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THE CANADIAN MECHANIC

MAGAZINE

AND
PATENT OFFICE RECORD

Vol 4.

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No. 8.

THE FAMILY FRIEND.

HERETOFORE, we have followed the custom of many American scientific journals, of introducing, indiscriminately, amongst scientific subjects, many articles relating to matters of general interest to every reader, and particularly for the benefit of the home circle. However valuable this information may have proved to actual readers of the MAGAZINE, there has been no outward indication, by its title, that the subjects contained within its pages were of interest to

any other persons than those solely connected with scientific pursuits; whereas, on the contrary, we have endeavoured to fill its pages with a variety of interesting matters of much value to every household. It is, therefore, for this reason that we now add to its present title that of the *Family Friend*, and in lieu of mixing up scientific information with other matters of lighter reading, but of equal importance to the mechanic, we propose classifying our subjects into two parts—one purely scientific and mechanical—the other (half) will be of a lighter character, but not less instructive or useful, as it will be the means, we hope, of creating a taste for literature and science, and for many of those pleasing useful arts, suitable for both sexes, which are so much practised in the mother country and in Europe, and which have tended, in so great a degree, to improve and benefit nations. The subjects of which we shall treat will be found in the remarks on our Prospectus on the back of the cover. We shall therefore, hereafter, commencing with the August number, classify these subjects into two parts, viz.: Scientific and Mechanical—and Popular Family Instruction—16 pages, with illustrations, will be devoted to each section. The first part will be entirely filled with purely SCIENTIFIC, ARCHITECTURAL, and MECHANICAL MATTER. The second part, to FINE ARTS; DRAWING; MUSIC; NATURAL HISTORY; BOTANY; GARDENING; &c. PLEASING AMATEUR MECHANICAL PURSUITS; such as FRET WORK; CARVING and GILDING;

TURNING; PICTURE FRAME MAKING; PLEASING and INSTRUCTIVE TALES; HOUSEHOLD ECONOMY; THE ART of COOKING; GAMES FOR BOYS AND GIRLS, and everything that will tend to render the HOME CIRCLE *cheerful and happy*, and *instruct and elevate the mind*.

In adopting this plan we do not take from the value of the scientific information afforded to our readers, or lessen the number of our superior illustrations—on the contrary, we shall endeavor to condense more important reading into smaller space.

The MAGAZINE, under its present arrangement, is a journal that will be found interesting and valuable to every family, particularly to its younger branches. In its pages they will find a selection of various subjects which would cost many dollars, annually, to obtain, had the valuable works, from which we select it, to be purchased. We have fairly done our part, at a great expense, to improve the MAGAZINE, and we now look for the support of every family who values education, afforded under a pleasing aspect to the younger branches, as the basis of the future happiness and prosperity of its members. It is works like this that sow the seed of knowledge around the family hearth, from which a rich harvest is reaped in future life by parents, in perceiving their boys grow up with manly feelings and cultivated minds. It is from such germs, also, that young girls grow up to be *women* in the true sense of the word. How many a boy and girl in early life has imbibed a taste for some useful and pleasing art or mechanical pursuit, which has been a boon to them thereafter, from having had placed in their hands illustrated and instructive books, instead of frivolous and trashy novels, which only fill the mind with false ideas of life and undermine morality? These kind of books are the very chaff of literature, in which is mixed up the poisonous seeds of weeds, which germinate rapidly in the fertile mind of youth, and if not soon cut down and exterminated, smother up, in their rank growth, the finest feelings of the human heart.

The Public are as much interested in the support of a journal of this kind, from its moral and instructive teaching to their children, as the publishers are to secure patronage for its maintenance. For the small sum of two dollars per annum, we now place within the reach of ALL a MAGAZINE which, we hope, will prove to be the most useful family work ever published in Canada.

THE CENTENNIAL EXHIBITION.

(See page 232.)

In the agricultural hall I discovered a very interesting tool for making fencing which would attract a considerable amount of attention in the machinery hall. Mr. Hall's universal fencing machine is designed principally for producing the rough-and-ready fence invented by the maker. This fence consists of posts placed on the surface—no holes being dug to receive them—in a zig-zag position, and connected by rails screwed into the posts. It is maintained that by placing the posts in this position they afford a mutual support to each other, and no ordinary pressure will upset them; but the machine is equally well adapted for producing ordinary straight fencing. In this country, where machinery is so extensively employed, especially for wood-working, and where great quantities of timber are used for fencing, it is strange that this should be the only fence-making machine we have seen in the Exhibition. The machine consists of a substantial frame of about 8ft. long and 4ft. wide, with three lines of shafting through its length of about 1½ in. in diameter. The posts are first sawn by a circular saw to even lengths of 5ft.; they are then thrown on to an inclined plane on the top of the machine, down which they roll and drop into a sliding carriage, where they are clamped and their level adjusted. The post is then moved up on the carriage against a gang of six augers, 2½ in. diameter, placed at unequal distances apart to suit the required position of the rails; on the shank of each auger is a countersink, and the holes are thus bored and countersunk at one operation. The carriage is withdrawn, and if the post is intended for the zig-zag fence it is turned to a proper angle to receive the other holes by means of a short lever inserted into one of the holes already bored, and furnished with a spirit level set an angle with the lever, which indicates when the post has been turned into the proper position. The boring and countersinking proceeds as before, and the post is completed. On one side of the machine is a circular saw, a reducer, and a header. The saw is used for cutting rails and posts to the desired lengths, and the reducer consists of two conical wheels with knives revolving with great rapidity. This reduces the ends of crooked or mis-shapen rails or sharpens posts for driving. The rail is then placed in the header, a conical shell with knives on the inside; this forms the circular tenon and shoulder. The rail is held while being headed by a sliding cam which prevents it from turning, and is very quickly released. A great saving in the cost of making fencing is effected by the use of this machine.

Messrs. J. A. Fay and Co., of Cincinnati, Ohio, show some of the best wood-working machines in the Exhibition. Many of these tools are at work in England, but doubtless they are not known to all of your readers. Their patent variety wood worker performs a great number of operations, no less than twenty-six varieties of work being shown on a diagram of the capabilities of this tool issued by the makers, but these may be practically reduced to about fifteen different classes. The iron platens are planed perfectly true and have independent vertical and lateral adjustments. The vertical adjustment is very quickly made by means of hand wheels and bevel gear, placed in the most convenient position for the operator. When facing or planing out of wind, the vertical and lateral adjustments can be made simultaneously, thus constantly retaining the proper distance between periphery of cut and the edge of table. All of the different functions of the machine are secured by the use of two tables, while other machines of this kind have three tables, thereby effecting a saving of time in making adjustments. The tables or platens are made with grooves to receive the gaining frame, and are made continuous by hard wood filling pieces connecting the two tables at each side. For sawing, an extra table can be inserted between the other two, making a solid and continuous saw table. The arbor is of steel, of large diameter, and revolves in bearings supported on the column. One bearing is cast solidly to the column, and the other is movable, being planed in a seat, the height of which to the centre of the arbor is equal to one-half the diameter of the large t head to be used. The movable or outside bearing is readily detachable for the purpose of substituting different heads by loosening a bolt at the bottom. This is a very important and advantageous feature, as it gives greater stability to the arbor, and obviating its liability to spring, renders the machine capable of performing a larger range of work. Another very important advantage will be found in the fence, which requires no separate adjustment. Being attached to and forming a part of the forward table, it always maintains its proper position in relation to the knives. The fence has lateral adjustment, is fitted to receive pressure springs for holding down the stuff, and swings

to different angles for beveling work. Each machine is provided with an 8in. three-knife planing head, rabbeting, jointing and capped heads, and is fitted to receive expansion gaining head and paneling heads, and when desired can be fitted on opposite sides with boring and routing table, which has vertical and lateral adjustment to suit the size of the stuff being worked. Of course Messrs. Fay and Co. exhibit a band saw, without which no stand of wood-working machinery would be complete, and the upper wheel is made of steel with india-rubber tire, which, from its lightness and elasticity, reduces the strain upon the saw when starting and stopping. The four-roll planing and matching machine has two important features, one being that the whole of the front portion of the frame, with the feeding rolls, can be swung to one side, and thus give ready access to the cutter heads. The matcher heads can be quickly lowered below the frame by means of two square keys when it is desired to plane only. The beading attachment is placed upon the pressure bar over the under cylinder, so as to gauge the depth of the bead from and by the surface of the board, and secure automatic adjustment of the beading shaft at all times. A double-deck planer is used for thickening or truing on one side only; their universal wood-worker is a moulding machine, with a "Variety" machine, previously described, attached to it, and is a very compact and useful article for performing a great number of operations. The patent band re-sawing machine is provided with a great number of adjustments, the most important being a strut, not shown on cut, which gives outside bearings to the upper and lower wheels. It consists of a hollow rod, furnished with an india-rubber spring buffer at its upper end, and a screw coupling at the centre by which the pressure on the outside bearings can be regulated. The wheels are 5ft. in diameter, and the distance between their centres is such that there is but a comparatively small portion of the saw blade left unsupported, and consequently less liability to deviate from a straight course. The tendency of the saws to "run" has hitherto been a serious drawback in the use of a band saw for re-sawing. The upper wheel revolves on a 2½ in. shaft, running in long self-oiling bearings, has a vertical adjustment of 12in., and can be adjusted so that the saw will run at any desired point on its periphery. The feed rolls are connected by expansion gears, operated by friction. This friction is operated by a shaft connected with a lever in front of the column, by different movements of which the feed is instantly started or stopped, and graduated from fine to coarse. The feed is strong and powerful, and is under complete and immediate control of the operator. The feed rolls are adjusted to and from each other by levers attached to their sliding frames, operated by hand lever rack and pinion. The hand lever is retained in position by ratchet and pawl, and a sufficient pressure can be obtained to take out and warp in the stuff being sawed, and the feed rolls next the column can be fixed as guide rolls in any desired position. The machine is fitted with patent roller guides for the back and sides of the saw, which form a perfect guide for the saw and prevent "buckling." They are always in a true vertical line with each other, and the upper guide has a vertical adjustment to suit different widths of lumber being worked.

The American File Company, of Pawtucket, Rhode Island, and the Nicholson File Company, of Providence, Rhode Island, display beautiful collections of every known variety of file.

Messrs. Hoopes and Townsend, of Philadelphia, exhibit car forgings, bolts, nuts, rivets, and chain-links, of the highest excellence of workmanship, and well arranged, including beautiful nuts, said to be punched cold; also specimens bent and broken to show the quality of the materials. In fact, one of the most important and interesting features of the Exhibition is the large display of manufactured articles and tools, and also samples of castings and forgings, seamless and welded tubes, &c. The castings comprise the largest water main I have ever seen, namely, one for the Croton Aqueduct at New York, 72in. diameter and 12ft. long, exhibited by Messrs. R. D. Wood and Co., of Philadelphia. These articles are nearly all very tastefully arranged, and are interesting to examine and prove the high degree of excellence to which American manufacturers have attained in the production of these articles, which were formerly all procured from England; but a written description could only consist of a bald enumeration of the various goods exhibited, and, therefore, I refrain from sending it; but I think a great many of the English manufacturers who may visit the Exhibition will be interested and surprised at this display.

The Pottstown-Iron Company, whose works are at Montgomery County, show specimens of ore raised from their own mines in Chester County, and fine iron plates 18ft. by 6in. by ½ in.

said to have borne a tensile strain of 45,000 lbs.—20 tons 2 cwt. nearly—per square inch, which were used in the construction of the steamships of the "American" line of steamers running between Philadelphia and Liverpool, and in which the Americans take great pride. The public are, however, attracted to the stand of the Pottstown Iron Company by a very noisy nail-making machine, which turns out about 200 nails per minute, in sizes of 2 in. to 4½ in. long; the most noticeable feature about this machine is an automatic feeding arrangement, which supplies the materials of which the nails are made.

The American ironfounders have long been celebrated for the superior quality of their chilled cast iron wheels for railway and tramway purpose, and I believe most of the English tramway companies find it to their advantage to import the wheels for their cars from America. The exhibition of chilled wheels is a large and interesting one, but it is somewhat singular to find the inventor of the most approved form of this class of wheel has abandoned his original ideas, and adopted a new form, with steel or wrought iron tires. The drawing will explain the new method of construction adopted by Mr. Atwood, of Brooklyn, for securing the tire, by which the use of bolts or rivets, and the shrinking of the tire upon the body of the wheel, are dispensed with. The wheel is composed of the boss of the wheel B, the spokes, C and C², connecting the boss and the rim D, in which are cavities forming a corrugated surface, and the flange F, on which the pins or lugs G G are cast. The tire is made with two cavities, I, I, on its inner surface, forming a corrugated surface, and on the flange side of the tire are holes to receive the projections G G. The form given to the tire A, by the cavities on its inner surface, leaves the thickest part of the tire under the central portion of the tread. When the tire is laid upon the flange, the pins G, G, will enter the holes or sockets H H, which are made a little larger than the pins, so that they should not touch. When the tire is placed on and fitted to the body of the wheel there should be an opening of about ¼ in. at L, between the tire A and the rim D, through which the packing is to be done. A space is left between the tire A and the rim D, forming an annular chamber K, which is larger within than at its orifice L, and this chamber K, is packed with hemp, cotton, or other fibrous material, forming a cushion, sustaining the whole weight of the load upon the wheel. This packing, which fills the cavities I I in the tire A and the cavities E E in the rim D, interlocks and secures the tire to the body of the wheel without the necessity of using bolts or other fastenings, thus doing away with all metallic connection between the tire and the body of the wheel in the line of force of the blows, the pins or projections G G serving the purposes simply of preventing the tire from turning or sliding around upon the central portion or body of the wheel, or, in case of fracture, from flying off. The hemp, cotton, or other fibrous material, moistened with glycerine, is to be inserted into the chamber K, one strand after another, each being consolidated by packing, using mallets and caulking tools, filling the chamber K piece by piece, and driving each one down as long as any can be forced into the aperture. After the chamber K is perfectly filled with the packing, the narrow space L, through which the packing has been done, should be filled with lead or other soft metal to make it water tight. The edge of the tire is then to be turned off, and the dovetail groove N cut into the rim D, into which groove the rim M is to be shrunk. The office of this ring is to prevent the packing from coming out, and to keep it dry. This ring should be turned off to give it a finish.

Another extensive exhibit is made by Messrs. Ferris and Miles, of Philadelphia, comprising steam hammers, punching machines, lathes, slotting machines, drills, and lathes for car and locomotive axles. There are no great peculiarities about any of these tools which call for particular notice. A radial drilling machine has a very neat adjustable feed; a crank handle on the pinion shaft serves to throw the carriage rapidly up or down, or by a screw nut in the handle it can be instantly clamped, by a patent annular clutch, to the worm-wheel on the same shaft, which operates the self-feeder; there is also a hand-wheel for slow motion and hand-feed. The punching machine is driven by gearing. The punches are placed at the extreme front of the machine, which is made very narrow so as not to obstruct the view of the work—with the same object the plunger and guide plates are made of wrought iron, very neat and compact. The die seat is a wrought iron block, dovetailed into the frame of the machine, which projects in front and is cut away and pointed like the horn of an anvil. This arrangement enables the punches to work within 1 inch; it means of any flange or projection, and, therefore, renders these machines applicable for punching many articles that have hitherto been drilled or punched by hand.

The high price of gas and the comparative cheapness of petroleum has led extensively to the adoption of the latter material for lighting small towns and villages; indeed, the substitution of petroleum for gas is not unknown in England in localities where the gas companies have been excessive in their charges. Watkin's patent portable gas attachment does not burn the oil directly, but by the application of a portion of the flame the liquid is converted into gas and burned with a mixture of atmospheric air. The reservoir containing the oil is placed on the upper side of an ordinary street lamp, and has an inclined bottom leading to the discharge pipe to prevent any accumulation of liquid from remaining in the reservoir and becoming unfit for burning. The oil is conveyed from the reservoir through a small pipe carried down the side of the lamp to the tap shown on the cut, of which the following is an explanation:—A, burner tip; B, mixing or gas chamber, having the air holes C; D, conducting tube communicating with tube B; E, generating chamber; F, lighting cup; G, plug or screw; H, shield; I, coupling; J, connecting tube, metallic packed; K, valve or stop cock, which is a screw, and is only closed when screwed down to the bottom, without reference to how the handle stands; L, needle hole. The burner is first heated by burning alcohol in cup F; then valve K is opened by turning once round. The naphtha passes through the packed connecting tube J to the generating chamber E, where it is vaporised, and passes through needle hole L into the mixing chamber B, and is there mixed with the air entering air holes C, ascends tube B, and burns in a flame at tip A, while a portion unable to escape at tip A passes into the down conducting tube D, burns in jets directly under generating chamber E. The shield H protects these jets from the wind, and the upward draught through shield H causes the jets to re-ignite whenever blown out. The packing in tube J regulates the flow of naphtha into the burner, and prevents its return when vaporised; the end with the small hole is always screwed into coupling I. The action of this lamp resembles that of the well-known Rob Roy, or Norwegian cooking lamps, in which the flame is utilised to vaporise the oil. The material used in this lamp is redistilled naphtha of 72 or 74 degrees gravity, one pint giving a light for six hours at a cost of two cents, about one halfpenny, and the reservoirs will hold sufficient oil for fourteen hours. Street lamps are lighted by this means at an annual charge of from 18 dollars to 30 dollars per annum, according to the number of nights and length of time the lamps are lighted. The charge for lighting street lamps with gas varies from 49 to 60 dollars per annum, the price of gas for domestic purposes in Philadelphia being 3.15 dollars per 100ft.

THE BERLIN NATIONAL GALLERY.

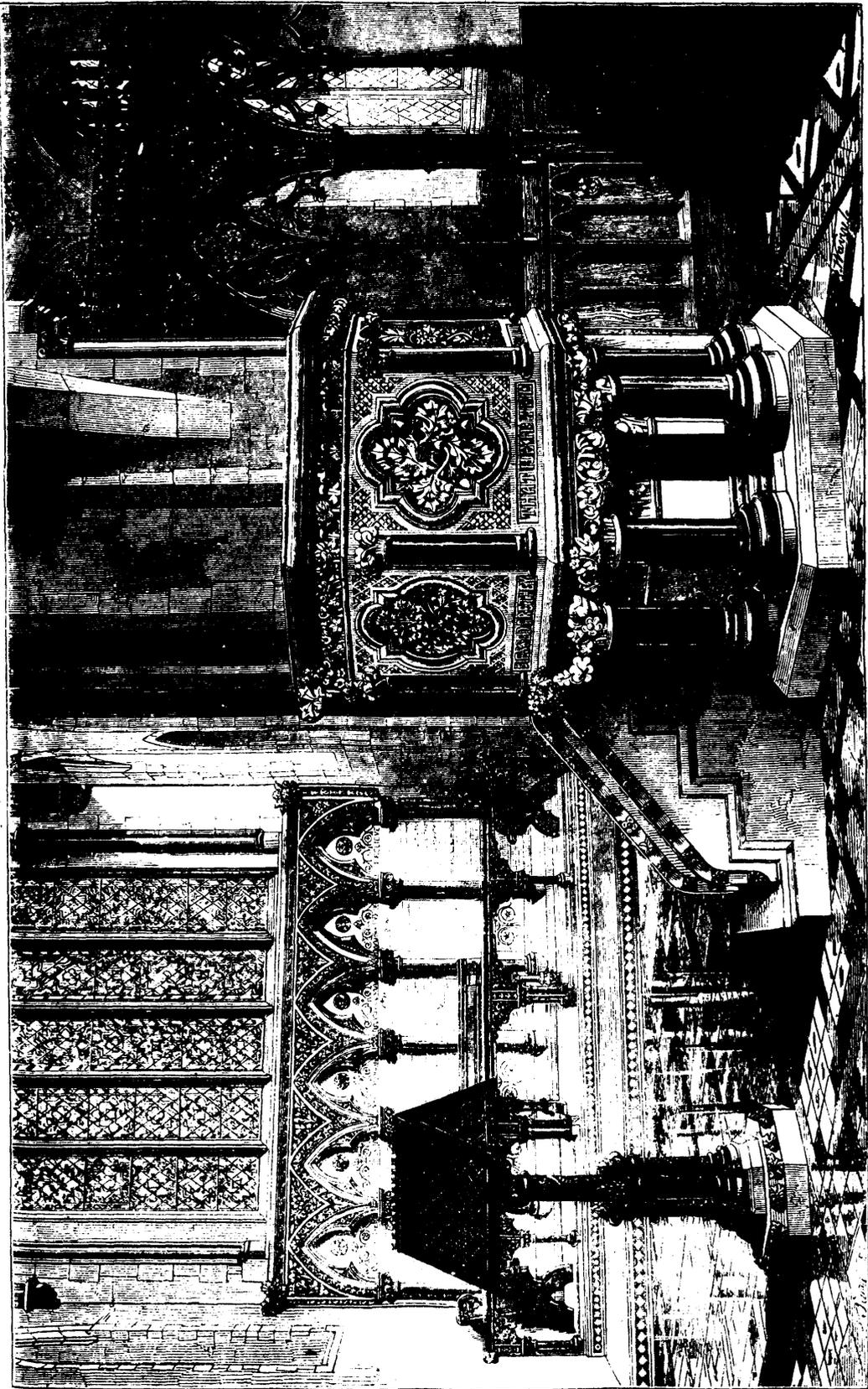
(See page 228.)

