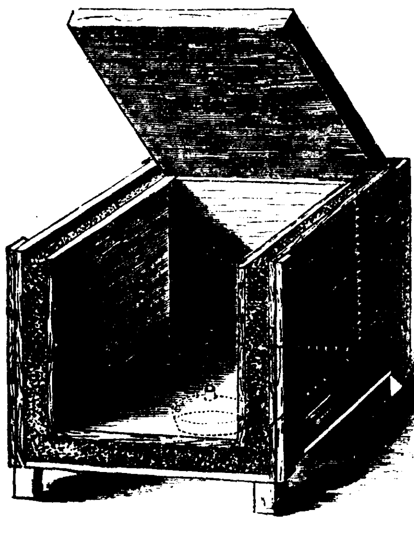
The Cuttle-Fish and Cuttle-Fish Bone.



Window-Shelves for Plants.

A HOME-MADE REFRIGERATOR.

In some cases it is not convenient to procure any of the very excellent refrigerators now made for sale. Then a home-made one may serve a useful purpose. The materials for this, as shown in the annexed illustration, are simply two packing boxes, one of which is smaller than the other, a quantity of powdered charcoal, and a few square feet of hair-felt, such as is used for covering boilers as a non-conductor of heat, or of common oil-cloth. The engraving shows the boxes with the front parts texen away, so that the manner of putting them together may be seen. A few inches (not less than four) in depth of the powdered charcoal is laid on the bottom of the outer box, which should be lined with the felt. Then the inner box, covered on the outside with felt, is placed in the outer box. The space around it is packed tightly with the charcoal up to the top. A strip of tin is nailed so as to cover the charcoal between the bones. The inner box should be lined with sheet zinc or galvanized iron. A hole is bored through the bottom, and a short piece of lead-pipe is fixed to carry off the water from the melted ice. The covers of the boxes are fitted so as to have an air space between them, and felt is tacked on to those to help to keep out the heat. Common oil-cloth will answer in place of the felt, if that cannot be procured. When in use, the ice is placed upon a small wooden rack upon short legs, which raise it an inch or more above the bottom of the box. The ice may be wrapped in a piece of blanket, which will make it last much longer than without it. If needed some rack shelves may be fitted around the box, upon which to place whatever is to be kept cool. The box is set upon four short legs, or blocks, and a pan is kept beneath it to receive the ice water.—*American Agriculturist.*



A Home-made Refrigerator

HOW TO WASH A WOOD-FLOOR.

"Top-dust" can be washed off without great labor. Have the water only moderately warm, especially when the floor is of soft wood, because hot water sinks in so rapidly, and occupies so much more time in drying, than cool water upon wood. Drain the mop pretty well before putting it upon the floor, thus wetting the floor but little. The object is to wipe up the dust as thoroughly as possible, rinsing it off from the mop into the water, and changing the water for cleaner very often. If you put much water upon a very dusty floor, you have a big troublesome mud-puddle to sop up or rinse away. Experiment has convinced me that a floor of pine or basswood looks best after cleaning, if a small amount of water has been put on each portion of it. Use as much water as you please on the whole floor, the more the better, if you wash and wipe only a small portion at a time, and then throw out the dirty water, and begin the next division with clean water. The sooner a soft wood floor dries, the better it looks. I have seen women work very hard to scrub a pine or basswood floor white, and the result has been quite disappointing. They would put a great deal of water upon the floor, and then scrub with a broom hard and long; after this would sweep all of the dirty water out, and rinse the floor with as many waters as they could afford. When at last the well-soaked floor was dry, it was undoubtedly clean, but it looked dark and somewhat weather-beaten, in consequence of remaining wet so long. It is a question of health with me, in winter, to have a floor dry as soon as possible. A little lye in the water has an excellent effect upon floors. It may be poured directly upon decided greasy spots, but the whole floor is whitened with very little hard rubbing, if a small amount of lye is mixed with the water. Too much makes the boards yellow. How much should be used depends upon its strength. Never put lye into the water with which you wash a painted floor, else you gradually but speedily remove the paint with each weaning. If you let an unexperienced hired girl have her own clay with a painted floor, she will probably use her boiling suds upon it, and soon remove nearly all of the best paint. Clean warm water is best for painted floors. If you have a nice hard-wood floor, be thankful, especially if it be of white ask, but never let its spotlessness become dearer to your heart than the family peace. You learn by experiment how much nicer one of these hard floors look, when washed with clean suds, than when washed with the boiling suds of Monday.