The new National Gallery in all its details and considered as a whole may be looked upon as a triumph of German art. Architecture, sculpture, and painting have here contended, and poured out their most beautiful and richest gifts, as if to prove to our own age and to posterity that the German people are not only able to win victories in the field, but are the equals of other nations also in the gentler arts of peace.

The building is a pseudo-peripteros (a structure surrounded by a facing of columns) in the Greek style, Renaissance forms, however, being also introduced. On a basement, 40 ft. high, of grey granite, rise two stories of red sandstone, the roof being supported by fluted Corinthian columns. The principal front, of 100 ft. long, has a portion of columns, and is ornamented by a frieze in relief by Moritz Schulz, on which are represented three-quarter size, figures of the most celebrated German artists. The tympanum of the portico, which is to receive an equestrian statue of Friedrich Wilhelm IV., has been sculptured by Wittig. Flights of steps lead up to the principal front, at the foot of which are two groups by M. Schulz, representing Sculpture and Painting, while at the top are two female figures, the "Purpose of Art," by Calandrelli, and "Creating Sculpture," by Moser. The side fronts of the building, 200 ft. long, are intersected by attached Corinthian columns; these rest upon a sober substructure, and are crowned by a rich entablature, with the names of artists inscribed in large gold letters. A half-round apse, in the same style of architecture as that just described, closes in the building at the rear. The whole building, to provide a proper light for its many rooms, has been set back towards the new Museum, and in the midst of the colonnades either already existing or still to be erected. The space thus created between the latter and the new National Gallery will be made into ornamental grounds, in which marble statuary will be placed.



THE NATIONAL GALLERY, BERLIN.



HOLKHAM CHURCH, NORFOLK.

ATHLETIC SPORTS.

(See page 253.)

Nearly akin to the gymnastics, but at the same time differing in design as well as in general character, are the Athletic Sports so frequent at our colleges and schools in the winter and spring seasons, in England, but so little practised at schools in Canada. Gymnastics may be regarded as simply a series of physical exercises, in which individual training is the sole object sought; athletics are similar exercises in which individuals contend with each other for pre-eminence, and are, therefore, in some degree the test of gymnastic proficiency.

Requesting our readers to bear this distinction in mind, we will give our attention to the exercises which form the subject of competition in athletic amusements. These may be divided into walking, running, leaping, and the throwing of weights; and these, again, may be subdivided under various headings, which we shall have hereafter to notice.

Before describing the character of these exercises as usually seen in athletic sports, we think it necessary to give our readers a little advice as to the training which is generally requisite to enable any one to take part in them with benefit and success. It is true that occasionally a youth may be seen to enter into a public competition of this nature without any previous preparation, and he may acquit himself creditably, or even carry off a prize; but success under such conditions is an exception to the general rule; nor can any one expect to engage in such sports without injury, unless he is already inured in some degree to gymnastic pursuits and fatigues. And the more arduous the character of the performance to be accomplished, the greater and the more careful must be the training which precedes it. An untrained lad, who is used to activity in the field, may possibly show well in a "spurt" of 100 yards; but if he should venture to engage in a mile or two-mile race, his want of condition may tell wofully upon him.

TRAINING.

then, is the first subject to which we must invite our readers' attention.

As soon as you made up your mind to enter into an athletic competition, your first care must be to see that your general health is good, and that you are fit to undergo the previous preparation, as well to take part in the actual contest. A lad at school, who has any doubt about his own health, will do well to consult his friends, who are better acquainted than himself with the character of his constitution, and, perhaps, the amount of fatigue he is fitted to bear. And if, either from his own experience, or as the result of such inquiries, he has the least cause to suspect that he is subject to heart disease or serious local derangement, he has no business whatever to direct his ambition to excellence in athletic sports, or to engage in such competition. Ordinary field amusements will at all times afford him as much physical recreation as is good for him.

If, on the contrary, the aspirant to athletic fame be "sound in wind and limb," he must turn his attention to the bringing of his muscular powers to their highest development. First of all, everything that his own sense tells him is injurious to the general bodily health must be shunned; and everything that is favourable to it must be sedulously cultivated. He must be clean in person, bathing or "tubbing" every morning; he must be regular in his meals, and his diet (of which we shall have more to say presently) must be good and plain; he must retire to rest early, and take a short walk in the morning before breakfast, if he has no set exercises to go through at that time in the training process. He must also take open air exercise, or practice, at other suitable hours of the day.

One of the great objects most persons have to accomplish in training is to get rid of superfluous fat. This is effected partly by abstaining from fatty articles of diet, and substituting in their stead others which help to make muscular tissue; and partly by "sweating," or throwing off the surplusage by perspiration, etc. The diet in such a case, as well as in training generally, should be confined chiefly to roast beef or mutton, pretty well done—for it is a mistake to suppose that half-raw meat is more strengthening than the same well cooked. Veal and pork must be avoided, but a little fish or poultry may be taken as a change. Vegetables must be eaten sparingly—although a little green-meat assists digestion—and their place must be partly taken by stale white bread. Pastry must be shunned, but the cooked fruit of pies and puddings may be eaten; the use of butter must be restricted, and sugar, if possible, dispensed with. The drinks should be tea in preference to coffee at breakfast, etc., and sound table-beer or porter in moderation at dinner, if the person training is accustomed to stimulating drinks. A glass or two of wine a day is

permitted, if it has been the practice to take it. But the plainest food and drink are frequently the best. Thus, oatmeal porridge is an excellent thing for training purposes, either at breakfast or supper.

Attention to those ordinary rules of training diet will suffice for general purposes. We do not anticipate that any of our readers will require more than instruction as to what is best to be done in preparing for competition in such athletic performances as those which are common between school and school. To any who may read these lines, and require for more arduous and ambitious tasks, we must recommend the perusal of the details contained in one or other of the existing treatises by standard authorities on the subject.

We apply the same remark to the subject of "sweating," which is intended, not only to reduce weight, but to free the muscles of the fatty tissues which may immediately surround them, and consequently to give them greater ease and freedom in their play. Sweating is usually accomplished by putting on extra clothing, and either walking fast or running slowly until the body is in a profuse perspiration. When the exercise is over, the body should be sponged with warm or tepid water—first the upper portion, then the lower, so as not to strip entirely while it is in a heated state—and well dried with a rough towel. Young men engaged in the great public competitions place themselves under the care of a trainer, by whose advice they are entirely controlled as to the amount and character of their "sweating" exercises, as well as all other matters affecting their general condition. The youth who has to train himself must exercise his own discretion, occasionally guided by the advice of friends, as to the exact degree either of restriction or fatigue which he should place upon himself—always remembering that he must stop short of the point where the feeling of downright exhaustion approaches. The Turkish bath is sometimes used as an excellent auxiliary for sweating purposes; and the drinking of from half a pint to a pint of water early in the morning, before breakfast, is recommended by high medical authority as a valuable aid in the reduction of weight and fat.

The object of this general training is to get the body into good healthy condition, and success is evidenced by a fresh-coloured, elastic condition of the skin; by the muscles standing out hard and firm; and by light and vigorous feelings both in body and mind. But beyond this there is of course necessary a special training for the performance which has eventually to be accomplished. This special training will be best treated of at the same time as the subject to which it relates; and we shall, therefore, now pass on to the first and simplest of athletic sports, namely,

WALKING.

Nothing, it may be thought, is easier than to walk; and this is true; but to walk well in an athletic sense is a science. It includes two objects of practice—style and speed. As regards style, the first thing is position, which should be with the head erect, the shoulders set back, and the chest thrown forward, the arms well up, with the elbows bent, and moving freely in keeping with the action of the legs. In quick walking, the motion of the arms is more vigorous, and assist the walker at each stride by helping to raise the weight of the body off the heels. The body must not be inclined forward, as in the running, and the knees must be kept straight. The contrary practice is inimical to fair "toe and heel walking, which is the next thing to be studied. At each step the heel must touch the ground, being dug into it, as it were, and then the ball of the foot; but neither the heel nor the toes should remain on the earth for a perceptible space of time, and one foot should always be upon the ground. Unless both the toe and heel touch the ground fairly, the competitor in a walking contest is disqualified, and at once loses his chance of a prize. The stride should be as long as can be practised with facility, and should be accompanied by a corresponding forward movement of the shoulder. Bending the knees too much is sure to lead to "lifting," or unfair walking, and the competitor must be especially on his guard against it when pressed in the race.

Speed is acquired by practising certain short distances, day after day, at the best pace you can command, and gradually increasing the length of the task until you reach the full limit of that which you have eventually to accomplish. In general practice, however, you must carefully avoid over-fatigue, for it is better to do a short distance well, and without excessive exertion, than to try a long spell, at the end of which you are thoroughly exhausted. You will be able to do more as you go on. After the distance has been gradually increased, as before mentioned, you should, a few days before the race, do the entire distance at top speed, not

only as a preliminary practice, but also that you may take an accurate measure of your own pace and powers of endurance. But the three or four days immediately preceding the race should be passed with less severe exertion, as you want a reserve of power to put forth in the actual contest.

As to the race itself, a good deal depends upon the start, which should be made with alacrity at the instant the signal is given, and at the best pace in your power. But do not, in your eagerness to get off well, allow yourself to attempt to gain an unfair advantage of your companions by anticipating the proper signal in your movements. The anxiety and the dodging to start before the rest, sometimes witnessed in such competitions, are in the highest degree unseemly; and it is better to lose a race, after contesting it fairly and honourably from beginning to end, than to win one by such discreditable manoeuvres, should they be so successful as to escape the punishment of disqualification.

If you have lead at first, strive all you can to retain it, for competitors are often discouraged by the fact that some one is going well ahead of them. If you find, in the course of a long race, that there is a sufficient distance between you and the nearest man behind you, ease your pace somewhat, thus relaxing the strain on your powers to recruit them for a fresh effort, but putting on another spurt if you think your competitor draws too near.

If you are behind at starting, use your best speed with a steady determination to overhaul your opponents, and if the race is of any considerable distance you will probably have ample opportunity to do so. Especially press forward when there are signs of flagging in those who are on in front; to pass one or two of them will give you fresh spirits and vigour; and the idea that a man is coming up well and vigorously behind them will perhaps discourage those still in advance.

The usual distances for walking races are from one to four miles. One mile has been done in 7 minutes; two miles, in 15½ minutes; four miles, in 31½—all by young amateurs.

RUNNING.

The special training for running must be similar in its nature to that recommended for walking contests, with the exception that if a long race is before you it is not necessary to put forth the powers for the same distance in the preliminary practice. Their highest efforts must be reserved for the race itself; but shorter distances, such as an occasional mile or half mile, at full speed, may be practised with advantage. It must be remembered, too, that walking is itself a good preparation for running contests, as it strengthens and develops the same muscles of the body. Quick walking and slow running, with an occasional "spurt" at the best pace, will, therefore, suffice to bring you up to the proper pitch for a long race.

If, however, the running is to be in what is called a "sprint" race—i.e., any distance from 100 to 400 yards—the whole distance should occasionally be practised at full speed; and it is also well to practise starting at top speed, as a great deal depends on this—even more than in the case of walking.

The best positions in running are given in our illustrations (Figs. 1 and 2), which show each side of the figure, and the alternate advance of the right, and the left limbs respectively. As the right leg is advanced, the left arm is thrown forward, and then brought back, while a similar movement of the right arm accompanies the motion of the left leg. The arms are kept more close to the sides than in walking; the body is inclined forward, the knees are well bent, the weight of the body is thrown upon the balls of the feet, and the forward impulse is from the toes. Running is, in fact, a succession of *leaps*; while walking is, or should be, a series of *steps* only.

"Sprint" races are very common in athletic sports; but a mile is a frequent distance, and from two to four or more miles are not unusual. The following times are on record as the performances of amateurs:—One hundred yards, 10 sec.; two hundred yards, 20 sec.; quarter a mile, 50 sec.; half mile, 2 min.; one mile, 4 min. 20 sec.; two miles, 10 min.; three miles, 15 min.; four miles, 21 minutes. But these performances are exceptional, being the authenticated times of some of the best athletes who have engaged in University and other amateur competitions. The young and untrained amateur must expect, in his early attempts, to fall considerably short of such performances.

—Cassell's Popular Educator.

LIGHTNING WITHOUT THUNDER.—Summer evening lightning, or, as it is frequently called, "sheet lightning," is the aerially-reflected (or, more properly, refracted) light of the flashes of a distant thunderstorm, too far away for the direct flash or even the clouds to be seen, or the thunder to be heard. Thunder is, indeed, seldom heard at a greater distance than 10 miles.

CHROMIUM GLUE AND ITS APPLICATIONS.

This consists of a tolerably concentrated solution of gelatine, to which has been added for every five parts of gelatine one part of chromate of lime in solution. This mixture has the property, on exposure to light, of becoming insoluble in water, a result due to the partial reduction of the chromic acid to a lower degree of oxidation; this property has already been utilized to a considerable extent in several of the recent processes for photo-lithography and photo-engraving.

Schwarz proposes this combination as a cement for glass vessels which have been broken. The surface of the vessel to be cemented are coated as uniformly as possible with the freshly prepared glue, and are then pressed firmly together and held in this position by means of thread. The vessel is then exposed to the light for several hours, at the expiration of which time the operation is complete.

Boiling water does not cause the article thus repaired to separate, having no effect upon the new combination, and the joint is hardly perceptible. Valuable vases or other articles, instead of being disfigured by the ordinary mastic cement, should be mended by this process. It has been suggested that microscopic slides may be finished with this material, with advantage over the ordinary asphaltum varnish.

Chromium glue may be also utilized in the manufacture of waterproof cloth and paper impenetrable to moisture. The fabric to be treated should be stretched upon a frame and immersed two or three times in the preparation, and exposed to the sun. Damp proof paper may be prepared by simply brushing over the surface with a thin solution prepared as above.

A singular application of this combination of glue and chromium was made during the Franco-German war in 1870. At that time the well known pea sausage, one of the most important articles of food used in the German army, was prepared daily in many thousands of skins. The preparation of the interior portion caused little difficulty, but so many skins were not easily supplied. As the supply fell short a substitute was sought in parchment paper—prepared by dipping, for a short time, blotting paper in sulphuric acid, then washing and drying it. This paper was used for the fabrication of sausage skins by doubling the sheet into the form of a cylinder and pasting the edges. But no glue or gum can resist the effect of boiling water in which the sausage has to be cooked, and so the artistic sausage skin fell asunder. Dr. Jacobsen suggested the use of chromium glue as a cement; the gelatine intended for the sausage skins was mixed with a minute portion of bichromate of potassium, and the part cemented exposed for a short time to the sun. The experiment succeeded perfectly, for the artificial skins endured boiling water exceedingly well. The number of sausage skins prepared in this way by the chemical operation of light amounted to many hundred thousands. *The Laboratory.*

HOLKHAM CHURCH, NORFOLK.

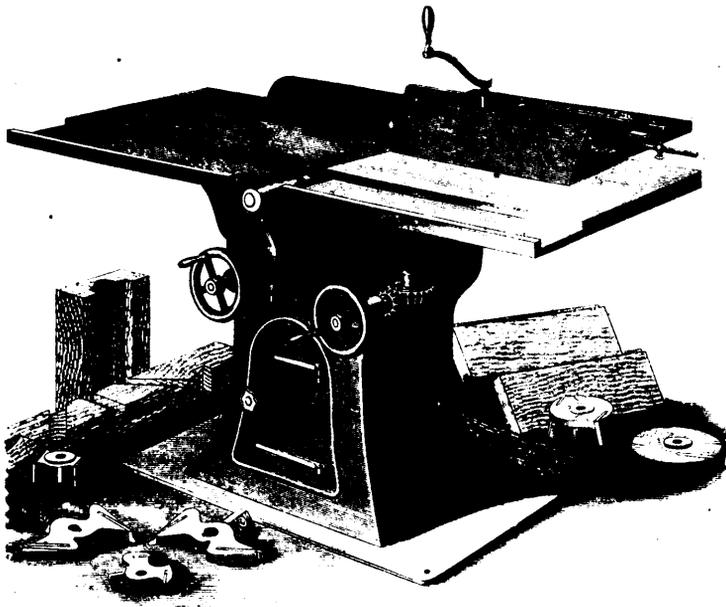
(See page 229.)

This church, of which our illustration represents the pulpit, lectern, screens, and other fittings, has been lately restored by the Right Honourable the Earl of Leicester.

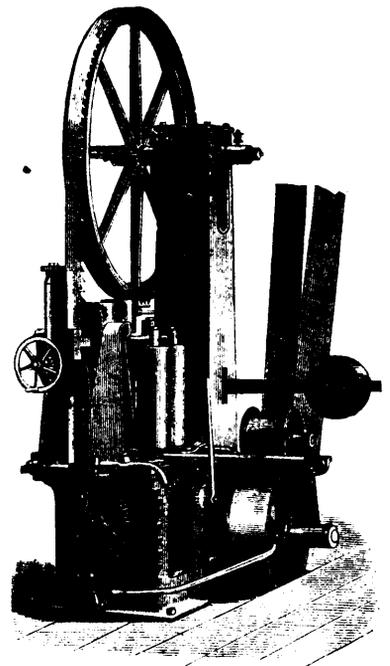
The seating, which is all open, is of oak with carved backs and bench-ends, with arm-rests. The plain surfaces of the bench-ends are panelled and enriched with carved foliage, arranged from nature, every panel throughout the seating being different. The reading-desk is of a similar character to the seating, having carvings of wheat and tares on one side, and barley and vetches on the other, with an admixture of flowers, such as the poppy and corn cockle, and harvest mice. The lectern is of carved oak, with a cluster of four carved columns forming the base. The pulpit is of Caen stone, with carved panels containing the oak, ivy, maple, and haw-thorn; and insects, such as butterflies, caterpillars, &c. Below the panels is an inscription, "Blessed are they that hear the Word of God and keep it." The angles of the pulpit are enriched by polished red granite shafts, and the whole is supported on a cluster of polished red granite shafts, with boldly-sculptured capitals. The reredos consists of an arcade with red granite shafts, carved capitals, and foliated spandrels. The flooring is laid with Maw's tiles.

THE operative labourers employed throughout the building trade of the country, and who number nearly 200,000 workmen, have, we hear, decided to federate the whole of the existing district and local unions into one National Association. There is to be a congress of delegates in London in August.

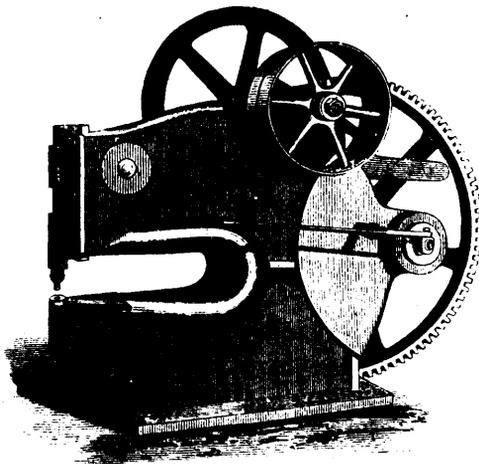
THE PHILADELPHIA EXHIBITION.—WOOD-WORKING MACHINERY AND RAILWAY WHEELS.



J. A. FAY AND CO. PATENT VARIETY WOOD-WORKER



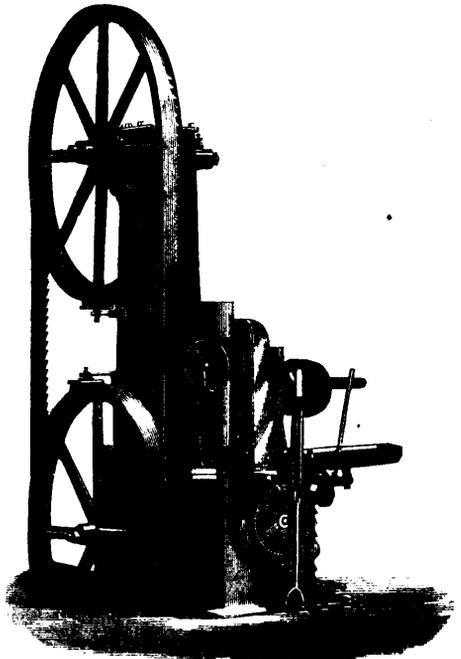
J. A. FAY AND CO.'S HAND SAWING MACHINE (FRONT SIDE)



FERRIS AND MILES POWER PRESS



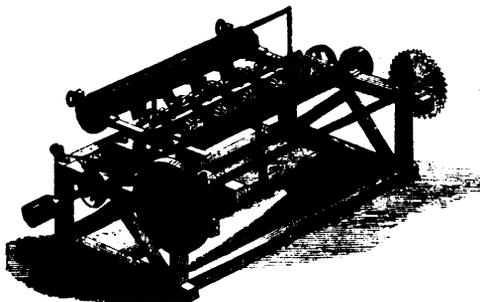
HAMILTON'S STEELED CAR WHEELS



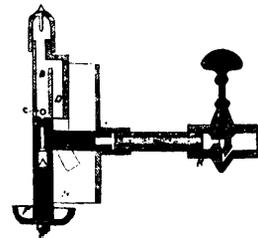
J. A. FAY AND CO.'S HAND SAWING MACHINE (BACK SIDE)



ATTWOOD'S RAILWAY WHEEL

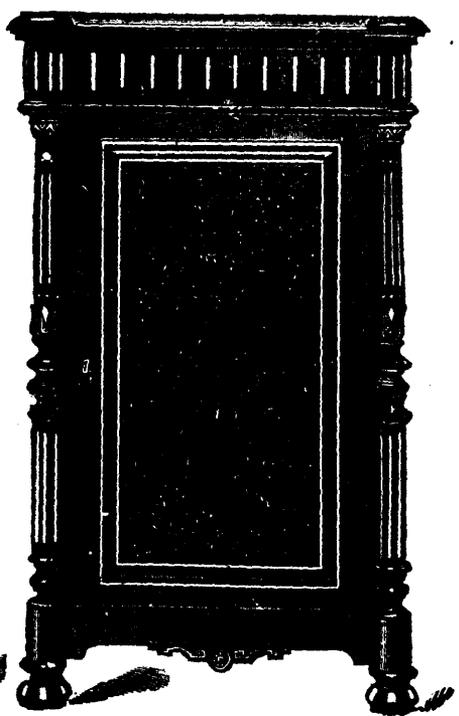
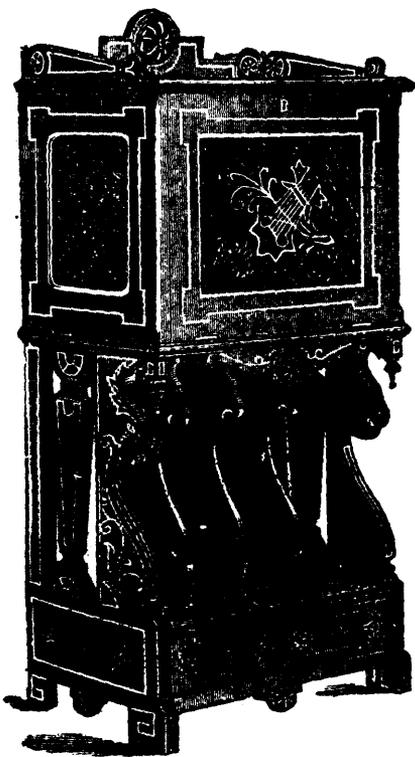
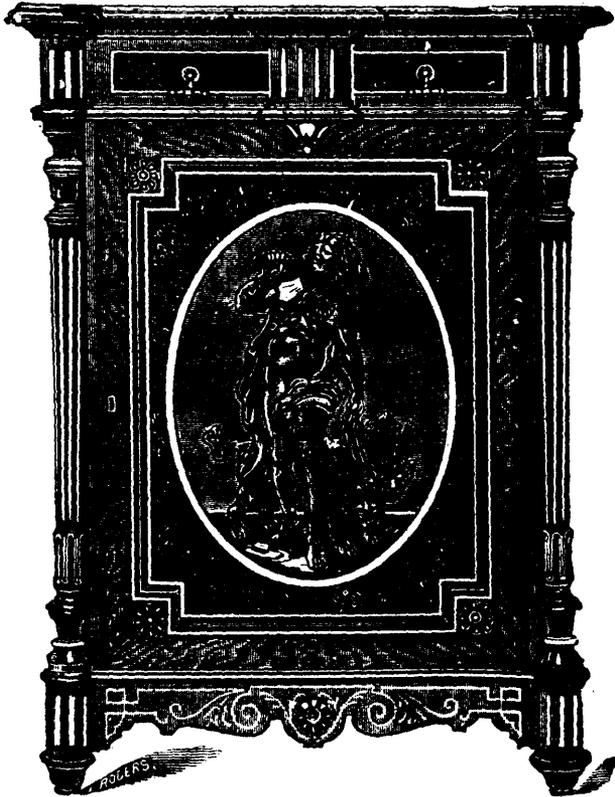


HALL'S UNIVERSAL FENCING MACHINE



WATKIN'S GAS-BURNER

FANCY CABINET WARE.



GOVERNMENT PROVISION FOR MECHANICS AT THE CENTENNIAL.

We learn that a bill has been introduced in the House of Representatives, directing the President to appoint six skilled mechanics for each Congressional district, "whose duty it will be to attend the Centennial International Exposition at Philadelphia, carefully study the arts, industries, and products there exhibited, and make full report in writing of all that, in their judgment, is important and useful to the practical and scientific industries of this country." It is further provided that they shall be paid for their work "such sum as the Secretary of the Treasury shall deem a fair compensation." There are 292 Congressional districts, so that the corps of skilled mechanics will number over 1,750 persons. If they all attend the exhibition every day, a very comfortable addition will be made to its daily receipts at the expense of the Government.

The constitutional authority to incur this expenditure will probably be found, says the *Evening Post*, just where the authority to establish a department of agriculture and an education bureau was found. Most persons will agree, however, that, if the enlightened people of this country do not take the trouble to learn for themselves what there is important and useful in the exhibition, they do not deserve to have a paternal Government do it for them.—*Scientific American*.

HYDRO-CARBONS IN DYNAMITE.

A Rhenish manufacturer of dynamite mixes 2 or 3 per cent of some hydro-carbon, like naphthaline, with the nitro-glycerin employed. Two different sorts of dynamite are made, in which the following proportions are employed :

	1st.	2nd.
Insufioral earth.....	23	20
Chalk	2	3
Solution of naphthaline in nitro-glycerin	75	70
Barytes.....	—	7
	100	100

VALUE OF TIMBER GROWN ON WASTE LANDS.—An illustration of the value of timber on waste lands in the Highlands is afforded by a sale of wood which took place on the estate of the Earl of Cawdor, in Nairnshire, the other day. In 1820, two hills on the Cawdor property, of about 300 acres in extent, and of almost no agricultural value, were planted with fir and other trees, and realised large sums, the remainder of the wood has just been sold off for the sum of 16,000l. The sums realised for the wood on this waste land during the fifty years is stated to be equal per acre to the return for the best arable land in the country.

SINGULAR PROPERTY OF THE LEAVES OF THE TOMATO.

Dr. C. B. Bates has favored the *Santa Barbara Press* with the following translation from *El Mercurio*, a paper published in Valparaiso. It will doubtless be of use to many of our readers. I planted a peach orchard, writes M. Siroy, of the Society of Horticulture, and the trees grew well and strongly. They had just commenced to bud when they were invaded by the curculio (*pulgón*), which insects were followed, as frequently happens, by ants. Having cut some tomatoes, the idea occurred to me that, by placing some of the leaves around the trunks and branches of the peach trees, I might preserve them from the rays of the sun, which were very powerful. My surprise was great, upon the following day, to find the trees entirely free from their enemies, not one remaining, except here and there were a curled leaf prevented the tomato from exercising its influence. These leaves I carefully unrolled, placing upon them fresh ones from the vine, with the result of banishing the last insect and enabling the trees to grow with luxuriance. Wishing to carry still further my experiment, I steeped in water some fresh leaves of the tomato, and sprinkled with this infusion other plants, roses and oranges. In two days these were also free from the innumerable insects which covered them, and I felt sure that had I used the same means with my melon patch I should have met with the same result. I therefore deem it a duty I owe to the society of horticulture to make known this singular and useful property of the tomato leaves, which I discovered by the merest accident.

COLORING BRASS.

In the following will be found valuable details relative to the coloring of brass. An orange tint, inclining to gold, is produced by first polishing the brass and then plunging it for a few seconds in a warm neutral solution of crystalized acetate of copper. Dipping into a bath of copper, the resulting tint is a grayish green, while a beautiful violet is obtained by immersing the metal for an instant in a solution of antimony and rubbing it with a stick covered with cotton. During this operation the brass should be heated to a degree just tolerable to the touch. A *moire* appearance, vastly superior to that usually seen, is produced by boiling the object in a solution of sulphate of copper. There are two methods of procuring a black lacquer on the surface of brass. The first, which is usually employed by instrument makers, consists in polishing the object with tripoli and washing it with a mixture composed of nitrate of tin one part, chloride of gold two parts. Allow this wash to remain for 15 minutes, then wipe it off with a linen cloth. An excess of acid increases the intensity of the tint. In the second method, copper turnings are dissolved in nitric acid until the latter is saturated; the objects are immersed in the solution, cleaned, and subsequently heated moderately over a charcoal fire. This process must be repeated in order to produce a black color, as the first trial only gives a dark green. Finally, polish with olive oil. Much pains are taken to give objects "an English look." For this purpose, they are first heated to redness and then dipped in a weak solution of sulphuric acid. Afterwards they are immersed in dilute nitric acid, thoroughly washed in water, and dried in sawdust. To effect a uniformity in the color, they are plunged in a bath consisting of two parts nitric acid and one part rain water, where they are suffered to remain for several minutes. Should the color not be free from spots and patches, the operations must be repeated until the desired effect is produced.

STENCILLING MATERIALS FOR PAINTERS' USE.—Stencilling is an art by which the painter can execute ornamental work very quickly. The articles required in making a stencil are a sheet of well sized writing paper, a lead pencil, and a sharp penknife. Fold the paper, allowing the edge of the fold to form the center of the pattern, then draw any desired design, leaving bars to hold the parts together. Place the paper upon a piece of glass and cut out the figure with a penknife. The tool used is a camel's hair brush with hair not over an inch long, bound with quill and wire on a round wooden handle. The small sizes are preferable. Color mixed with vinegar and sugar will be found best. The paint must be quite thick, and a small quantity only must be taken on the brush, and then well rubbed out on a dry plate before applying it to the work. Placing the stencil on the panel as desired, hold it down firmly, and rub over with the brush carefully until the cut portions of the figure are well coated. Then lift off the stencil and the work is completed.—*Scientific American*.

PAVING.—Twenty different kinds of paving have been tried in Paris; wood paving has been judged, in bitumen paving there is room for improvement, and now paving by pig iron is to be tried in a few days. A bed of mortar is first laid down, which is covered by a strong layer of asphalt; it is in this layer that the iron cakes, which are about 1-6in. thick, are set. These cakes, it appears, preserve the homogeneity of the bitumen, and prevent its depression, and render the asphalt less slippery for horses. This pavement will cost more, assuredly, than the compressed asphalt, but it is estimated that this mode of paving will save 50 per cent. upon the repairing expenses, which are very considerable. The end desired is to avoid, by the adoption of this kind of pavement, the depressions in roads over which a great deal of traffic passes. To attain this, it does not suffice to pour bitumen upon a well-prepared ground lightly covered with a coat of lime; the resistance of the ground should equal that of an old macademised bank; and a very thick bed of mortar, which should be very homogenous, should be laid before the asphalt is.

BRICKS.—We have been shown by Messrs. Copeland & McLaren a very fine pressed brick, of beautiful cream color, manufactured at Peterborough, Ont. The brick is one of the best for building purposes we have ever seen, and we are assured is a fair specimen of those manufactured. Such an article should have a very extensive sale. Mess. Copeland & McLaren are the agents in Montreal.

SCIENTIFIC NOTES.

NORTH country engineers will be glad to learn, says the London correspondent of the *Newcastle Chronicle*, that the scheme for raising the Vanguard, invented and patented by Dr. Rutherford, of Elswick Lodge, Newcastle, has been accepted by the Admiralty. Some months ago their lordships applied for tenders for raising the war-ship so unfortunately run down in the Irish Sea. 130 plans and estimates for accomplishing this very difficult and dangerous work were sent in to Mr. Ward Hunt and his colleagues for their approval. All were carefully examined by engineers and experts; the whole of them were discarded, however, as being either impracticable or too expensive, except three. These three have been more carefully gone into, and the result of this prolonged and extended investigation by the engineering representatives of the Admiralty has been to cause Dr. Rutherford's plan to be selected as the best. The Doctor has patented his invention, and he is now in negotiation with the Lords of the Admiralty for applying it to the raising of the sunken vessel. I am told by persons who have the means of knowing, that the scheme of Dr. Rutherford has struck the naval engineers by its originality and comprehensiveness.

THE *Times of India* says:—"A pistol that can kill at 500 yards has been patented by Captain Burton. The butt is that of an ordinary pistol; the barrel is that of a good rifle, cut short, but leaving sufficient 'turn' to send the bullet on its errand with the proper spin. The chief object is to send a rifle bullet at an enemy or at game without having to use the shoulder, especially when on horseback. To accomplish this the barrel is fitted with a steel handle to be grasped by the left hand, while the arm is extended as in archery. The recoil is scarcely felt; it does not affect the firer so much as the kick to the shoulder would do. The pistol can also be used with one hand like an ordinary pistol. The inventor has also provided a patent safety bullet which will explode as a shell when it crashes against the bones of large game, but will pass through brushwood or through the skin of a wild animal like an ordinary ball. It will not explode if let fall upon its apex, but if fired into a box of ammunition it will blow up everything." It seems to us that the new weapon very much resembles what was called, if we remember rightly, the "Elevator" gun introduced some years ago.

BOETTIGER publishes the observation that when an alcoholic solution of any of the coal-tar colours is mixed with a sufficient quantity of infusorial earth, water added, and the mixture filtered, the liquid will run off clear, while the earth retains all the pigment. Hitherto the compounds of alumina have been used for the production of the so-called lakes, and it is quite probable that the above noted behaviour of this material, which is very cheap, may find important applications in the arts.

ENGLISH people who propose to enjoy their summer holiday at the Philadelphia Exhibition had better make up their minds to take with them full purses. The trip, even under ordinary conditions, would be somewhat costly, but in existing circumstances it will be enormously expensive. This arises from the vast prices charged at Philadelphia. "Extortion," says the *New-York Times*, "is the order of the day in Philadelphia and on the Exhibition grounds." Our American contemporary has received a bill in which nine dollars are charged for three nights' sleeping accommodation for a single man in a second-rate hotel, a small room having been shared on the first night with a stranger. And dozens of similar cases are reported, "all showing that landlords and private citizens who have beds to rent are exacting many times their worth."

REARING CANARIES.—The following is good food for young canaries:—Hard-boiled egg, yolk and white grated through a piece of perforated zinc, added to twice its bulk of crumbled stale wheaten bread or biscuit powder. A little green food, such as lettuce or chickweed, is beneficial, but avoid giving hemp seed. Seed to be continued as usual. Herb diet should be given to them after a month or five weeks. When about a month or five weeks they should be separated from the parent birds, but in such a manner that they can be fed by their parents. I have never separated the old birds.

A GOOD and simple furniture polish consists of a little Castile soap scraped into a pint of warm water. Add three table spoonfuls of sweet oil; heat, and apply while hot.

CASK MAKING MACHINERY.

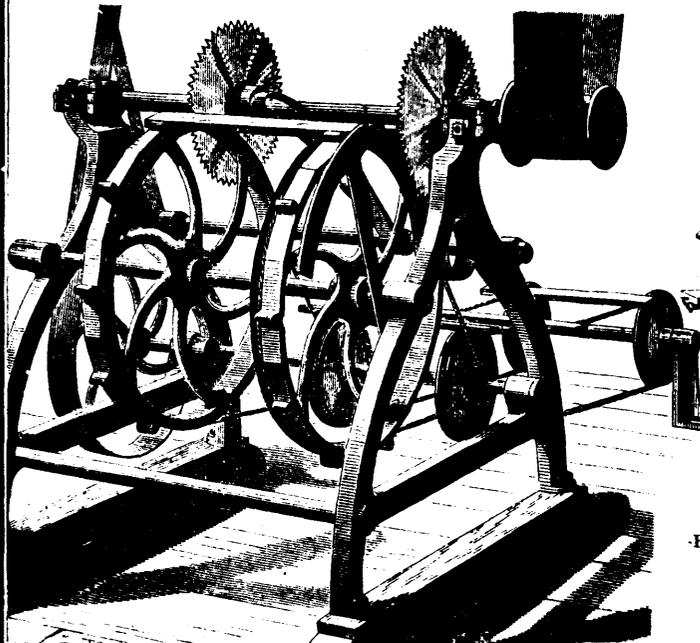
(See page 236.)

A very interesting exhibition is that of Messrs. E. & B. Holmes, of Buffalo, N. Y., who show four sets of barrel making machinery in operation, making tight and slack barrels of different sizes. The first operation consists of sawing off the staves to the required length, by means of two circular saws set on one spindle, with the proper interval between them; the staves are then passed through a machine which dresses both sides of them simultaneously. The jointing of the staves and cutting them to the requisite curve is performed by holding the stave against the side of a revolving concave wheel furnished with a radial cutter. The staves are then placed in a setting-up frame, which retains one end of the staves in position; the barrel is then conveyed to a windlass machine which draws the other end of the staves together by means of a wire rope passed round them, and a hoop is then dropped over them. The barrel is then placed over a stove and heated inside, and then the hoops are forced on by a dressing machine. The next operation is performed on a working-off machine, where the exterior of the barrel is smoothed and the grooves and bevels for the reception of the heads are cut. The heads are jointed on a wheel and planed on one side only, and are then turned and chamfered. A machine is also shown for cutting shingles or barrel heads, and for punching and riveting iron hoops at one operation. Wooden hoops are still made by hand. The set of machines I have thus briefly described is for making light barrels for containing liquids, and will turn out 500 barrels per day with one man in charge of each tool. The tools for constructing slack barrels for solids and small kegs are upon the same principle with modified details. *The Engineer.*

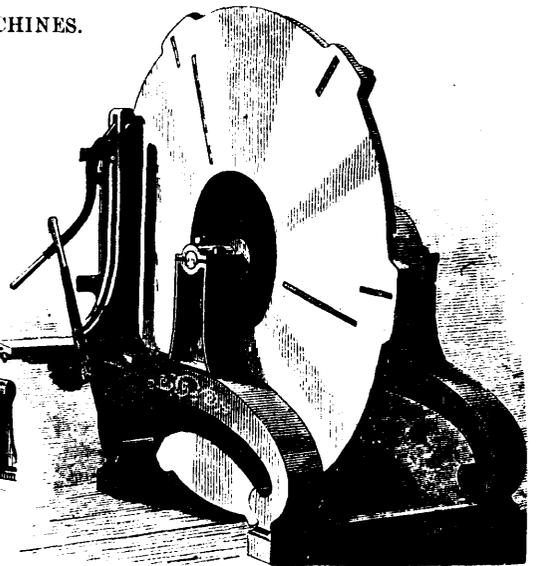
HARMONY OF COLOURS IN FLOWERS.—One of the obscure points of science is the cause of the harmony of colours always observed in flowers. An exchange states that when two colours are found, they are generally complements of each other. The wild Asters of autumn generally have purple rays and yellow disc flowers. The Pansy is yellow and purple, and the blue Violet has its stamens yellow and its petals a reddish blue. In fact yellow and purple generally go together in flowers. A splendid example is afforded by the large *Iris Germanica*, the popular Fleur-de-luce of our gardens. From the white base of its petals the colourless sap passes into its petals, which become of a gorgeous purple, while the beard of the petals becomes at the tip a very rich yellow, though the lower part of each separate filament is not of the purest white. What chemical or physical law determines the arrangement of colour, if there be any such secondary cause, is not yet discovered. Two French chemists, Fremy and Cloez, say that the tints of flowers are due to cyanin, xanthein. Cyanin is reddened by acids. A supply of vegetable acid developed in a flower would then turn the blue to rose colour, while a scarcely sensible quantity might produce a purple. Xanthin is a yellow from the Sunflower, and xanthein the yellow of the Dahlia.