Let those who like get down upon their knees, and scrub their floors with brushes and floor-cloths—such work is not for me nor mine, and I consider it pitiful business for any one. I hear of long-handled scrubbing-brushes, and doubtless these are suitable for human beings in the work of floor-cleaning. What I most want is a cheap and easy mop-wringer, for I dislike extremely to put my hands into the mopping water. Of such a wringer I have heard, but have had no experience of its merits.

BATHING: HOW OFTEN, AND WHEN.

Habit has something to do with our supposed necessities in regard to bathing. Some respectable persons never bathe the whole body except in warm weather. Others cannot be comfortable, cannot feel clean, without a daily bath. Those who have a daily bath usually take it on rising from bed in the morning. For this purpose, some use water of any temperature which the season may make most convenient, even taking icy water in winter, and bathing in a cold room. Some who have followed this practice for years, have become convinced that it has wrought much mischief, and that only great robustness of constitution ever enabled them to endure the tax upon their native vigor so long. Most physicians do not advise so frequent bathing, considering a weekly or semi-weekly bath sufficiently frequent for cleanliness. Something depends upon the season or climate, and much depends upon the manner of bathing and the previous condition of the bather. It is an established rule that no general bath should follow very closely upon a meal. The stomach should be allowed to monopolize the first consideration for at least an hour after filling it, during which time no great demand must be made upon brain, muscles, or skin. The stomach, when full, demands more than its usual portion of blood, so that the surface of the body is sometimes made chilly on account of a heavy or difficult meal. When cool water, or much friction, is applied to the skin, an immediate demand for blood is made at the surface of the body, and of course stomach and skin cannot both successfully make these demands at the same time. Sudden death has been known to result from a full bath immediately after eating. I can't help thinking that many little children have suffered from the carelessness or ignorance of their mothers, or nurses, in regard to this rule. I have known more than one mother to bathe and dress her little child immediately after its dinner, just because this time was most convenient. This rule, however, does not apply strinctly to infants while fed wholly on milk. The stomach of a little babe holds but a very small quantity, and this being wholly fluid, does not require a very long period for its digestion. It does not seem necessary to wait more than half an hour after nursing a baby, before giving it its mild little bath, which, of course, is never given in a cold room. If you wait too long, baby sometimes gets very hungry and complains loudly before the dressing is all completed. Physicians sometimes recommend that baths be taken when the body is at its greatest point of vigor, or near noon, but however this may apply to sick persons in respect to their curative baths, it cannot well be obeyed by busy people in their weekly or semi-weekly baths for cleanliness. A housekeeper will usually take her bath on rising in the morning, or when she changes her clothes after the dinner work is done, or when she goes to bed. One should not bathe when much fatigued, but if not especially weary, a bath just before bed is a good thing—not a "tonic" or cold bath, but a good washing with comfortable water, rapidly given if the room is cool; but if possible the room should be warm.

GRAHAM BREAD.

This is an easy and good way to provide loaves of graham bread. When making common white bread, set enough sponge at night to spare a little for a graham loaf next morning. For one common tin-loaf take a little more than a pint of the sponge, add a tablespoonful of sugar, and stir it thick with graham flour. Stir well with a spoon, but do not knead it or it may be too hard and dry. Turn it into the buttered pan, let it rise in a warm place, and bake it slowly for an hour or longer.

Of course several loaves may be made in this way, setting a fine flour sponge at night, and stirring graham flour into the whole. Most people will prefer this to loaves of undiluted graham bread. Unless you put in sugar or molasses, your graham bread made with yeast is not half so sweet as graham gems, especially if these are mixed with sweet milk, either new or skimmed. Many prefer to steam graham loaves for an hour, and finish by baking 20 minutes—to prevent a hard crust.

SOUR MILK AND SODA.

I presume I can say nothing under this head that has not been said before in these columns. But I perceive that there are experienced housekeepers who have yet to learn how to use soda with sour milk. A woman of double my experience told me, not long ago, that she had now got so that she could make sour milk buscuit that her folks would eat. Now she mashed the soda and mixed it with the flour, then stirred in the sour milk or buttermilk. Before this she "put the soda in a cup," but the buscuits were always streaked and spotted. This would not happen, I am sure, if the right quantity of soda was taken, and if the soda was carefully dissolved in water, either warm or cold, stirred quickly and thoroughly into the sour milk, and rapidly beaten up with the flour.