DAMP FEET.—The primary cause of damp cold feet is to be found in imperfect circulation, which may proceed from cold, or want of food, or a debilitated action of the heart. When the latter is the case, exercise, when taken in any quantity, will for the time afford relief, but, by overtaxing the weakened organ, will tend to aggravate the complaint. The proper means, therefore, to adopt will be to effect a supply of blood to the feet without at the same time exhausting the vitality. Friction of the body will be found to effect this object; but the whole surface must be vigorously rubbed with a flesh-brush night and morning until an abiding sensation of warmth is felt, which will prevail sooner or later, provided "Widred" has sufficient perseverance. He must take care, however, that the feet are not exposed to cold during the operation. But this effect will be to a certain extent nullified unless strict attention is paid to clothing and diet. He will find material benefit from wearing flannel next the skin, besides a shirt; and if this is not sufficient another flannel may be worn in the form of a vest. Flannel drawers, thick wool stockings, and warm boots are also essential. If the feet are cold during the night it will be found desirable to use a foot-warmer, which should either be taken out of the bed before retiring, or left in without the feet touching it. Moderate exercise, consistent with the strength, is proper. By steady perseverance in using the means indicated "Widred" will find not only his feet, but his general health, materially improved, as coldness of the extremities is seldom unaccompanied by other derangements.

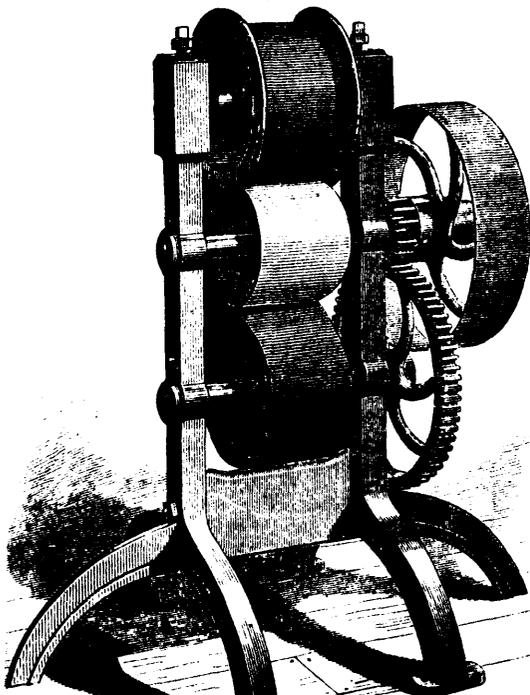
CASK MAKING MACHINES.



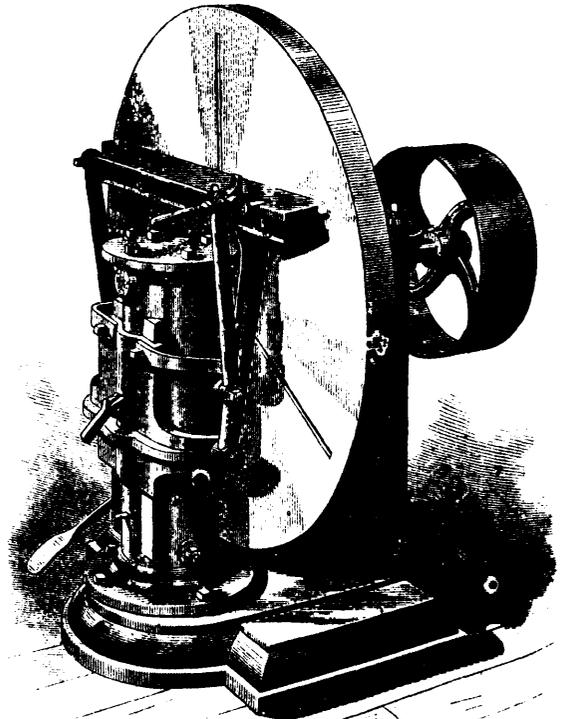
BARREL STAVE EQUALIZER AND CONVEYER.



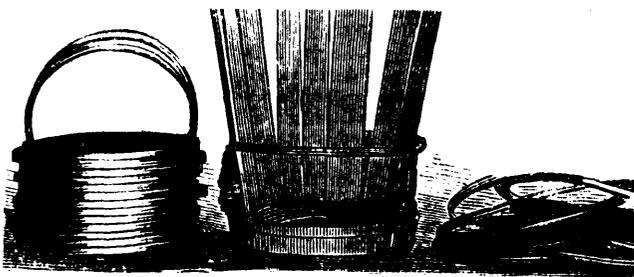
BARREL HEAD DRESSING AND JOINTING MACHINE.



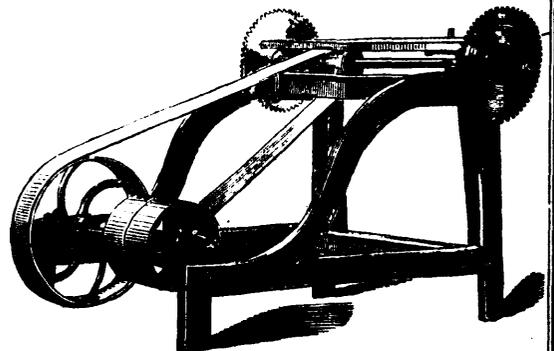
MACHINE FOR BENDING HOOPS.



KEG STAVE JOINTING MACHINE.

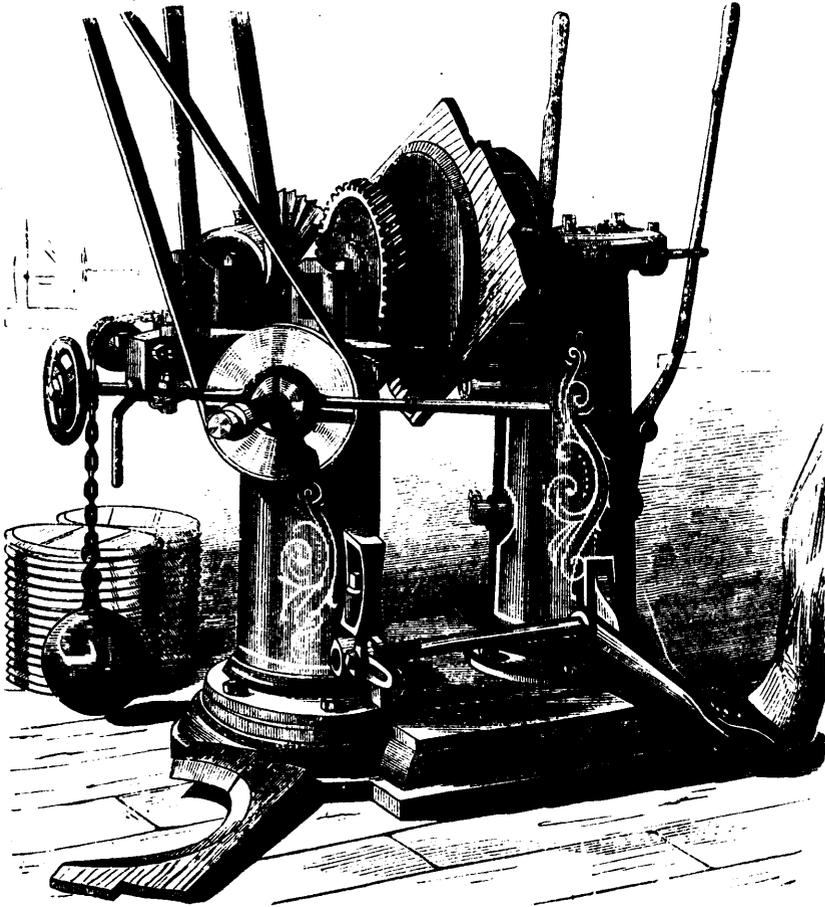


BARREL SETTING UP FORMS AND TRUSS HOOPS

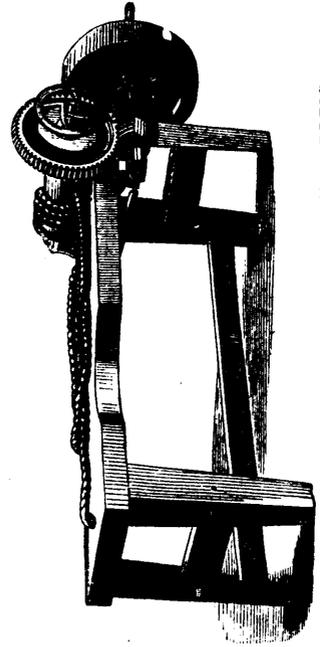


MACHINE FOR SAWING OFF STAVES.

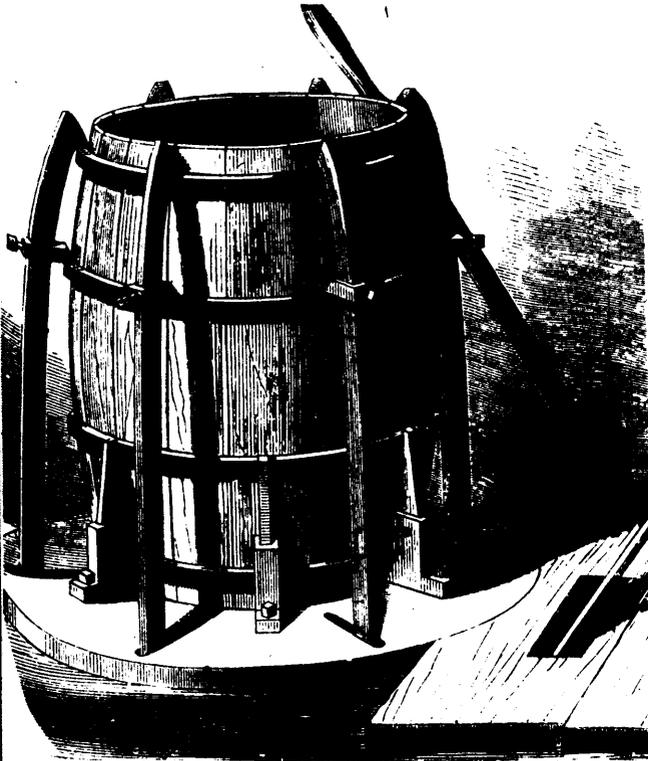
CASK MAKING MACHINES.



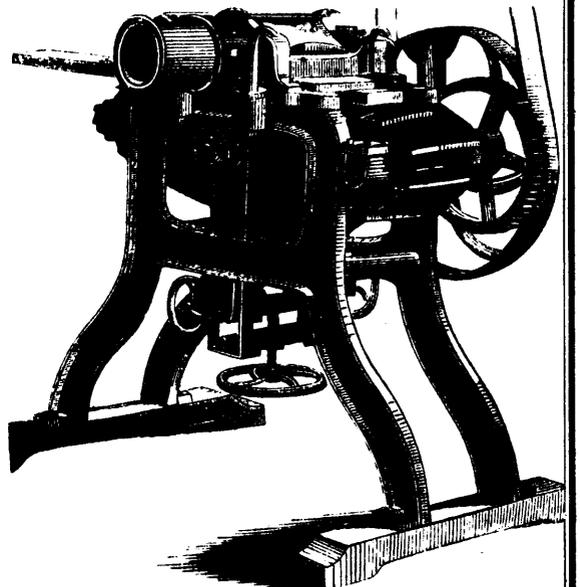
MACHINE FOR TURNING BARREL HEADS OF ALL SIZES.



POWER WINDLASS FOR TIGHT AND SLACK BARRELS.



MACHINE FOR TRUSSING TIGHT AND SLACK BARRELS.



MACHINE FOR DRESSING SAWED STAVES

FUMIGATIONS, DISINFECTANTS, AND THE LIKE.

An able medical lecturer in Philadelphia is in the habit of tersely saying before his class, that fumigations, as a rule, act on the principle of "one stink stinking out another stink." There is a deal of truth about it. The popular idea is that they destroy filthiness. Used in the ordinary way, they can do no such thing. They only make filthiness less *evident*, because they make the odor less perceptible which is an indication of its presence. Remove the *cause*, and all the unpleasant effects must cease.

CHLORIDE OF LIME.

Sometimes, in an emergency, this cannot well be done immediately, as in the case of a damp cellar; then lime will absorb the moisture, or "chloride of lime" neutralize the mustiness, etc. In emergencies, we may be forced to resort to disinfectants, but we must always remember that by using them we only temporize, as it were, with matter, that are using substitutes for the more efficient ones, *cleanliness, fresh air and sunshine*.

Among the things which can be used for the time are the "chloride of lime" and solution of chlorinated soda. These are easily procured, and readily used to remove traces of odor, or suspected traces of infectious principles from sinks, vessels, etc., after they have been thoroughly washed.

A pound of the chloride of lime, mixed with two gallons of water, make a very powerful disinfectant solution. When chloride of lime is used in the dry state, it should either be sprinkled about or exposed in wide, open vessels, so that the chlorine gas, which is the real agent, can readily escape from the lime to unite with the offensive substance we wish to destroy.

DESTROYS COLORS SOMETIMES.

One thing should always be remembered while using any disinfectant containing this chlorine gas, and it is, that the gas will destroy certain colors as well as many poisonous emanations. Unless sufficiently diluted, the mixture may destroy delicate fabrics as well.

CARBOLIC ACID.

A new article is prepared which ample experience has proven to be of great value. It is a solution of carbolic acid. It is not bulky, keeps indefinitely, has many reputed advantages over other disinfectants, and can now be had from most dealers, put up with directions for use. A very good disinfectant, and one of the cheapest too, is the

NITRATE OF LEAD.

Four ounces of nitrate of lead dissolved in a quart of water makes a very nice disinfectant. A tablespoonful of the liquid can be used at a time when the following is ordered in the foot note.

SULPHATE OF IRON (COPPERAS).

Five pounds dissolved in ten gallons of water, and slowly poured down a drain or vault, or thrown against the sides, so as to expose a large surface of the solution, will destroy offensive odors in a very short time.

In using all salts of iron, remember that every spot of it on muslin or linen leaves an iron-mould.

CLEANLINESS—MEANING OF THE TERM.

A house may be filthy where there is not a *pile* of dirt everywhere to be seen. Carpets filled with dust, saturated with grease, etc., uncleansed furniture, old papered walls, of years' standing, are just as much sources of impurity to the air as a refuse-heap in the cellar. They defile the atmosphere quite as much, and more or less tend to encourage disease. Sweeping with a broom certainly can remove much dirt from a floor, but what it does not sweep out, it scatters through the air, making little true improvement. After the dust "settles," the room is usually "dusted," which practically means whipping the dust from one piece of furniture to another with a bunch of feathers. It really seems that the dust had better be left alone, unless it can be removed altogether, and the only way to do this is to wipe every thing with a damp cloth. The floor of a sick-room should really be without a carpet, or if there is one, it should be well beaten before the patient goes into the room, and again well beaten and aired as soon as the person is done with it.

* In typhoid fever, dysentery, and some other diseases, where the infectious principle is supposed to reside to a degree in the discharges, it is well to keep on hand, in a jug or large bottle, a strong solution of the sulphate of iron, made by dissolving a

pound of the salt in a gallon of water. After the chamber utensil has been thoroughly cleansed (and it should be cleansed, too, immediately after it has been used by the patient), a gill of the solution should be poured into it, to purify the vessel. A half pint or more should be poured in before the contents are emptied, to destroy the fetor, as well as lessen the possibility of infection.

EXQUISITE CLEANLINESS.

Few people, never mind who they are, have any idea of the exquisite cleanliness required in the sick-room. The smoky chimney, the dusty furniture, the utensils emptied but once a day, even in the best houses, keep the air of the sick-room constantly dirty. What a person in health "may put up with" for a night only, may prove a source of suffering, postponement of recovery, or even the hastening of a fatal end, to a sick person who is confined there, perhaps in one posture, for twenty-four hours.

DYSPEPSIA FROM EATING HOT BREAD.

Gen. Clingman tells some truths and offers suggestions about the causes and results of dyspepsia and indigestion, with special reference to hot, doughy bread, which will apply to all parts of the country. Read and heed: It has been said that the frying pan is an enemy of our people. There can be no doubt that it has slain thousands; but bad bread is the slayer of tens of thousands. While traveling in Europe for eight months, I saw nothing but cold bread, nor did I, while there, see anything that tended to induce me to believe that anybody in Europe had ever eaten a piece of hot bread. I invariably, however, found the bread good, and the people I saw appeared healthy and robust. Some, as the English and Germans, were especially so. With respect to the United States, the condition of things may be more strikingly and pointedly presented by reference to individual cases. Many years ago I stopped at a house of an acquaintance, and on seeing him I said, "You are not looking as well as usual." "No," he replied, "I have the dyspepsia powerful bad." When dinner was ready there was an abundant supply of meats and well baked corn bread. There was also, however, something called biscuit, which was, in fact, rather warm dough, with much grease in it. I saw that my host ate this freely with his meats. I remarked that I did not wonder he had dyspepsia, for I could not live a month that way. I suggested that if he would eat well baked corn bread, or better still, light bread, he would not suffer as he was doing. He answered vehemently that he would rather die than eat cold bread. I replied: "This is a free country, and you have a right to die in this mode if you choose, and I have no doubt that you will soon die." Then I referred to cases in which I had known people to die from such practices. My cold mode of discussing the question evidently made an impression on his wife. Next summer, on meeting him, I said: "You are looking much better." "Yes," he replied, bursting into a hearty laugh, "I followed your advice and took to eating light bread, and I am as well as I ever was in my life."

HIGH HEELS.

Nearly all the corns, bunions, incurvation of nails, etc., which are peculiar to civilisation, being unknown pedal troubles in savage or barbarian life, are traceable to high heels. Notwithstanding shoemakers know this to be true, they continue the fashion, which gives employment to chiropodists—or, as they are known in plainer language, corn doctors—a lucrative profession, which thrives by the folly of those who would rather be lame than wear easy shoes or boots of unfashionable patterns. Any elevation of the heel drives the toes into closer quarters, and corns develop to notify to the individual that there is not room enough at the point of the shoes. Being too tight across the ball of the great toe joint inflames it excessively, and causes a bunion. If the pressure is not removed, which is the only permanent relief, a distortion of the toe joint follows, and a perpetual crop of corns is as certain as seed-time and harvest.

THE green outer husks of walnuts contain a yellow brown and remarkably fast dye, which is well suited for dyeing woolen or cotton materials, staining wood, &c. Wood thus dyed requires no mordant, is very soft to handle, and not like that dyed with vitriol. The shades of color obtained are from bright to dark brown. The husks may be simply kept dried till used, or placed moist in tubs, by which means their coloring power is further increased.

TRIMMING AND PUNCHING ROOFING SLATES.

(See page 240.)

Mr. E. R. Davis, of Detroit, Mich., has patented (Dec. 21, 1875), a new machine with which a roofing slate may be trimmed and the nail holes punched at a single operation.

In the engraving herewith given, A is the main frame, to which the cutting frame, B, is hinged. C¹ are two bearers, adjustably secured, so that they can be adjusted to or from each other, according to the width of the slates to be trimmed. The bearer, C¹, has one side turned up, as at C³, forming a guide flange for one side of the slate, which is laid against it. A guide is adjustably secured to the front girt between the bearers. The outer edges of the beveled ends of the bearers are flanged upwardly, and sharpened to form cutting edges, b. The cutting frame is composed of two parallel iron bars set up edgewise, bent to form three sides of a frame, with spacer blocks between the bars, which are tied by bolts through the said spacer blocks. The cutters, E, E are adjustably secured under the frame diagonally across its corners, so as to bring their cutting edges just outside the cutting edges of the bearers below. F is a handle across the front edge of the cutting frame, which can thereby be lifted up or thrown forcibly down, the impact upon the front girt of the main frame being eased by rubber buffers.

To trim a slate the latter is laid on the bearers, one edge bearing against the guide, C², and the front end against the guide, D. The cutting frame is then thrown down, when its knives will shear off the corners of the slate in line with the cutting edges, b, of said bearers. To punch the nail holes in the slate at the same operation each bearer is provided with an anvil, G, longitudinally adjustable in a slot therein, each anvil having an oval hole through it. Across the top of the cutting frame a cross beam, H, is jacked, said beam being constructed like the cutting frame of two parallel iron bars set up edgewise, and may be moved forward or back by loosening its jack bolts. I are nail hole punches, each having a screw shank, which is inserted up through the slots of the cross beam, where it receives a wing nut, Y, which secures it in position to have the point enter the anvil hole, first passing through the slate. A spring, J, spirally coiled about the punch, forces off the slate when the punch is raised.

—Scientific American.

A NEW MECHANICAL MONEY BOX.

(See page 253.)

A variety of curiously ingenious money boxes for children have, of late, appeared in the hardware and toy stores, which, it seems to us, must tend to cause the average youngster to lay up immense stores of pennies, if only for the satisfaction of seeing the toy operate whenever a coin is inserted. There is a metal frog into whose mouth the penny is put, whereupon he gulps down the coin and rolls his eyes in the most astonishing manner. Another device is so constructed that, when the penny is dropped in the slit of the box, two or three tin horses proceed to race around a miniature race track; still another is the figure of a portly individual seated in a chair. The coin is placed in his hand, whereupon he promptly inserts it in the slit which is located in the position of a coat pocket. About the most ingenious invention of the kind we have yet seen is that herewith illustrated. It was patented by Mr. C. C. Johnson, of Windsor, Vt. The penny is placed on the tray held by the miniature cashier outside of the house, and the weight is just sufficient to press down the platform on which the figure stands. The arm, in descending, strikes the pin of a locking device beneath it and frees a spindle which, operated by concealed clock-work, causes the cashier to be carried round in a circle against the door on the left, which opens before him so that he can enter the bank, and then closes behind him. He carries his receiver through the slot of a chute, a lip on which removes the coin so that it drops down the chute and into the vault below. Then the cashier moves round against the other door, which opens outward and closes as he passes, and coming again to the front of the bank he is again held by the locking device, waiting for the next contribution.—Scientific American.

EMBROIDERY PATTERNS FOR ORNAMENTAL NEEDLEBOOKS, WORKBASKETS, &C.

(See page 252.)

These patterns are both worked in French embroidery and point russe, with coloured purse silk or cashmere. The thimble, cotton, and ribbon are worked in appliqué with glacé silk. The colours are chosen according to personal taste.

CUTTING AND SURFACING MACHINE FOR METAL AND WOOD.

(See page 240.)

Letters patent have been granted to Mr. J. P. Smith, of Glasgow, for the invention of a revolving tool adapted for cutting circular holes, annular grooves, or recesses, and for truing the surfaces of metal, wood, and other substances. In the ordinary form a sleeve or collar is placed on and caused to rotate with a central spindle. The end of the spindle is pointed so as to centre on the article to be cut. Formed with, or attached to, the sleeve or collar is an arm or arms (two or more are preferred), constructed each with a channel in which a cutter of steel or other hard material is secured and held in position at the required distance from the centre of the spindle by moveable jam blocks and set screws or similar appliances. The moveable jam blocks are counterparts of each other when the cutters act on the same surfaces, so that they can be readily adjusted. The cutters are of uniform cross section throughout their length; and the tool is fed to its work by self-acting appliances operating on the sleeve or collar, or it is fed by a hand-wheel. In a modification the tool is caused to rotate on a stationary adjustable spindle, and when this arrangement is adopted the end of the stationary spindle has its end formed with several points to hold the article to be operated upon in position.

In the drawings Fig. 1 represents a vertical section of the tool for cutting annular grooves or recesses, flat rings from plates of iron, discs, or flanges. It is attached by its upper or shank end (spindle A) to the drilling machine or to the lathe; B is a centre bit accurately fitted into the lower end of the spindle, and bearing against a hard thrust-plate, C; D is a sleeve or collar having at its lower end two projecting arms, E, each with channels or spaces to receive cutting tools, F. The cutting tools, F, are set and held in position by the jam blocks, G, and set screws H. The jam blocks, G, are made in sets, so that if cutting tools, F, are used at the same time in more than one arm, E, and such is generally the case in practice, the tools, F, may be readily fixed at the same distances from the centre. It will be obvious that the number of arms, E, may be varied, and that the sleeve or collar, D, might be so formed with one or more channels as to provide in disc-like form the equivalent of the arms. I is the feed-wheel working on the screwed portion of the centre spindle A, and attached to the sleeve or collar, D. The feed-wheel, I, is operated by the pinion, J, pawl, j, and lever, j¹. A spring or weight may be provided to return j and j¹ into position. In the mechanism delineated, the tools, F, are shown arranged to cut malleable iron flanges from a plate, the outer tools being set to the outside, and the inner to the required inside diameter.

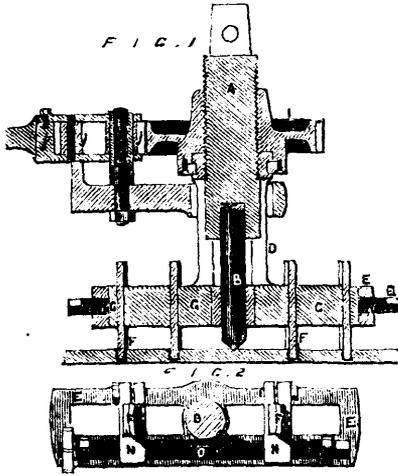
In a modification of this apparatus the central spindle is stationary, and has a claw-like termination to hold the article to be operated on in position. In the form shown in Fig. 1 the centre bit may either rotate or not, but in the modification the central spindle is stationary, and the other parts are caused to rotate in or with the part of the machine to which it is attached or secured. Fig. 2 is a plan of the tool bar when arranged for use in a vertical drilling machine or lathe, for the purpose of surfacing, such as facing the flanges of pipes. A right and left-handed screwed shaft, O, is carried by studs, P, fixed to the radial arms or disc. On the screwed shaft, O, are clamp nuts, N, and when the shaft, O, is rotated by a star wheel, R, or its equivalent, the clamp nuts, N, with the cutters, F, secured therein are caused to traverse.

RUBBER PULLEYS.

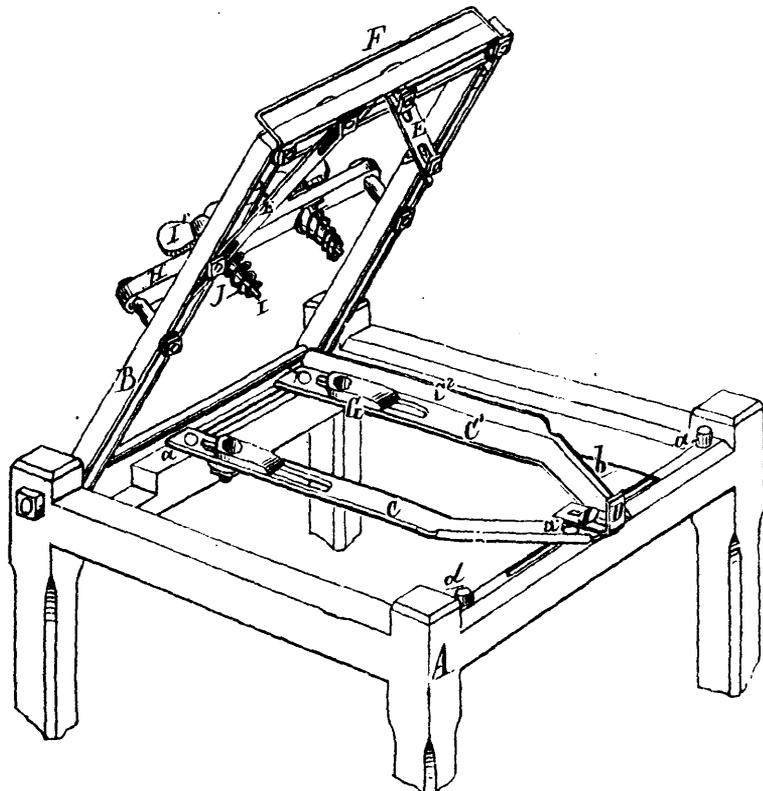
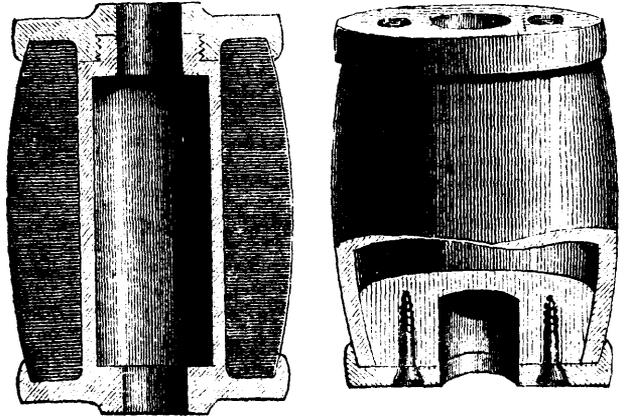
(See page 240.)

A patent has recently been obtained by Mr. D. Hee, of Philadelphia, for the construction of rubber-faced pulleys as represents a block of wood turned to the required size and curve, and covered with rubber, which is held in place by the flanges of the end-plates. The latter may be either of metal or hard wood, and are screwed to the block or pulley, as shown. The pulley is keyed to the shaft in the ordinary way. In the other figure a different kind of pulley is shown, in which a thick rubber ring, formed with the required curve, is put on a metal shell or hub, which may have ridges in its outer surface, between which the rubber is pressed, and is thus prevented from turning. The rubber is held by the end plates, one of which screws on, as shown. This pulley is secured to the shaft by a key, or other suitable means. The utility of this invention would seem to depend on the durability of the rubber faces.

CUTTING AND SURFACING MACHINES.



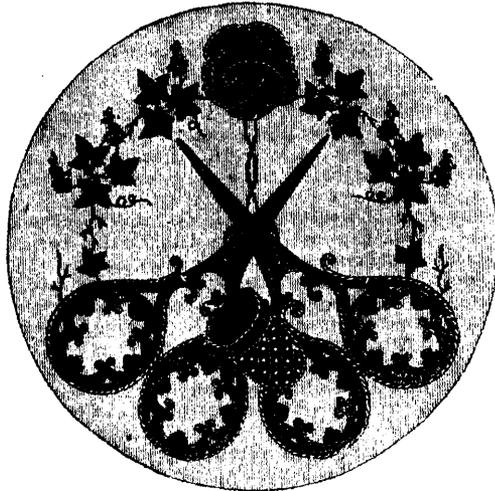
RUBBER PULLIES.



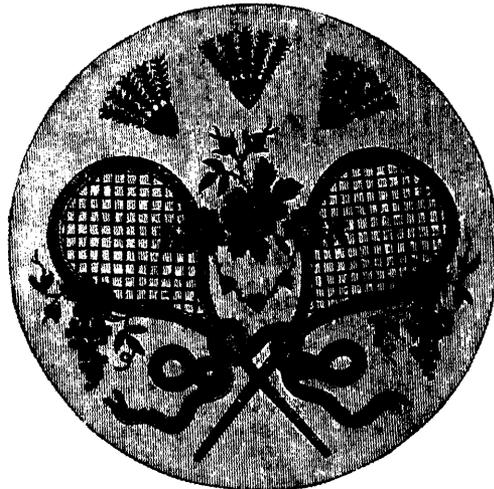
DAVIS' MACHINE FOR TRIMMING AND PUNCHING SLATES.

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 boys and girls, NEEDLE WORK, AMATEUR MECHANICAL PURSUITS, and all the elements of a *practical domestic education*; also GARDENING AND AGRICULTURAL NOTES.



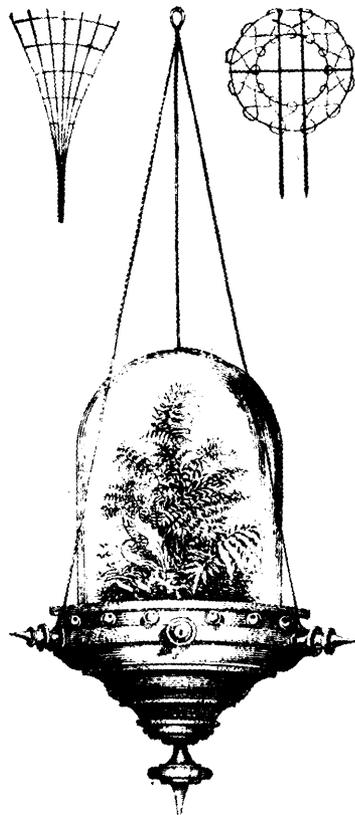
EMBROIDERY PATTERN FOR ORNAMENTS NEEDLE-BOOKS, WORKBASKETS, &c.



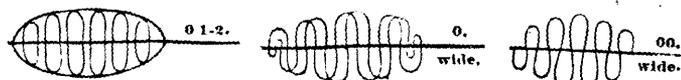
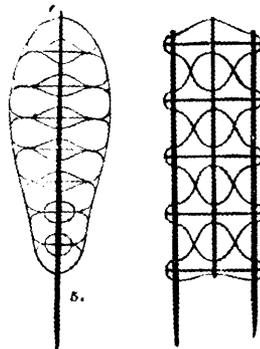
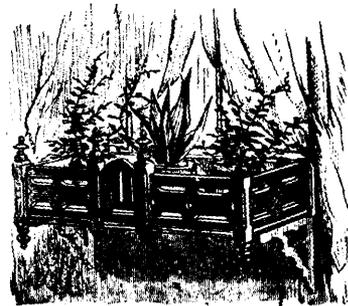
EMBROIDERY PATTERN FOR ORNAMENTS NEEDLE-BOOKS, WORKBASKETS, &c.

GARDEN REQUISITES.

HANGING FERNERIES.



WINDOW GARDEN AND BRACKET.



Incidents in the lives of Naval Officers during the Wars of the 1st Napoleon.

TALES FOR BOYS,

WRITTEN FOR THE "FAMILY FRIEND."

More than half of the allotted term for man's time on earth has passed away, since some incidents in naval life, never yet recorded by pen, were related in the writer's presence by a near relative and some of his brother officers, during the pleasant after dinner hours of a winter's eve; when the fire burnt brightly on the hearth, and happy and jovial faces smiled around the hospitable table. And yet those tales of peril and adventure, those stirring incidents in naval history, which occurred during the exciting times of the first Napoleon, are as fresh and vivid in his memory as if that time were but as yesterday, so deep and lasting was the impression they made upon a youthful and susceptible mind.

At the period to which we allude, then but a young lad, too old for the nursery, and not old enough to be allowed to participate in the privilege of an elder brother, who after his first glass of wine, was supposed to retire and enjoy the society of the ladies (he generally preferred that of his dogs), but being a favorite with my father's friends, and his first wife's youngest child, more latitude appeared to be allowed to me than even to the elder brother; not that he cared a bit for sailor's yarns, not he; he wondered how I could sit and listen to them when there was a wild cat to hunt, a colt to break in, or some exciting fact of the present, and not of past, to engage his attention. So not being old enough and entitled to the privilege of wine and dessert, I was quiescently permitted to remain, after the ladies had retired from the table. It certainly was a great pleasure to me listening to those good old sailors fighting their battles over again, and watching the kindling eye and excited action as they warmed up in the relation of their stories, no doubt fancying they were passing through former scenes in life; in fact, so great was the impression their stories made upon my mind that, child like, I would fancy myself at times some great naval hero, and fight battles in the air with imaginary foes, and against enormous odds, nailing my flag to the mast, and sending aloft the signal "England expects that every man this day will do his duty;" in these aerial actions I invariably came off victorious, honors were showered upon me by a grateful country, Parliament voted me thanks, and I was almost worshipped by the nation. One day, I remember, I challenged my elder brother, who could have fought me with one hand, and thrashed me easily for that matter. Yes, I, a puny boy, actually challenged an elder brother to fight a naval engagement in the duck pond, our vessels being wash-tubs, our only propelling power a broom handle—and our artillery—well, I have sometimes thought since, that the first idea of the ram originated with us, as our system of warfare was to see who could first destroy the other's ship by running her under water; whether it was that my skill was not equal to my pride and anticipations, or that my brother had chosen the larger wash tub, or that, on account that his calibre, like the American frigates at one time, was greater than mine, I distinctly remember that I was quickly sunk, and went down with colors flying, my pocket handkerchief being nailed to the broom handle, and nearly met a watery grave in the slimy duck pond. How badly I felt after this discomfiture, and how I longed for revenge. Next day I issued another challenge, and each party collecting his forces from the native boy peasantry, it cost me—alas! all my marbles and tops, in pay—the duck pond became the scene of one of the most exciting, and we are now happy to say, bloodless battles on record: this time victory crowned my efforts, my brother retired from the contest, growling but still fighting, like some river god covered with green slime and weeds, and bespattered with mud, whilst his craven crew were driven in ignominy from the water; after which we remember singing with the very heart and feelings of a conqueror, "Britannia Rules the Waves." But this is a digression from the incidents of our story; we well remember, in those happy days, what a pleasure it was to lie on the soft hearth rug before the glowing winter fire, fondling a favorite terrier or spaniel—for my father was fond of his gun and dogs—and listening with enthusiasm to the relation of those eventful scenes of true life which befel those old naval heroes during many years of constant warfare and active service. They might justly be called heroes, being all brave men. All could not be Nelsons or Collingwoods; but from them we learned and realized the fact that, many

a man has done more for his country in actual hard service and untold exploits, which never put even a single epaulette on his shoulder, than some who rose from circumstances and chance, from favoritism or interest, to be promoted above their heads; even the great Nelson once exclaimed against the injustice done to himself, that although he had been in a hundred fights, his name had never, up to that time, appeared in the Gazette.

But why are we writing down these incidents, what incentive has induced us to portray stories so long since told, and forgotten, except by myself, and perhaps the only living one who remembers having heard them. Thuswise then did it occur:—On a dull rainy day, in an uncomfortable hotel in a country village, and unable to attend to any business, no books to read, no companion to speak to, or any way of occupying time profitably or pleasantly, we retired to the sitting room, and there reclining on a lounge, read over a letter just received from a younger brother, who had recently visited the old home of our father, and where his gentle life had ended. The spirit of the past seemed to come up again, and light up the imagination with glimpses of those happy times, long since gone by, when we, a happy family, sat around his hearth. Soon falling into a dreamy state of repose, the images of childhood took again a shape of early days, which seemed to fill the room and float around, in aerial form, with such a softening influence, that they assumed almost a reality—awakening from the spell, a thought quickly passed across my mind like the reading of the flash over the mirror telegraph. Why not, you sluggard, employ your time to a better purpose in noting down these incidents of your father's life, in place of dreaming your own away in slothful idleness? You may live for many years to come, when the memory of the past will lose its lustre and fade away, and then, when life has lost its many pleasures, the reperusing of these pages will awaken pleasant thoughts of youthful days with remembrances, like the light of the sunrise of your youth, illuminating the hazy sphere of age.

Before, however, entering into a brief relation of the incidents which will be given in these pages, let us draw a picture of our father as we then remembered him.

If called upon by any one to give an opinion if, ever in life, we had met with a man of christian heart, perfect honor, generous and sensitive to the sufferings of humanity, a gentleman in the true signification of the word, we could unhesitatingly say, in our filial love, yes—we had found it in him. In action his bravery had been well tested, his honor was unimpeachable, the quivering of his lip when distress, or the tale of grief reached his ears, told the feelings of the heart; and he treated the poorest member of society as courteously as he would his Sovereign.

At the most glorious time of England's naval history, when her children were flushed with her supremacy on the seas, and the land resounded with the echoes of her great victories, either in single combat or by the annihilation of fleets; he, then the youngest of three sons, two of whom had preceded him in the navy, entered the service as a midshipman under the celebrated Sir Sidney Smith, and in the same ship in which his eldest brother was then a lieutenant. Serving through the greater part of that war which terminated only by the exile of the remarkable man who then swayed the destinies of the world, he participated in many of the numerous actions of that period, and at the peace, in 1815, retired for a time to the quietness of private life. He was subsequently appointed to a special and confidential service by the Admiralty, and immediately afterwards, assumed the command of a district for coast service. It was during this latter command, when his house was frequently visited by his officers and by many of his old companions in arms, that we heard the relation of many of the sailors' tales we are about to place on record.

THE CUTTING OUT OF A BRIGANTINE ON THE COAST OF DENMARK.

"Yes," said my father, "these are the pistols," taking down from a rack a pair of small saw handled pistols beautifully inlaid with silver—"they were placed in my hands by my brother, on the bloody deck of the brigantine, when I was barely fourteen years of age." "Keep them, William," he said, "in remembrance of this your first fight, and of that poor fellow lying on the deck, whose life you tried to save, and never use them, my boy, to take a human life, except in self-defence or in the battles of your country."

"I should like to hear that story, capt. Standard," said a fat old lieutenant—we boys used to call him "Old Bilgewater," when he was not present. "I served in the Baltic seas myself, shortly after you sailed for the Mediterranean, and heard that

"exploit highly spoken of by a messmate—but never had an account of the details of the action in which you say, as a boy, you took a prominent part."

"Well mate," rejoined my father, "I have fought that battle over more than once, to some of you present at this table, when we have been passing away the time by relating our reminiscences of the hard knocks and little comfort we experienced in those stirring days of war, and I would rather you should hear it some day from Stephens, across the table there, who is gifted with a freer flow of the gab than myself, and could throw in a sentiment occasionally, and is never brought up all aback for want of words to express his thoughts. My life has been one of more truth than poetry, more hard knocks than comfort, and to give an order in the fewest possible words. However, messmate, as I expect from you some yarn in return, of some incident in your own career, pass along the port, for story telling is dry-work, and makes my throat feel as husky as a dutchman's, whose draught is deep enough to float a line of battle ship."