In giving directions to another, I think I should advise a thorough incorporation of the soda with the flour, after both soda and sour milk have been exactly measured. For then the effervescense (or foaming) would all take place in the dough, the gas would raise the flour, and the mass would surely be light. A careless cook will perhaps mix her sour milk and soda together, and while it is foaming and settling again to quiet, she is perhaps getting her flour and hunting up her rolling pin, and of course she doesn't "have good luck" with her biscuit. If she would get everything ready, even the buttered tins, and then measure out a level teaspoonful of soda for each teacupful of sour milk, or a rounding teaspoonful for each pint, then dissolve entirely the soda in a cup by itself, and stirring it quickly into her sour milk or buttermilk (sour of course), pour the whole into the flour before the foaming fairly begins, and work it together quickly—there would be no streaks and no heaviness. But the best thing to do with baking soda, is to avoid its use as far as possible, for accurate measurement is impossible so long as there are varying degrees of sourness in milk, and different sized spoons and cups; and good things, and plenty of them, can be made without any soda.—*American Agriculturist.*

BEAUTIFUL HOUSEHOLD ORNAMENTS.

By Geo. M. Hopkins.

Now that so many artisans and mechanics are unemployed, and so many are anxious to dispose of their time to some profit, or at least legitimate pleasure, I venture to suggest a plan by which several household ornaments may be made, with few tools, and without expense ; and if the directions are faithfully followed, whoever tries will feel well repaid for time and trouble.

A beautiful imitation of the much prized antique bronze vases and urns may be made in the following manner:

Turn a vase of any desired design from well-seasoned maple or other suitable wood. Handles, knobs, rings, pendants, etc., may be turned and added. Give it several coats of black varnish (shellac preferred), rubbing it down with fine sandpaper and for the last time with a well-worn piece. When the grain of the wood is well filled, such places as are to be ornamented with bands of fret, carved or knurled work, are to be fitted with strips of cotton lace or edging. The parts which are to receive this ornamentation are varnished with a thin coating of shellac varnish, and allowed to stand for a few moments, when the cotton lace or edging being pressed on will adhere.

In the centre of the beads, or in the edge of the lim of the article, a groove may be turned and a cord having a well-defined twist fastened therein with shellac. The varnish must now be allowed to dry thoroughly.

A medallion or other fine ornament for the sides may be found in stamped stove ornaments, in brass buttons, or in the so-called sawdust and glue ornaments which are used to adorn furniture, etc. These may be neatly put on or let in, as the case may require.

The lace is now to be well filled by giving it several coats of shellac varnish. When this becomes dry and hard, the whole vase is to receive a coating of quite thin, plain shellac varnish having a sufficient quantity of fine plumbago stirred in to give it a metallic appearance. When this coat is dry, the whole vase is to be polished with fine plumbago, rubbed on dry with a woollen cloth or stiff brush until a fine lustre is obtained. Now coat the article with a lacquer made from plain shellac varnish having in it a considerable quantity of tincture of turmeric and dragon's blood. This gives it a dark bronzed appearance.

Powdered verdigris is mixed with turpentine, and a very small quantity of furniture or turpentine varnish is added (not enough to give the mixture any lustre). This must be brushed into the interstices of the cotton lace and all the creases, and under portions of beads, bands, and ornaments. The verdigris remaining on the projecting portions must be wiped off clean before it can set so as to make it impossible. Should it adhere so as to make it difficult to remove it, a little turpentine may be put on a cloth, and with this it may be readily wiped off. A base-piece to imitate the usual marble base may be turned from wood, and dyed or painted black, and polished in the lathe, and added with good effect.

The subscriber has made ornaments in this manner, which have passed for bronzes under quite close inspection. Very few have recognized the cotton lace even after the article is known to be made from wood.

Among the articles which may be made in this manner are, card-receivers, brackets, match-safes, picture-frames, etc. A host of other articles will suggest themselves, and so also will other plans for ornamentation. For instance: symmetrical paper figures, dried natural leaves, small shells, etc., may be attached and treated in the same manner as the cotton lace. A pleasing variety may be made by using bronze-powders of various shades. —*Scientific American.*

Draining the Zuyder Zee.—Preparations are going on for the commencement of the long-projected work of draining the Zuyder Zee. A dam, 40 kilomètres (24 miles 1,504 yards) long, and 50 mètres broad at its base, is to be carried across the gulf, built up to a height of half a mètre above the ordinary level of high tide. Upon this, pumping machines of 10,000 horse-power will be erected, capable of pumping up from the enclosed sea, and discharging on the outside of the dam 6,500,000 cubic mètres of water daily. Taking the average depth of the water at four mètres and a half, it is estimated that the work of pumping will be completed in about sixteen years from its commencement. The total cost of reclamation is set down at 335,000,000 francs, but, huge as this sum is, the undertaking is confidently looked upon as likely to prove a most remunerative speculation. The success of the scheme will add to the kingdom a new province, 195,300 hectares, or nearly 500,000 acres in extent.

DOMESTIC.

Simple Pudding.—Take ¼lb. of finely-chopped suet, ½lb. of bread crumbs, ¼lb. of moist sugar, and a small quantity of any fruit syrup or dissolved jelly. Mix the dry ingredients, add the syrup, and a little milk if not sufficiently moist. Put the mixture into buttered cups and bake for half an hour, turn them out, and serve with sauce flavoured with fruit syrup or with dissolved fruit jelly.

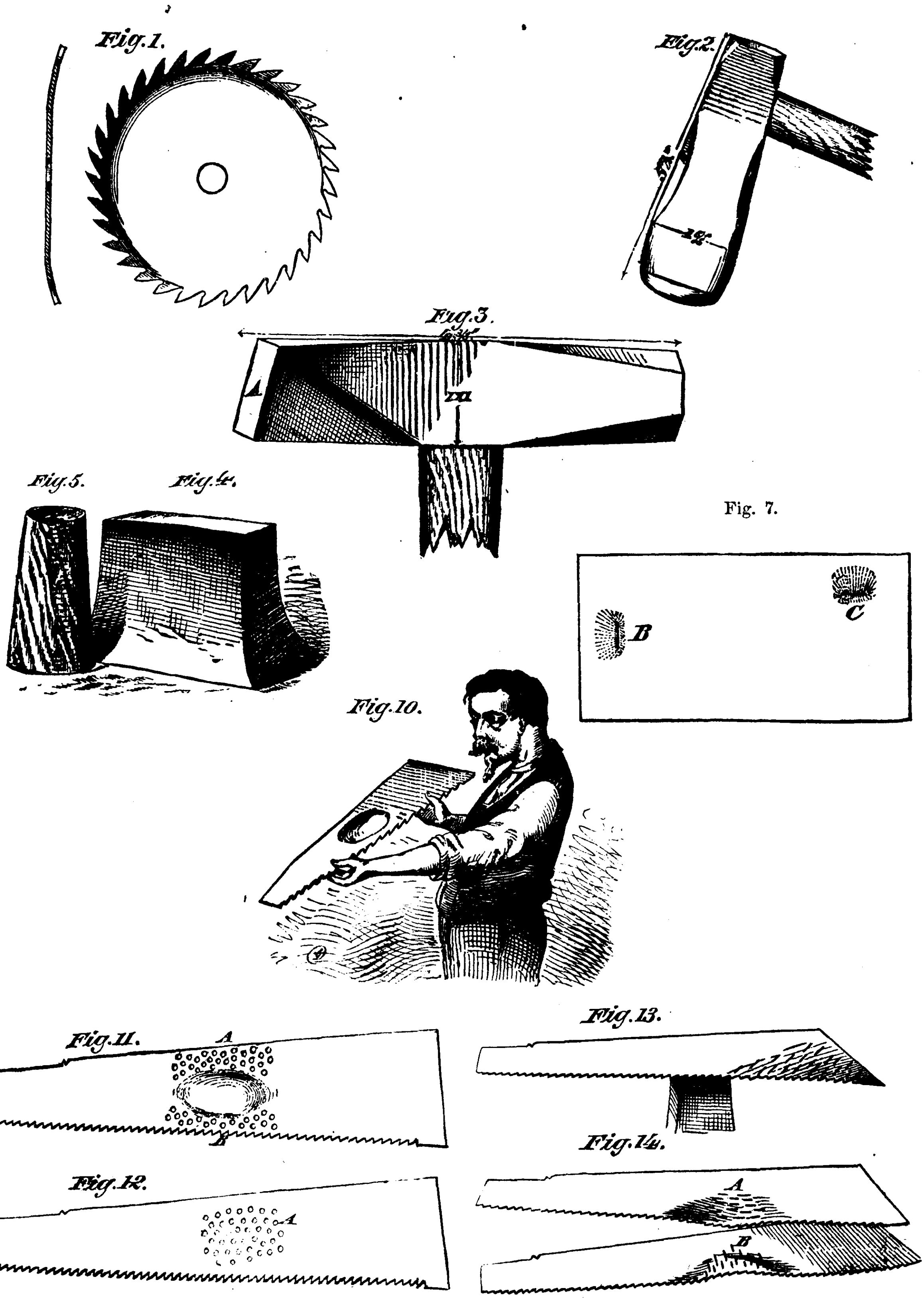
Puddings Made with Dripping.—Make ½ pint of milk hot, and stir into it 2oz. of clarified dripping ; let it cool, and then add 2oz. of powdered sugar, 2oz. of flour, the yolks of three eggs and the white of two (whisked separately), flavour with a little grated lemon peel, and beat the mixture well. Grease some small tins, fill them three parts full, bake half an hour, and serve with sweet sauce. Put a small pot of red currant jelly into a stewpan with a gill of water, boil, and pour round the pudding.