"We had been cruising about in the Baltic seas, keeping a strong blockade on the enemy's coast, and occasionally picking up any small craft venturesome enough to run the gauntlet. It was towards the spring of the year, when the ice had cleared out of the numerous creeks and inlets that run inland through the flat land of the country, like the feelers of some gigantic cuttle fish, of which the Baltic sea formed the body. We were one day tacking off and on shore, expecting, shortly, to fall in with one of the enemy's cruisers, knowing that they were anxious to send despatches of an important nature to the north, that a full manned boat from our frigate, armed with a howitzer, was sent along ashore during the night to lie concealed, to cut off the return of any small craft venturing to run between the points of land that stretched northward far out to sea, leaving deep bays between, when, if pursued they quietly ran into these tortuous creeks, where it was impossible to follow them with a probability of success, except in our boats, and then in the face of numerous masked batteries which rendered the gain not worth the sacrifice of life. Early at the break of dawn, as we thus lay concealed, in a narrow creek, a fishing smack came stealthily down the inlet, not far from which we lay upon our oars. The heavy fogs which prevail on this coast, completely concealed her from view, but we knew by the sound of the dripping oars, and the subdued but deep voice of the seamen that they had passed the mouth of the inlet and had stood out to sea. Giving her sufficient time to clear the land, the wind being fair we hoisted sail, and were soon gliding noiselessly and swiftly after her, and so little apprehension had the Dutchmen of the proximity of danger, that, ere a few minutes had elapsed, we distinctly heard their voices in conversation; shaping our course accordingly, we were almost upon the astonished fishermen before they saw their danger; and they were quietly captured without a shot being fired. Upon being brought on board the frigate, the skipper was almost terrified out of his wits on the supposition that we were probably going to hang him instant—such was the terror of Sir Sidney's name—so that we elicited from him the important information that a brigantine of war was anchored about six miles up the inlet, formed by a small river, and within a quarter of a mile of the guns of a fort; that she was fully equipped, a quick sailer, and only awaiting the favorable opportunity of a dark night and fair wind to run the blockade of our fleet. Our commander immediately concluded that this was the vessel about which he had received information as ready to sail with the important despatches before alluded to, and was determined to cut her out that very night if the weather was favorable. No sooner was this information obtained, than the ship's course was altered, and we stood out to sea, in order to lull suspicion, and at evening were nearly hull down from the land. Preparations for the cutting out, however, were going on, and as fortune favored us by the wind veering during the night, there was little possibility of the brigantine attempting to venture to run out, until better favored. She might possibly, however, drop down the river with the tide ready to start on the first favorable opportunity,

The Dutch skipper who had been condoling himself with beer and a pipe, had been pressed into our service as a pilot, under pain of instant death if he shewed treachery, but promised freedom to himself and crew in case of success, as well as the return of his fishing smack; and he, being an unsentimental Dutchman—and like many other patriots, his patriotism laid in his pocket—his heart too was with his Frau—consented to the terms.

Every preparation having been made, the officers and crews were told off to their several boats under the command of my brother, who was the first lieutenant. About midnight we knew

by soundings that the frigate was within four miles of the shore. She hove-to, the boats were launched, and I was allowed to take a place in the gig commanded by Jones, the senior midshipman on board. Sir Sidney had, also, placed his coxswain on board of his gig, a splendid seaman, and of tried experience and bravery.

It was about two o'clock in the morning, when we pulled stroke for the shore, and after some difficulty, during which the fat Dutchman seemed much convulsed with fear and quivered like a jelly—as frequent exclamations of Mein Gott! and Meine Frau! escaped him—that we discovered the inlet to the little muddy river, up which the dutch brigantine was said to be anchored. Over an hour had been expended in the search for this creek in the darkness of the night, which was by no means an easy task on a flat and markless beach, but luckily the eyes of the skipper, rendered doubly keen from his hazardous position, perceived a heavy crooked post not unlike a Dutchman in its shape—on which a sombre looking cross draped with seaweed was attached, and reminded one of those which used to point out the resting places of unfortunate suicides; this indicated, grotesquely enough, the way to the mouth of the stream. We had still more than six miles to pull, according to our informant's statement, the river or creek was tortuous and narrow in places, and marshy reeds grew in the shallow water along the banks on either side. Pulling under such difficulties with muffled oars was slow work, and in the stillness of the night every sound vibrated in the air. One could distinctly hear the crowing of the village cocks in the farm houses, and now and then the wild birds disturbed on their feeding grounds, would rise with a noisy whirr and screech which was very likely to alarm the sleepy Dutchmen from the state of repose in which we anticipated to find them; but if we thought to catch them sleeping, we were soon likely to know the difference—no Rip van Winkles were there.

"We had now rowed, by calculation, about the right distance, when we expected to see the enemy, and still no vessel was in sight; the tide was running out to sea, and although the river was not more than two hundred yards across, yet so dense was the fog that we might possibly have passed her. By this time the pale shades of morning light which precede the dawn of day began to blend with the sombre line of the vanishing night; grey tints began to prevail; and objects on shore appeared less obscure to the view; the cold fog seemed to rise and fall, and occasionally the roof of a house and the tops of a few trees could be seen above its dense grey wall—as with a steady and stealthy dip of the muffled oars we glided cautiously forward, almost in indian file.

My brother was in the foremost boat; the next was commanded by the senior mate, and the third in order, in which I was placed, was in charge of Jones the senior midshipman of the frigate—presently a whispered h-u-s-h passed down our line—the half raised oars suspended in the air—we felt that the enemy was in sight. We had arrived at a point where the stream divided, forming an island, and whilst deciding up which branch to proceed (for I must say that the skipper was gagged and gave this information by signs), a sudden clearing up of the fog, for an instant, enabled us distinctly to see the topmasts of the brigantine, on a mast of which flew the national flag of her country. She was evidently anchored on the other side of the island, but the position of the fort could no where be seen. For a few seconds a death-like stillness ensued—the fog had again become apparently thicker, and not a sound could be heard even from the shore.

"My brother soon decided on the order of action—a whispered word to the mate in the next boat, to back water quietly and to desire the lieutenant of marines, with his men, to move up to his side; they were to keep up a heavy fire of musketry, and grape from the howitzer in the boat's bow, upon the deck and rigging, to cover the boarders. The word was passed along our line, that on the first shot, each boat was to dash forward, grapple, and board; and whichever party obtained first possession of the foredeck, to cut her moorings, and let her drift down with the running tide out of the range of the fire of the fort."

"This change in the programme brought the gig up second in line to my brother, who, leaning over the gunwale, and grasping my hand said, "God bless you, my boy, do your duty well." Hardly had the words been spoken when a burst of lurid flame issued through the fog, and a discharge of grape, shot whistled to the right of us, almost blinding me with spray. "Give way, my hearties" shouted my brother—"at her, my boys, at her altogether," he again called, as with rapid strokes, we dashed onward; but another better directed discharge of grape passed over his boat, killing several of his men and

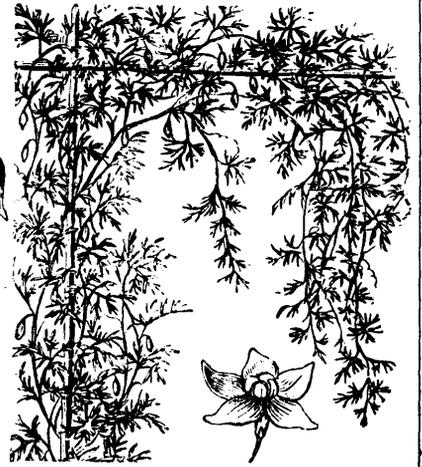
FLORAL CULTURE.



ABRONIA UMBELLATA.



ADLUMIA CIRRHOSA.



ABROBA VIRIDIFLORA.



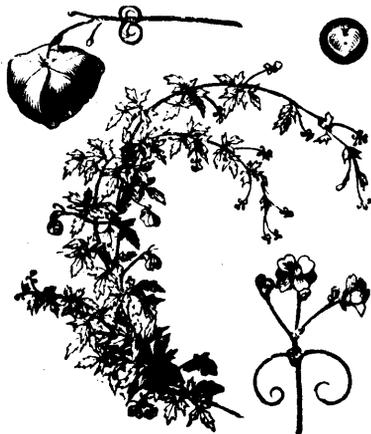
AGERATUM MEXICANUM.



ALYSSUM SWEET.



AMARANTHUS CAUDATUS.



BALLOON VINE.



AMMOBIUM ALATUM.



AQUILEGIA.

FLORAL CULTURE.



ACROCLINIUM ROSEUM.



AMARANTHUS TRICOLOR.

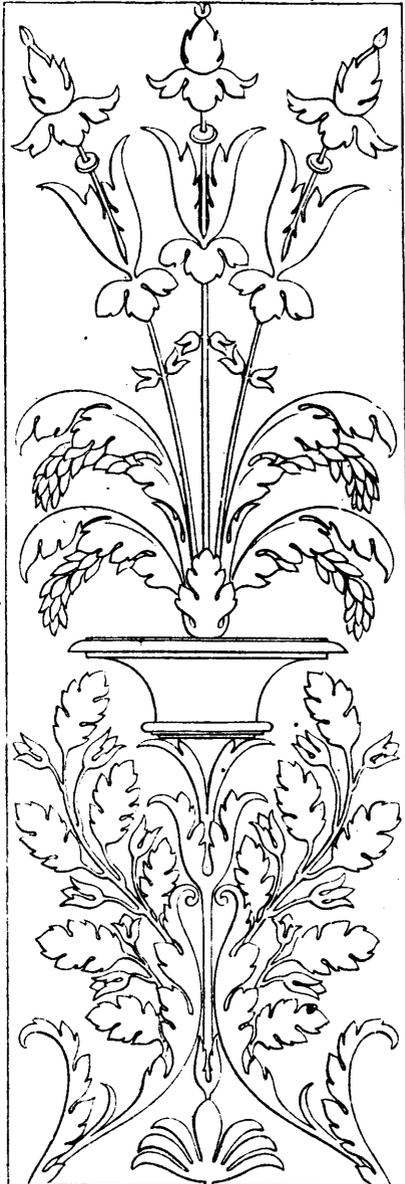


AUBERGINE WHITE FRUITED.

FREE-HAND DRAWING.



FROM A PILASTER. CHURCH OF S. LORENZA, LUGANO.



FROM A PILASTER IN THE CATHEDRAL, FLORENCE.

wounding him severely in the thigh. Cheer upon cheer rose up from the remainder of our boats as they rapidly pushed forward, whilst the lieut. of marines directed a heavy fire on the decks of the vessel. Already had the mate's boat reached the ship, but found her decks completely protected on the exposed side by boarding nets, and in spite of all his efforts, his crew were driven back into their boat; a third discharge of grape completely riddled another boat, which went drifting helplessly down the stream; matters were beginning to look blue indeed; the counter cheers of the Dutchmen now mingled with those of ours amidst the roar of musketry. In coming up in our gig the coxswain, placed with us by Sir Sidney, addressed poor Jones—"Sir," he said, "it is not the place of a warrant officer to offer advice to his superior in command, but seeing as how I have been in many a hard fought battle and cutting out, with our noble captain, and that he placed me alongside of you, sir, to help in case of need, your honor will excuse the liberty of an old sailor, if he offers a bit of advice, and now sir, be quick and board her on the land side, where she may have no nets put up, and perhaps unprepared for the attack." "You are right, coxswain, quite right: give way, my boys; here, youngster, to me; take the tiller whilst I prepare for boarding." Hardly had he spoken, when I heard the dull thud of bullet strike some object, and he fell back a corpse into the coxswain's arms, his forehead perforated in the centre. Springing to the bow of the boat, a marine, with an oath of revenge, stood up and discharged his musket at the enemy, and then fell dead himself into the river, with the oath still muttering in his throat. "Keep her away, Mr. Standard, keep her away, sir, give us room to round her," and he then took the tiller out of my hands. I cannot, said my father, tell how I felt at this moment. Of the wound my brother had received, I knew not—the smoke had rendered the fog still more dense, and the flame, from the constant discharge of fire arms, made the scene one of ghastly appearance. My messmate lay dead at my feet, and for a moment I felt as if my heart would break, hot tears stouted in my eyes, but instantly another feeling, almost indescribable, succeeded, one devoid of all fear, of perfect recklessness. I dashed away my tears, and in that moment became a man.

(To be concluded in our next.)

FLORAL CULTURE.

(See page 244.)

Years of study from school books which are not accurately illustrated, will not impress so firmly upon the young mind a knowledge of flowers and plants, as a glance at a perfect illustration accompanied with a brief description of the subject. How many who see a lovely flower are unable to describe it even by name, and yet there is not a more beautiful study in the world, or one that has a more softening influence over the feelings than the study of these beautiful gems of nature.

Under an alphabetical arrangement, we shall illustrate the principal flowers cultivated in our gardens, until the list is completed.

ABROBA.—Nat. Ord. Cucurbitaceæ. *Linn.*—*Monœcia Monadelphica*. Abroba viridiflora, extremely pretty tuberous perennial climbing Cucurbitaceæ; with handsomely cut, glossy, dark green foliage, small oval scarlet fruits; suitable for planting out during the Summer, forming beautiful garlands.

ABRONIA UMBELLATA.—Nat. Ord. Nyctaginaceæ. *Linn.*—*Pentandria Monogynia*. Charming trailer, with beautiful Verbenalike clusters of sweet-scented flowers; continues in bloom a long time; very effective in beds, rock-work, or hanging baskets. Peel off the husk of the seed before sowing, to facilitate vegetating; transplant ten inches apart.

ADLUMIA (Mounmain Fringe.)—Nat. Ord. Fumariaceæ. *Adlumia cirrhosa*, a beautiful hardy climbing plant of graceful habit, hardy annual, from North America; 15 ft.

ACROCLINIUM.—Nat. Ord. Compositæ. *Linn.*—*Syngenesia Polygamia Superflua*. A beautiful class of everlasting flowers, similar in form to the *Rhodanthe Manglesi*, but more hardy and robust; a valuable acquisition for the flower border, beautiful for Winter bouquets, for which purpose they should be cut just as soon as they begin to expand, and carefully dried in the shade. *Half-hardy annuals*.

AGERATUM.—Nat. Ord. Compositæ. *Linn.*—*Syngenesia Polygamia*. Splendid plants for large clumps or masses, as well as for blooming in pots during Winter; very useful for cutting and for bouquets. *Half-hardy annuals*.

ALYSSUM.—Nat. Ord. Crucifereæ. *Linn.*—*Tetradynamia Siliculosæ*. Free-flowering, useful, pretty little plants for beds, edgings, or rock-work. The annual varieties bloom nearly the whole Summer, and the perennials are among our earliest and most attractive Spring flowers.

AMARENTHUS.—Nat. Ord. Amarantaceæ. *Linn.*—*Monœcia Pentandria*. Ornamental foliaged plants of an extremely graceful and interesting character, producing a striking effect, whether grown for the decoration of the conservatory or out-door flower garden. If the seed be sown early in heat, and the plants put out in May or June in very rich soil, they make exceedingly handsome specimens for centers of beds or mixed flower borders. *Bicolor* and *tricolor* should be grown in poor soil to increase the brilliancy of their colors. *Half-hardy annuals*.

ANEMONIUM.—Nat. Ord. Compositæ. *Linn.*—*Syngenesia Polygamia*. A useful Everlasting for making dried Winter bouquets, and a showy border plant, growing freely in any garden soil. *Hardy annual*.

AQUILEGIA or COLUMBINE.—Nat. Ord. Ranunculaceæ. *Linn.*—*Polyandria Pentagynia*. A class of highly ornamental plants; its varieties combining at once flowers the most curious in form, with colors the most striking and beautiful. *Hardy perennials*.

ASTER.—Nat. Ord. Compositæ. *Linn.*—*Syngenesia Polygamia Superflua*. For beauty and variety of habit, form and color, the Aster stands unrivalled, and of all flowers is best adapted to gratify the taste and win the admiration of every lover of floral beauty. It is not only one of the most popular, but also one of the most effective of our garden favorites, producing in profusion flowers in which richness and variety of color is combined with the most perfect and beautiful form. Some of the flowers are unusually large, others quite small; some are beautifully incurved, others reflexed; while some of the varieties are tall and others dwarf. Amongst the tall kinds most worthy of note, TRUFFAUT'S magnificent varieties of the PEONY-FLOWERED PERFECTION with their beautifully incurved ball-shaped blossoms, and the NEW GIANT EMPEROR with its immense double blossoms, stand unrivalled. The IMBRIQUE POMPONE with its numerous miniature flowers, and the COCKADE with its showy large white center and variously tinted borders, are equally attractive, and are particularly suitable for large flower beds or intermingling in the borders with Dahlias, Gladioli and Roses. Of dwarf varieties the principal beauties are the CHRYSANTHEMUM, its large flowers almost hiding the foliage, and the BOUQUET ASTER with its profusion of blossoms. They are splendid either for small flower beds or edgings. All the varieties require rich, light soil, and in hot, dry weather should be mulched with well rotted manure, and frequently supplied with manure water; this labor will be amply compensated by the increased size, beauty, and duration of the flowers. *Hardy annuals*.

ATBERGINE (Egg-Plant.)—Nat. Ord. Solanaceæ. *Linn.*—*Pentandria Monogynia*. Ornamental varieties; the scarlet and white are curious and interesting, being covered in Autumn with beautiful egg-shaped fruit; they succeed best in warm localities. *Half-hardy annuals*.

BALLOON VINE (Cardiospermum).—Nat. Ord. Sapindaceæ. *Linn.*—*Octandria Trigynia*. A genus of rapid growing, handsome climbers, remarkable for an inflated membraneous capsule, from which it is sometimes called Balloon Vine, very ornamental; succeed best in a light soil and warm situation. *Half-hardy annuals*.

GARDEN REQUISITES.

POT PLANT AND GARDEN TRELLISES.

On page 241 will be found some designs for pot plant and garden trellises which an amateur can readily make. These light and tasteful frames or trellises upon which to train plants and vines are indispensable, and assist materially in the graceful training of the plant. Reeds are more serviceable than wire, as they retain their shape and form better, while they are much lighter and equally durable. They should be painted green.

For parlors, use a circular top of black walnut, which can be used as a plant stand and trellis combined. This is particularly designed for training vines; the most useful size is 32 inches wide, and 7 feet high.

DRAWING.

(See page 245.)

As the student can find within these pages so many excellent examples of mechanical drawing, which he will find greatly to his advantage to copy, we will now give examples of a more varied kind for the general reader. In the present number, on page 245, we furnish two beautiful designs from Vere Foster's National Drawing Book, in freehand ornament, and from which amateur carvers in wood will derive much instruction. We cannot too highly recommend the whole series of Vere Foster's cheap work, not only to every student, but also to the heads of families. They have been approved by the Department of Science and Art in England, and adopted by the Board of National Education in Ireland. We have much pleasure in giving, in full, the general instructions on Freehand Drawing, and hope it will be an incentive to many to commence the study of this beautiful art. Any of the numbers required for convenience to subscribers we shall be happy to furnish through this office; the price ranges from 10c. to 15c. a Number.

The following remarks on the art of free-hand drawing are by F. E. Hulme, F. L. S. &c.

Freehand though perhaps not so interesting in its nature as many other branches of Drawing, is an essential feature in art-training, since by its means the eye is educated to a due perception of form, and the hand gains power in its delineation. Hence a double advantage is gained:—*first*, the power to appreciate beauty or to detect error, and, *secondly*, the faculty of producing really accurate representations of such forms. Thanks to the real need of technical education, that time is now rapidly approaching when drawing will cease to be classed as an accomplishment merely. Seeing, then, this growing demand for art instruction, it becomes a matter of grave importance that examples of a suitable kind, and proper methods of instruction, should be provided, if drawing is really to possess that practical value which is now claimed for it. On the other hand, it is no less needful that the student—such examples being provided—should bear in mind that perfection is a plant of slow growth. Hence arises one of the difficulties of the teacher; for, while many are willing to undergo what we may call the drudgery of the earlier lessons—those attempts that seem so disheartening before the interest is aroused and the mind encouraged by progress made—others (and they are not few) cast aside such restraints. They see no value in their work: they are machinists, and want at once to draw plan and elevation of a locomotive; or they are cabinet-makers, and they must begin at once to design for furniture; or they may be amateurs—persons who need not study drawing with a view to increased efficiency in their business, and, the corollary of such additional power, more wages to receive—and, therefore, they think that, to them at least, no such course of study is necessary. Thus many a pupil has come to me desiring to sketch in water-colors who was unable even so much as to outline correctly, and yet too proud to learn. Such do not realise that the loftiest buildings have the deepest foundations; that the tree must be tended many a year before its fruit is gathered; that the facile touch they admire so much in some eminent man's work has been acquired by dint of long years of devotion to his art; and that the clever sketch they saw done in some twenty minutes was but the gathering in of the fruit of many months of previous practice.