Fruit Pudding (cold).—Put a layer of any kind of fruit (previously stewed with sugar, and allowed to get cold) or jam into a deep glass dish, mix three tablespoonsful of cornflour with a gill of milk, boil one pint of milk with the thin rind of a lemon, and with sugar to taste ; when well flavoured with the lemon, pour the boiling milk through a strainer on to the cornflour, stir, and return it to a saucepan ; boil five minutes, or until it thickens, and when cool enough not to break the glass pour on the fruit, and leave it to get quite cold and set. Ornament according to fancy with jam, preserved fruit, or angelica.

Yeast.—The following recipe is in constant use with good results. Peel three potatoes, boil till quite tender, crush with a fork, add ¾lb. brown sugar, three dessertspoonsful of flour, a teaspoonful of salt ; mix the whole with cold water to the consistence of butter ; next put two quarts of water in a saucepan with two good handfuls of hops, boil for thirty minutes, then add the above mixture, heat again to boiling, take it off and strain into a stone bottle. Let it cool till milk-warm, then add a half-pint of a previous make. In default of this, add a half-pint of brewer's yeast, or a little German yeast mixed with warm water. Allow the stone bottle, with contents, to stand loosely corked in a warm place near the fire till the following morning ; then cork tight, and put away in a cool place. The yeast will keep for a month ; a half-pint is required for each 14lb. of flour ; shake well before using.

Bonne Femme.—Cut up a good-sized onion into very thin rounds, and place these in a saucepan with a good allowance of butter. Take care not to let the onion get brown, and when it is half done throw in two or three handfuls of sorrel, one lettuce, and a small quantity of chervil, all finely cut ; then add pepper, salt, a little nutmeg, and keep stirring until the vegetables are nearly done. Then put in one tablespoonful of pounded loaf sugar, and about half pint of vegetable stock ; boil until the onions are thoroughly done. Meanwhile prepare about a dozen and a half very thin slices of bread about 1in. wide, and 2in. long, taking care that they have a crust along one of their long sides. Dry these slices in the oven. When it is time to send up the soup, first remove the superfluous fat from it, then set it to boil, and when it boils take it off the fire and stir into it the yolks of two or three eggs beaten up with a quarter of a pint of cream or milk. Pour a soup over the slices of bread, and serve in three minutes.

By exposure to the long-continued influence of moist air certain kinds of glass lose their transparency and become covered with opalescent layers, which are easily cracked off. In the collection of ancient relics exhumed at Cyprus by General Di Cesnola, there are abundant examples of glass bottles, cups, vases, &c., which are said to be as brilliantly iridescent as if carved from pearl shell. There is reason to believe that the ancients were in possession of processes for producing iridiated glass, similar to those in use by the glassworkers of China and Burmah. In April of last year specimens of the Chinese glass were sent to M. Clemendot, a noted French chemist, for examination. According to the *Comptes Rendus*, M. Clemendot has in conjunction with M. Frémy, succeeded in reproducing the iridiated glass, and that numerous fine specimens have been exhibited before the French Academy. The process, which is said to be certain in its results, consists simply in submitting ordinary glass for six or seven hours to the action of water containing 15 per cent. of hydrochloric acid at a pressure of from two to three atmospheres and at a temperature of about 248 deg. Fah.



METHOD OF STRAIGHTENING SAWS.