While thus cautioning the student, however, I may also dishearten him: for he will say, "How can I now give years of my life to this pursuit?" I would, therefore, hasten to add that, while eminence can only thus be attained, yet, if only the foundation be truly laid, enough art-power may be speedily acquired to become both pleasure and profit to its possessor.

In almost all trades, decorative art in some way makes its presence felt; but in some, as we are all aware, it is present in a marked degree. In these branches of business, more especially, the power of drawing is of great value. Many persons are not aware at what disadvantage we are placed, nationally, by this past neglect of the art-power, which it is not unreasonable to suppose is latent amongst us. The following quotations from a Blue Book, compiled on the Government inquiry, in 1864, into the working of the Schools of Art throughout the country, may not be without interest. One of the leading Manchester calico

manufacturers, during the course of his examination, says: "I have made a calculation, which I believe to be within the mark. I believe the amount paid by calico printers alone, at this very time, is enormous. I may state at once that I know twelve houses that pay from £35,000 to £30,000 a year for designs. I believe the entire payment now in the trade, in French designs alone, is upwards of £30,000 a-year. We get much better designs in Paris: unless it were so, we should not go there, of course." One of the chief manufacturers in the Staffordshire china trade, in answer to the question—"Our best painters, with the exception of one, are foreigners; and I may state, also, that our best modeller is a foreigner." In France and Germany, technical art training has been in full practice for a great many years, with what valuable results the foregoing extracts will show.

Freehand Drawing possesses this great advantage over many other kinds of art-work, that it impresses on the beginner the necessity of scrupulous accuracy. Beginners are frequently set to a much more seductive kind of work—little picturesque details of gables, rustic gates, and so forth; but these, though more attractive, and therefore more dangerous, are not nearly so good for the preliminary practice. When the hand has acquired the needful accuracy, then the freedom of touch will come in due course; but the attempted freedom without firm basis is only hurtful and mischievous. For this same reason, geometry makes an excellent study in alternation with the freehand work, as, in that too, the most careful work is required. In geometry, as in freehand drawing, the eye readily detects error, even when the hand, from want of present skill, is unable to remedy it. The pupil must be careful to keep the two modes of working quite distinct. Freehand drawing is so called, because it is quite independent of any such mechanical aids as the ruler or compass; in fact, their use is not permissible, as it ceases to be freehand if they are employed. On the other hand, geometry absolutely requires their use; and it is as much an error (and one commonly indulged in) for the student to sketch his geometrical problems by hand as to use any artificial helps in overcoming the difficulties he may encounter in his freehand. I have seen many a student, after sketching a problem freely on the black board, utterly unable to work it rigidly out with his instruments on a sheet of paper, the two things being so very different in their nature. In the same way, the student who allows himself the use of compasses or ruler while engaged in so-called freehand become their slave: their use cramps his progress, and he is under a painful feeling of restraint directly a stroke has to be attempted without their aid.

While accepting like ruling, or bending the paper down the middle, or such-like little subterfuges, are thus, from the nature of the work, inadmissible, it is a question in my own mind how far an occasional measurement, after the completion of the work, is at time allowable. If resorted to at all, it should always be in the order just named—not first the measurement and then the drawing made to fit it—but first the drawing honestly striven for, and then, if at all, the measurement test. The temptation to resort to its use, even under these limited conditions, is very great, but its only value lies in this, that where a beginner's untrained eye fails to show him how grievously he may be wrong, and the teacher fails to convince him of his fault, a strip of paper judiciously applied, first to the copy and then to the student's work, is an irresistible argument—an umpire whose decision cannot be impugned. Bear in mind, however, that it can hardly be too little used, and that its use may very easily degenerate into an abuse.

It will not in all cases be necessary for the pupil to go through the whole of these examples. Some will show more natural aptitude than others; and while a few may find it necessary, not only to go through the entire set, but even to draw some again and again, others will feel justified by their progress in missing one occasionally, while the great number to select from will be a welcome feature in the present course. Be the number attempted few or many, let the work, so far as it goes, be thorough. If at any time the task grows wearisome, either subdue the feeling by sheer force of will, or failing that, let the work be put aside for a while, as half-hearted work is of little value. Above all, beware of that constant temptation to young beginners—the desire to get a thing done and out of the way. This is doubly wrong; for, first, to finish one drawing is but the first step towards beginning another; the subject truly has altered, but the next subject brings its own share of difficulty and labour to be gone through no less than its predecessor; and, secondly, it raises a false standard in the pupil's mind: quality should be striven for rather than mere quantity. The practical question is not "How many done?" but rather "How well done?" Let



THE CHIRONECTIFORM OR ANGLING FISH.



PALACE HOTEL, BUXTON.—THE LARGE DRAWING ROOM.

the student conquer as he proceeds. If his first attempt is a failure, let that rather spur him to a fresh endeavour. There is nothing heroic in being beaten, and, if any of these examples present an amount of difficulty that seems hard to overcome, the learner must not rest satisfied with the sense of failure, but try again.

Practice frequently rather than for any considerable time at one sitting. Drawing is so essentially a thing of practice and habit, of hand and eye, that he who is half-hearted enough about it to put it aside for a few weeks at a stretch, must be content to find, when he resumes his work, that his faculties have rusted somewhat, that his eye has lost its nice discrimination, his hand some, at least, of its old cunning. By little and little, if steadily adhered to, the sense of growing power will arise, and thus the student, having tided over the earlier days of disappointment, will begin to see some show of fruit, some return for his labour. Let him beware, however, of an overweening confidence in himself. No student is worthy of the name who does not realise that the road to perfection stretches before him for many a mile to come; and such an one will hardly care to repose on his laurels at this early stage of the journey. In requiring the student, so far as our influence extends, to retrace his steps, and try again and again at any of these examples which he fails to manage at first, I am aware that the teacher is imposing a somewhat heavy burden on him; but I have nowhere throughout this little essay told him that drawing is all sunshine: I have, on the contrary, tried to impress on him, without discouraging him, that drawing is real work. A boy at school will go through the same French exercises time after time, till he has mastered them; the girl will sit at the piano for hours together, going over the same scales; the child has many a fall before it runs alone: why then expect that drawing alone should be an exception, and that, in this, to attempt is to achieve?

In looking carefully through this book, the pupil will easily discern that the examples may be conveniently divided into two broad classes: the first consisting of representations of natural leaves, the second of arbitrary, ornamental forms, more or less based upon such natural growth. During the time he is at work upon the first of these sections, he will find it a pleasant variation in his task, if he occasionally try a real leaf instead. He will find it a more difficult study than the other; but as it is perhaps pleasanter, and also the sort of thing his practice in these outlines ought speedily to lead to, it will give him a sense of greater reality in his labours. We do not want him to feel that these few outlines sum up the whole of what we may legitimately call freehand. When I once again remind him that freehand, in the broad sense of the word, means any kind of drawing in which instruments have no share, he will see that the subject has far wider range. To draw a cat is as much an exercise in freehand as to draw an ornamental scroll, and it is no less so if your model is a veritable living animal. We merely give the ornamental forms first, because they present fewer difficulties to the beginner, and their rigid precision is a valuable discipline at the outset. In drawing the section following the natural leaf forms, the work may also be pleasantly varied by finding other examples of a similar type. The acanthus leaf in this series having been drawn, it would be excellent practice to find such another on the capital of some column, and attempt it when in relief. The designs embossed on book-covers will often afford good examples for a change of work, or the monograms so often stamped on envelopes. By thus at times diverging from the beaten course, the student will realize what his drawing power is doing for him, and see and comprehend more fully its service.

In drawing any object, it is often an advantage to lightly draw an enclosing line passing through all the salient points. Thus, in the oak leaf in this present series, the learner will notice that all the holes of the leaf could be just fitted, so to speak, within an elliptical line. It is a good plan, then, to draw such a line, as it gives greater accuracy frequently to his work, and it can, when done with, be removed. He will see that, in the drawing of natural leaves, this principle has in every case been applied. Where any leaf is serrated, that is to say, the edge of it cut like the teeth of a saw, let him draw a line first of all to get the general shape of the leaf—such a line as would touch the points of the leading serrations. After this has been successfully managed, the smaller tothing of the edges can more easily be added. The copy based on the leaf of the strawberry is a very good illustration of this, which is also indicated in the acanthus leaf already referred to.

Whenever the copy has both sides alike, let him begin by drawing a central line, and in this, as in all constructive lines,

let the work be as good as he has the power of making it. He must not think, because these lines really form no part of the finished work, and are destined on its completion to be removed, that, therefore, they need not be drawn with much care; for on their accuracy or inaccuracy depends, in a very great measure, the question whether the drawing built up by their means shall be a success or a failure. The drawing that thus begins askew must end askew, and no amount of added detail, however good, can hide the fact that the drawing was too hastily commenced. Having got the central line true, the pupil should begin at the top and draw a portion of the left side, selecting first those parts that are contiguous to the middle line, and afterwards adding the outlying parts. He should not, however, finish the whole of the left side first, and then endeavour to reproduce it on the right hand; but rather, having drawn one curve on the one side, draw the corresponding balancing curve on the other side. When a curve starting from the central line ends at some distance from it, a line should be drawn from the outlying point at right angles to the upright line in the middle of the work, and then, judging the distance very carefully by the eye, should be continued from the middle, until it is equal in length on each side of the central axis; its extremity will then give the point for the termination of the corresponding curve on the right hand side. The learner may draw as many such lines as he pleases from all the leading points, bearing in mind that the distances must be judged by the eye alone, and that the lines must be truly perpendicular to the centre line.

The concluding and more elaborate examples, it will be seen, are selected from existing remains of past ornamental art, chiefly of the Renaissance period. It has been thought advisable in these closing sheets, after the student has had preliminary practice at the forms which have been specially designed to facilitate his progress, to set before him some illustrations from authentic sources of the direct application of the power in freehand drawing that he has thus acquired to decorative art, as exemplified in the works of others. He will thus, we trust, see to what end his labours have been tending, and so derive, possibly, greater encouragement to go forward than he might do from the mere copying of arbitrary forms which, though excellent as exercises, may not, perhaps, sufficiently in themselves satisfy the student as to their utility and ultimate bearing. These examples are all what is technically termed "flat"—all ornamental art, whatsoever, being capable of classification under two great divisions, the "flat" and the "round"—or, in other words, surface ornament, be it painted, woven, enamelled, engraved, inlaid, &c., and relief ornament—work resulting from carving, stamping, or modelling. In the first great class, the decorative effect is produced by lines or masses of colour, and in the second by masses of light and shade. A fictitious effect of relief can be produced in surface decorations, as in many sixteenth century illuminated MSS.; but such treatment is not really legitimate, and is never met with in the best periods of ornamental art.

Should the student, on arriving at this point, feel desirous of emulating the skill in design of others, we would recommend him, before entering upon a too ambitious and independent trial, to take one of the present advanced illustrations, and, after studying the general arrangement of lines, to adapt some other foliated forms to them—the leaves of the ivy, strawberry, arrow-head, and many others given in the earlier examples, being admirably suited to such a purpose. It must be remembered, however, that true ornament does not consist in the mere reproduction of natural growth, but in its due adaptation to decorative forms. A certain "conventionalism" of treatment to fit the design for its service is the true principle to adopt, although "naturalism" may, according to circumstances, be more or less suggested. It is a very difficult problem to define how far either principle may be developed in a given design, but if the student will bear in mind the distinction between pictorial and decorative art—the one dealing with the actual appearance, a direct transcript of Nature's loveliness, while the other is a more or less idealized rendering, a suggestion of the natural beauty, rather than an attempt to directly imitate it in an unsuitable material—such consideration will prove sufficiently a safe guide to indicate the right course to adopt, though it is impossible to lay down any general rule to regulate the precise degree of conventionalism that may in any special case be desirable.

Though these examples will be found to be of the best practical size for working from, it will sometimes be a piece of good discipline to re-draw them to a larger or smaller scale, and more especially if any tendency to unfair measuring manifests itself. In all examinations, too, in which freehand enters, the examples have always to be enlarged or reduced. If, therefore, the intention is to go in for any such examination, it will be well to

bear this in mind from time to time. In thus altering the scale, the pupil must be careful to keep his work in the due proportion seen in the copy. As his work progresses, even if it appears satisfactory, let him turn it upside down occasionally: his eye will then, very probably, notice little inaccuracies that would otherwise escape observation, as he sees his work under fresh conditions; and the eye, somewhat jaded before, detects more readily any errors that may have crept in. Let him avoid using bread, or the preparation known as ink-eraser—the bread, because the crumbs will frequently get under the paper, and so spoil a good curve by the unevenness they cause, and the ink-eraser because it leads to carelessness of work. The pupil using it does not take the pains he should do, as he knows that, no matter how bad the line, this preparation will remove it. It also damages the surface of the paper. The slovenly style of work to which it leads is, however, the greatest objection to its use. India rubber is sufficient for all purposes. No line should be drawn in the first sketch so darkly that that would not remove it: while, in the finished drawing, the darker lines employed are those which the preliminary sketch should have shown to be correct, and all erasure then becomes needless. Bread may be occasionally used to clean the whole surface of the paper; but if due care be taken, and a piece of clean paper kept under the hand during the progress of the work, the paper need never get so soiled as to render the use of bread necessary.

Where one form passes in front of another, draw the lower one faintly through, as indicated by the dotted lines seen in several of the examples. Without this precaution, the forms are very likely to have a disjointed look.

In conclusion, let me once more urge on the student that, while the discipline is a valuable one if due pains are exercised, the value will be very slight without such care. No arithmetician is satisfied with a working that comes *nearly* right; no mathematician will accept an *approximation* to the truth merely; let me then impress upon the learner the importance of attaining as full a measure of proficiency, step by step, as lies in his power, since a *few* of the examples well drawn, will have a value a hundred-fold greater than could possibly result from a hurried execution of the whole series.

F. E. HULME, F. L. S., & C.

FRET WORK.

Continued.—(See page 253.)

We will now suppose the tools have been purchased, and a suitable piece of wood obtained to work a small picture frame, and that the tyro intends trying his hand in his own room with a table to work on.

Being a small frame a piece of wood a quarter of an inch thick will do, and it should be planed up smooth on both sides. The first thing to do is to select a design. There are several capital designs to be purchased through establishments in Montreal cheap, in sheets with several articles on one sheet.

Having decided on the pattern, which should not be too intricate, commence by pasting it on the prepared piece of wood smoothly. Next place the *horse* on the table so that one of the openings lie over the edge for four or five inches, and apply the cramp to an off corner out of the way of the saw to keep it steady. Then perforate all the openings to be cut in the pattern with the drill or the awl as an entrance for the saw. If the latter tool is used, care must be exercised that too much force is not used or the wood will split. Insert a medium saw-blade, with the teeth towards the handle, in the frame by the screws, and tighten it with the screw in the handle. Seat yourself on a stool so that the table will be about breast high; place your work on the *horse*, and hold it flat with your left hand, and with the saw in your right commence sawing out the outside of the design. The blade of the saw should be as near perpendicular as possible, the cut being given with the downward movement of the hand, and the work slowly guided round the curves by the left hand. The method of holding the saw is seen in the Engraving, Fig. 7. (see June number, page 188). No doubt some little difficulty will be experienced at first in working the saw round the sharp corners, and also so as to produce a smooth and even appearance on the edge, but practice will teach that on rounding the short curves the strokes of the saw must be short, quick, and feeble, and that in the larger curves the whole length of the blade may be used with more decision. No great force is required or should be used, as when the saw seems to stick fast it is often when the blade is twisted and not fairly before the work. A little grease or soap occasionally applied to the blade of the saw will be found advantageous. Having sawn round the

outside of the pattern, the inside of the design may be commenced by loosening the saw-blade with the top screw, and inserting it in one of the holes made by the drill. The saw-blade having been replaced and tightened, cut round the pattern, and if, on removing the piece sawn out, it is found any of the sharp curves are not well and sharply cleaned out, a stroke or two of the saw in opposite directions will oftentimes suffice to make a sharp, well-defined angle. Sometimes it is necessary to back the saw to the drill hole to make another start in another direction. This is easily accomplished by backing the saw with an up and down movement as if sawing. When the whole of the design is cut out all the rough places in the pattern can be smoothed out with a half round file, care being used to keep the file level on the work.

The whole design being complete, the next thing is to remove the paper left on the frame. This is accomplished by slightly damping it and peeling it off a little at a time. Be careful not to wet the frame, or it may warp. Should this be the case at any time, damp the hollow side and place it under a weight for a time.

The little frame having been neatly glass-papered down (not across the grain), and all the roughness taken off the cut edges with a half-round file, it should have three neat pieces of wood, with a rabbet, glued on the bottom and two sides, near the sight edge, so as to slip in a glass and the picture.

Many fretwork patterns are much improved by backing up with coloured cloth, velvet, paper, or wood, and either can be easily attached with a little glue.

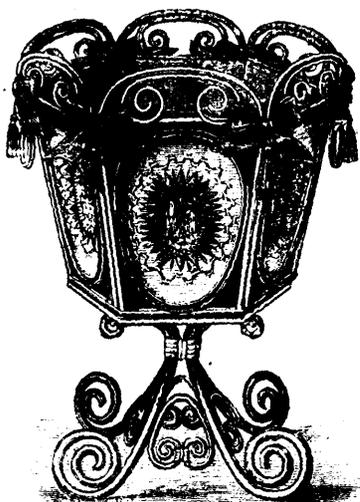
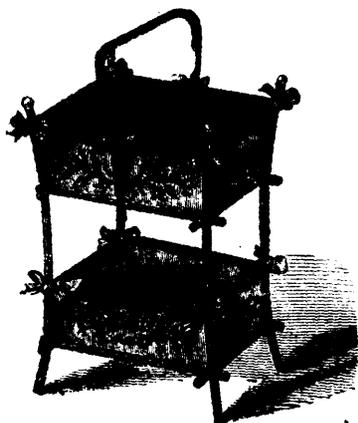
The little frame we have in hand would be improved by backing up with scarlet cloth. The colour being seen between the cut out design gives it a much richer appearance. Before any article is backed up, if it is meant to be stained, varnished, or polished, it will be necessary to complete this operation before so doing, and instructions will be given in another part of this work.

When a little practice has been acquired in the use of the saw and tools, a *pair of frames* can be produced with almost as little trouble as one, in the following way:—Procure two pieces of wood not thicker than necessary, and paste them together by inserting a sheet of paper between them pasted on both sides, and place under pressure till dry; when the pattern is cut out they may be separated by inserting carefully a thin table knife, when the paper will give way and the wood will be separated. The two pieces can be secured together also by drawing pins driven into the wood in various parts of the design. The wood can be separated as before with a thin knife and the pins drawn out.

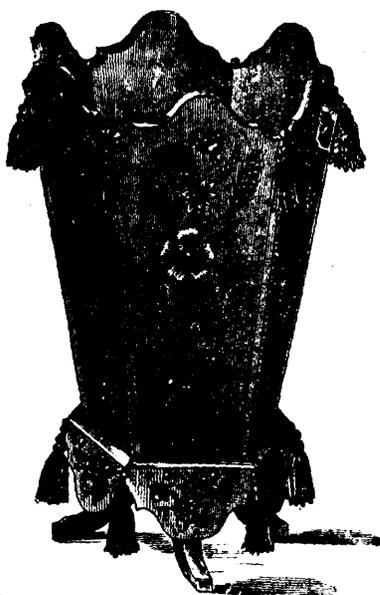
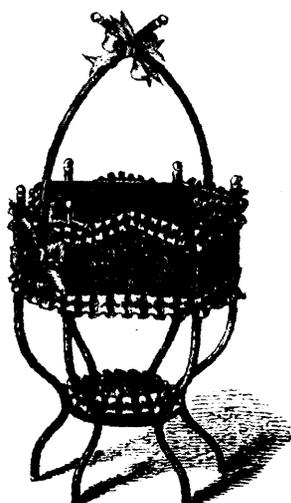
In the foregoing instructions the general rules for work have been laid down, but many particulars not mentioned are most important in order to produce first-class fretwork. With this end in view, we will take in hand another simple pattern, so that we may say many things we had not the opportunity to allude to before, without somewhat confusing our pupil in what it was desired to be most perspicuous.

We will take in hand the end of a bookslide. The preceding engraving will show the pattern which is drawn just half the size the article will be when finished. The pattern measures $3\frac{1}{2}$ inches by $2\frac{1}{2}$, so that it will be necessary to obtain a piece of suitable wood $\frac{3}{8}$ of an inch thick, and in size $6\frac{1}{2}$ by $5\frac{1}{2}$. It will well suit our purpose of a dark colour, so that it shall be pear-tree. Having selected the wood, the next thing is to take a pattern from the engraving, and recommend the learner as may not be skilled in free-hand drawing to copy it in the following way, which is often practised by draughtsmen:—Draw parallel lines on the copy half an inch apart, from top to bottom and from side to side, or if it is objectionable to pencil mark the book, draw the lines on a piece of tracing paper, and place over the copy. Next draw lines one inch apart on paper the size of the board. Now with these lines as guides, the pattern of the bookslide end can soon be copied, and you will have a copy of the exact size required. It will be as well, in copied patterns, to roughly mark with a pencil the apertures to be cut, as seen in the engraving *A, A*, as mistakes are likely to happen in entering the saw. As this is one end of a bookslide, another will be required to complete the article, and while we are on the subject of pattern copying we will say that the process we have described need not be gone over again, but when the pattern has been completed it can be copied in a minute by laying on it firmly a piece of paper of medium thickness, and rubbing over it a heelball, when the pattern will appear ready for work. Any patterns can be copied by tracing them on tracing paper, when they belong to a friend, or if is not desired to use them by pasting on the wood. To those of our readers who have been to a school of art and learning

ORNAMENTAL DESIGNS FOR THE DRAWING ROOM.



FLOWER-POT STAND.



WASTE
PAPER
BASKET.

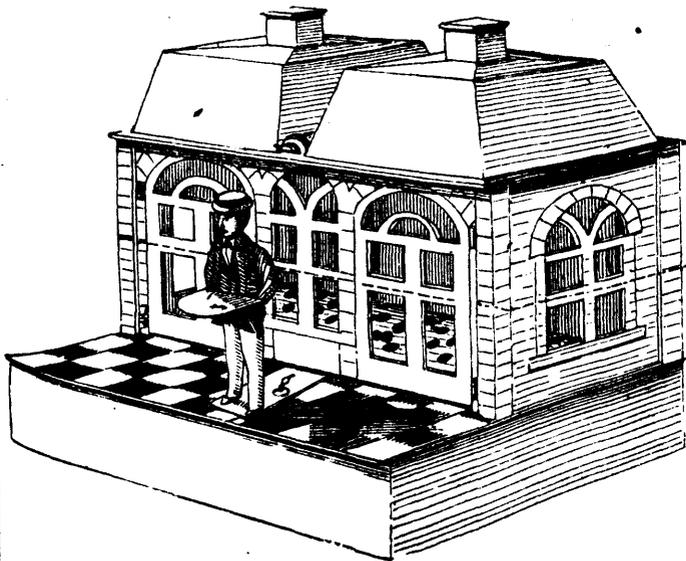
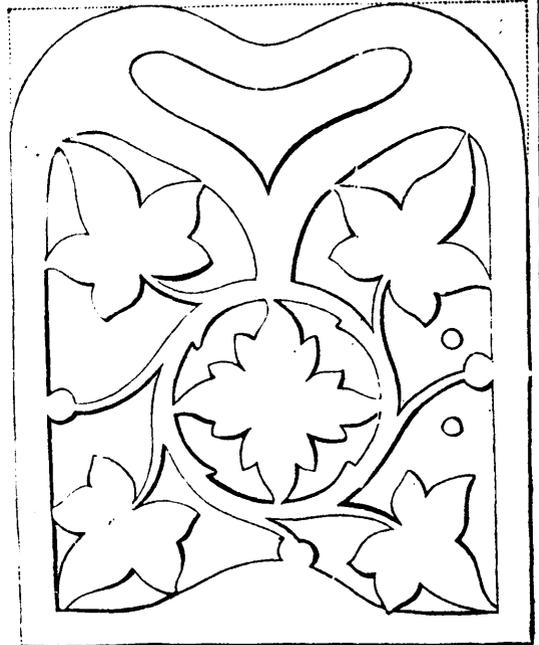
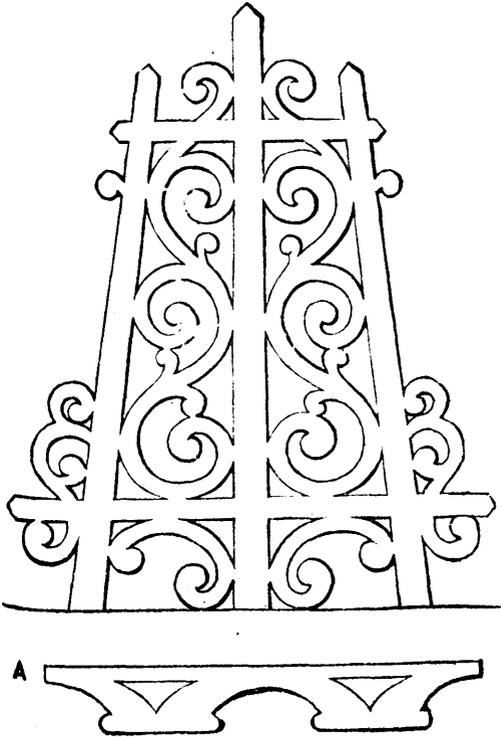


DRAPERY OF PAPER-BASKET.



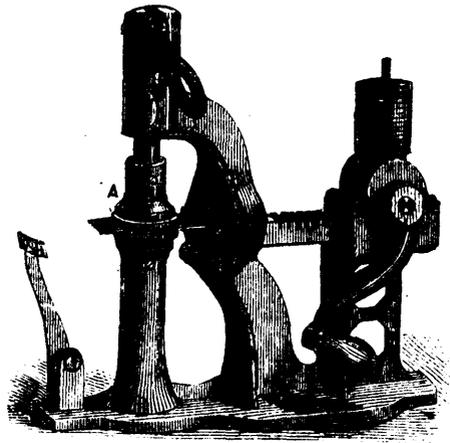
DRAPERY OF PAPER-BASKET.

FRET WORK.



A NOVEL MONEY BOX.

A DARNING MACHINE.



ATHLETIC EXERCISES.



FIG. 1.—RUNNING.

FIG. 2.—RUNNING.

a little free-hand drawing, an original design will be a "labour of love." Another method for producing an original design we saw employed by a grammar school boy with a "mortar board" on his head: wanting a pattern for a letter rack, he doubled a half sheet of note paper together, and with a scissors in about two minutes produced an original design in scrolls, with a centre that did him great credit. Both sides of course were exactly alike, and the pattern was shaped in graceful curves. A number of patterns could be made in this way for almost any article. A very good and cheap method often employed is by placing a sheet of carbonic paper on the sheet on which the copy is to be traced, and the original on the top, when with a style or pointed stick go over the outline, and a good copy will be obtained.

We will suppose the design has been copied by the method indicated, and is now ready to lay down on the piece of prepared walnut or holly. After so doing make the holes in the pattern with the drill, as marked *B, B*, and in all the parts of the pattern to be perforated, and proceed to saw them out as before directed. There are a number of very sharp angles in this pattern, and to prevent breaking the saw, and difficulty in turning, do not saw into the angles, but turn round; keep as much as possible on the lines of the pattern, and when the piece is cut out return to the angles, which with a stroke or two of the saw in two directions, will clear them out. Should the wood be damp, you may find the saw clog with saw-dust, when it will be very difficult to work. Do not force or twist the saw, or you will break it, but loosen it entirely from the frame, and draw it out of the pattern. No doubt with the preliminary instructions, a pair of the bookslide ends can now be well finished, as the design is not difficult to cut; but we have not done with the pattern, as in the next chapter we shall give another illustration, and carve the leaves, which will greatly add to their beauty.

Our next illustration is a table easel, to hold a portrait or photograph. It is drawn one fourth the size it is meant to be cut out. In the engraving it measures 3 inches, while it will stand on the table 12 inches high. This must be copied as before described, but parallel lines must be drawn a quarter of an inch apart both ways on the copy, and 1 inch on the drawing paper. But little requires to be said about the easel, except that walnut would be suitable about a quarter of an inch thick. The small piece at the bottom *A* is a little shelf, and must be fastened with glue on to the cross-piece *B* for the picture to rest on.

The pattern of the easel demands a remark or two, and has been selected to this end. While it is desirable in a large majority of patterns to cut round the outside first, yet this is a pattern with small work on the outsides, which, without the support of the outside wood, would be liable to break off in cutting out the pattern of the middle. In the various patterns which come to hand judgment is required in this respect. At first in fret cutting the operator has a difficulty in cutting the centre of a scroll such as is seen in this easel, and round. In cutting these centres, handle the saw tenderly a little at a time, and keep the saw on the line.

There are many beautiful patterns the reader will be likely to cut, which will require judgment in cutting, so as to leave on wood till the last as a support for weak places, which would be surely broken off if judgment is not exercised.

If a perpendicular position is preferred by the operator, the design may be secured in a vice, and cut out, being removed from time to time to suit the action of the saw.

Full-sized patterns for almost any article can be obtained on application to the Editor of the *Canadian Mechanics' Magazine*.

HANGING FERNERIES.

On page 241, we give a beautiful ornament for window decoration. The bottom part is of hard wood, turned, and may be beautifully ornamented. It should be lined with a zinc pan, in which the ferns are to be planted, and covered with a glass shade which preserves the plants from dust and the dry atmosphere so fatal to plants exposed to its influence. They require but little care, and are easily managed. It is a very beautiful design, and will well repay the expense. They are a beautiful and pleasing ornament in any house.

GREEN GOOSEBERRIES make a nice pudding by stirring a pint of them into a pint of batter, and either baking or boiling.

HOUSE ADORNMENTS.

(See page 252.)

Nothing gives a home a more cheerful appearance than a few plants and flowers, and when they are accompanied with tasteful accessories, the fine effect is much increased. The two small illustrations which we give, will, at a glance, show how much such simple articles add to the effect of a window, particularly in towns, where anything in the form of flowers and foliage outside of a dwelling is a grateful relief to the eye when all around is brick and stone. Ornaments of this kind are within the reach of all; there is hardly a mechanic who is not capable of making shelf brackets similar to our designs, and we feel assured amateurs will feel grateful for the hint who wish to present to their lady friends specimens of their workmanship in beautiful brackets for window gardening.

THE PALACE HOTEL, BUXTON.

(See page 249.)

LARGE DRAWING-ROOM.

This room has been decorated and furnished on a scale seldom adopted, in similar establishments. The arrangements of the carpet and furniture are such that the room can be speedily converted into a ball-room, the flooring having been specially prepared for that purpose. The room is 70 ft. by 40 ft., and is lighted by six large windows, the entrance being obtained from the corridor on the west, with an exit to the croquet lawn. The furniture is in the style of the last century, and one is struck on entering with the rich, yet subdued effect which is obtained by the low-toned covering of the furniture, draperies, and decorations, relieved from monotony by the masses being broken up with hand-painted panels of birds and flowers on gold ground. The ceiling is divided into panels of cool buff and pale blue, the ornament being of the same period as the furniture, some of the members being picked out in colour and gold. The large cove over the cornice, extending round the room, is divided into panels, with the signs of the zodiac, and flowers, fruits, and birds, typical of the months, painted by hand.

The walls are covered with an all-over pattern in different shades of neutral green; the furniture is ebonised, with mouldings picked out in gold, carved frieze, bevelled edged mirrors, and panels of figures, peacocks and other birds, and flowers, painted on gold ground. The principal pieces of furniture are a large cabinet, console-table, jardinière, chimney-glasses, and centre ottoman. The architectural woodwork has been carried out in the same spirit, the panels of the doors being filled with stained glass of appropriate design. The carpet is of Wilton manufacture. The room at night is lighted with gas, having a ten-light chandelier of polished brass, with a five-light chandelier on either side, and lights fixed to the mirrors in various parts of the room.

THE CHIRONECTIFORM OR ANGLING FISH.

(See page 248.)

The chironectiform is found in the vicinity of New Zealand. There is also a neighbouring European genus, the lophius, or angler.

This curious fish gains its livelihood by fishing for his fellow fish, and sets a trap with which nature has provided him in the shape of an extraordinary apparatus located on the top of his head. The appendage is a flattened, bony member, covered with a granulated skin, and working on a universal motion joint, and having a thick muscular base. At the free end of the bony shaft is a semispherical gland, resembling much in form the seed vessel of the gum tree (*encolyptus*) covered in its front aspect with a brilliant nacreous integument, and having an aperture connected with its interior.

From this gland rise several soft branched appendages with white shining vermiform filaments at the top of each branch. It is stated to crouch close to the ground, and by the action of its fins to stir up the sand or mud. Hidden in the obscurity thus produced it elevates its appendages, moving them in various directions by way of attraction or as a bait. The small fishes which may approach, either to examine or seize, immediately become the prey of the fish.

HINTS ON PASTRY MAKING.

The following hints on pastry making, by an old housekeeper, are worthy of study. The Americans are too much addicted to pastry, but since the taste is already formed, it remains only, in the preparation of such food, to make it as little injurious as possible by making it good.

The art of making paste requires a good memory, practice and dexterity; for it is principally from the method of mixing the various ingredients of which it is composed that paste acquires its good or bad qualities.

Before making paste wash the hands in hot water; touch the paste as little as possible, and roll it but little; the less the better. If paste be much wetted it will be tough.

A marble slab is better than a board to make paste on; both, together with the rolling pin, cutters and tins, should be kept very clean, as the least dust or hard paste left on either will spoil the whole.

The coolest part of the house and of the day should be chosen for the process during warm weather.

Flour for the finest paste should be dried and sifted, as should pounded white sugar.

Butter should be added to paste in very small pieces, unless otherwise directed.

If fresh butter be not used, break salt butter into pieces, wash it well in spring water to cleanse it from salt, squeeze it carefully, and lay it upon a soft cloth. Fresh butter should also be well worked to get out the buttermilk.

After the butter has been pressed and worked with a wooden knife on the pasteboard, press it very lightly with a clean soft cloth, to absorb the moisture. If good fresh butter is used, it will require very little, if any, working.

Lard is sometimes used instead of butter, but the saving is of very trifling importance when it is considered that, although lard will make paste light, it will neither be of so good color or flavor as when made with butter.

Dripping, especially from beef, when very sweet and clean, is often used for kitchen pies, and is, in this instance, a good substitute for butter, lard, &c.

In hot weather the butter should be broken into pieces and put into spring water, or into ice; but on no account put the paste into ice, else the butter in it will harden it, and in baking, melt, and separate from the paste.

The same thing happens in winter, when the butter has not been sufficiently worked, and the paste is rather soft; for, though the season be favorable to the making of paste, care must be taken to work the butter sufficiently.

In winter, paste should be made very firm, because the butter is then so; in summer, the paste should be made soft, as the butter is then the same.

It is important to work up paste lightly and gradually into a uniform body, no strength nor pressure being used.

It is necessary to lightly flour both sides of paste when you roll it, in order to prevent its turning gray in baking; but, if much flour be sprinkled on it, the paste will not be clear.

Attention to the rolling out is most important to make light puff-paste; if it be too light, it may be rolled out once or twice more than directed, as the folding mainly causes it to rise high and even.

Be sure, *invariably*, to roll puff-paste *from you*. Those who are not practised in making puff-paste should work the butter in by breaking it into small pieces, and covering the paste rolled out; dredge it lightly with flour, fold over the sides and ends, roll it out very thin, add the remainder of the butter, and fold and roll as before.

To insure lightness, paste should be set in the oven as soon after it is made as possible; on this account, the paste should not be begun to be made until the oven is half heated, which sometimes occupies an hour. If paste be left 20 minutes or more before it is baked, it will become dull and heavy.

Paste should be light, without being greasy; and baked of a fine color, without being burnt; therefore, to insure good baking requires attention.

Puff-paste requires a brisk oven; a moderate one will best make pies and tarts, pudding and biscuits. Regulation of heat, according to circumstances, is the main point in baking.

If the oven be too hot, the paste, besides being burned, will not rise well; and if it be too slack, the paste will be soddened, not rise and want color. Raised pies require the quickest oven.

When fruit pies are baked in iron ovens, the syrup is apt to boil out of them; to prevent this, set a few thin bricks on the bottom of the oven before it is heated; but this will not be requisite if the oven has a stone bottom.

DOMESTIC RECEIPTS.

FRENCH BREAD.—Take nice rice, $\frac{3}{4}$ lb.; tie it up in a thick linen bag, giving enough room for it to swell; boil from three to four hours till it becomes a perfect paste; mix while warm with 7 lbs. flour; adding the usual quantities of yeast, salt, and water. Allow the dough to work a proper time near the fire, then divide into loaves, dust them in, and knead vigorously. This quantity will make 13 lbs. 7 oz. of very nutritious bread.

BROWN BREAD.—Take equal quantities of Indian meal and rye flour, scald the meal, and when lukewarm add the flour; adding one-half pint of good yeast to four quarts of the mixture, a tablespoon, even full, of salt, and half a cup of molasses, kneading the mixture well. This kind of bread should be softer than wheat flour bread. All the water added after scalding the meal should be lukewarm. When it has risen well, put it to bake in a brick oven or stove, the former should be hotter than for flour bread; if a stove oven, it should be steamed two hours then baked one hour or more; when done it is a dark brown. The best article for baking this kind of bread is brown earthenware—say pans eight or ten inches in height, and diameter about the same; grease or butter the pans; put in the mixture; then dip your hand in cold water and smooth the loaf; after this slash the loaf both ways with a knife, quite deep. Some let it rise a little before they put it to bake. Many people prefer this bread made of one-third rye flour instead of one-half. When it is difficult to get rye, wheat flour will answer as a substitute. It adds very much to the richness and flavour of this kind of bread to let it remain in the oven over night.

GINGER BREAD.—Mix together $3\frac{1}{2}$ lbs. of flour; $\frac{3}{4}$ lb. butter; 1 lb. sugar; 1 pint molasses; $\frac{1}{4}$ lb. ginger, and some ground orange-peel.

RULES TO BE OBSERVED IN CAKE-MAKING.—1. In making cakes, use refined white sugar, although clean brown sugar does as well. 2. Use good sweet butter in every case. 3. Cake mixture cannot be beaten too much. 4. An earthen basin is the best for beating cake mixture, or eggs in. 5. A good regular heat must be kept up in the oven. 6. Use a broom splint to run through the thickest part of the cake; if done, it will come out clean, if not done, there will be some of the dough sticking to it. This rule applies to bread also. The following cakes will be found to come out all right with a fair trial.

SPONGE CAKE.—Sift 1 lb. of flour and 1 lb. of loaf sugar; take the juice of 1 lemon, beat 10 eggs very light, mix them well with the sugar, then add the lemon and flour: if baked in a pan two hours is necessary.

LOAF CAKE.—Take 2 lbs. of flour, $\frac{1}{2}$ lb. of sugar, $\frac{1}{4}$ lb. of butter, 3 eggs, 1 gill of milk, $\frac{1}{2}$ teacupful of sweet yeast, cloves and nutmeg for spice.

CREAM CAKE.—1 teacup cream, 2 teacups sugar, three well beaten eggs, teaspoonful saleratus dissolved in a wine glass of milk, piece of butter half the size of an egg, flour to make as thick as pound cake, add raisins and spice to taste; wine and brandy if you like.

THE DARNING MACHINE.

(See page 253.)

The accompanying illustration represents the darning machine, the invention of Mr. Hosmer, which in a couple of years has attained a wide and it would appear deserved popularity in the United States, and is now being introduced into this country. The drawing, which exhibits the needles out, is almost sufficiently explanatory in itself; but it will be enough to say that the part, A, drawn up by the loop seen at the top, and the stocking to be darned is adjusted between the two plates, through which the needles are made to pass, in corrugations provided for them, when the crank handle is turned. In front of the needle points and to the left of the engraving is an upright bar, supporting a cross piece containing as many knobs as there are needles, generally fourteen. The yarn is threaded through the eyes of the needles, one end secured to an end knob, and the portions between the needles drawn up in loops and passed over the respective knobs. The handle is then turned, the needles draw back the threads, and the bar bends over and allows them to escape off the knob; a slight forward motion of the needles shifted for another "stitch," or for crossing. The instrument is small and can easily stand on the sewing machine table; it cannot well get out of order, and if treated properly will last a lifetime. It stands alone as the only machine of the kind, and a brief inspection will show that it does at two threadings of the needles work, that would be represented by a great many stitches in the hand process.

Hold the Fort.

Voice.

Andante.

Piano. *mf* *f*

1. Ho! my comrades, see the sig-nal Wav-ing in the sky!
2. See the high-ty host ad-vanc-ing, Sa-tan lead-ing on;
3. See the glo-rious ban-ner wav-ing, Hear the trum-pet blow,
4. Fierce and long the bat-tle ra-ges, But our help is near;

p

CHORUS.

Re-in-force-ments now ap-pear-ing, Vic-to-ry is night!
 High-ty men a-round us fall-ing, Cou-rage al-most gone!
 In our Lead-er's name we'll tri-umph O-ver ev'-ry foe.
 On-ward comes our great Com-man-der, Cheer, my com-ra-des, cheer!

"Hold the fort, for I am com-ing,"

mf

Je-sus sig-nals still, Wave the an-swer back to Hea-ven,—“By Thy grace we

will.”

f