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CANADIAN MECHANIC MAGAZINE AND PATENT OFFICE RECORD

Vol. 6. MAY, 1878. No. 5.

TREE WASTE AND TREE CULTURE.

IN an article that appeared some months past in this MAGAZINE, we drew attention to the rapid destruction, from fire and waste, going on in the forests of Canada, and the immense pecuniary loss to the country that must ensue, if some stringent steps are not soon taken to save our pine forests from annihilation. If not, then we need no prophetic gift to say that half a century hence merchantable lumber will be as hard to find up the tributaries of our great rivers, as it is now in the denuded woods around us, in which, not more than thirty years ago, there was abundance of pine of the finest description, from which the wooden ships of the English Navy were fitted with their large masts and spars. The subject is one of so much importance to the Dominion, that this wholesale destruction of what has hitherto been one of the largest sources of wealth to our merchants, and has, in its various ramifications, given so much employment to our people, must end in a total cessation of the export of lumber to the markets of Great Britain.

We might readily suppose that, if stringent laws were passed by the Government of the country to save from destruction and waste its forests, caused by lightning fires in the bush during the heated term, or from burning up cleared land — except at certain seasons — that these laws should be sufficient to check the evil. But such laws are far more easily made than enforced; and if we look for example to the United States to observe how far their State laws have been effective in putting down many evils of this nature, we will find that they have been of little use, and that it has been to the formation of societies and the energy of their people, that law-breaking and destructive habits, horse stealing, orchard robbing, and similar offences, have been almost entirely put down where such societies exist. The most effective way, therefore, to save the forests of Canada from early destruction, would be by the formation of an organized society, supported by law, whose members should be spread over the whole country, giving information of infractions of the law, and bound to take the necessary steps to bring infringers of it to punishment. But irrespective of the necessity of such a society for the protection of our forests, it would have another object in view, of equal importance, and of equal benefit to the community; and that would be to stimulate the agriculturist to the planting of trees on every spot of their farms which are too rocky, or too unproductive, to produce grain crops. Hard-wood timber will grow to a great size on rocky land, because the soil is generally strong, and the roots will find nourishment where nought else can be cultivated. Pine trees will attain a great height on sandy soil, where little else will grow; and on swampy lands, tamarack, which is a very valuable timber, particularly for railway ties, can be grown with little trouble.

There are two most important points to be considered in relation to the subject.

First: How to save our forests from destruction.

Second: How to renew the waste land of the country with a new growth.

If any one is disposed to think that the pine districts of our forests are inexhaustible, let him look at the map of Canada, and he will see how much of its surface has already been cleared of its trees in a single century; and then he can judge that, if the cultivation of the soil and destruction by fire proceed in the same ratio with the increase of the population, how much will be left of pine lumber at the close of another century. Let him not suppose, because he sees on the map an area of wild land, equal to a large portion of Europe, that that immense tract is all covered with forest-land bearing merchantable timber—or, that the banks of the rivers and their tributaries are studded with pine. Why, more than nine-tenths of that immense space is composed of mountains, lakes, swamps, grass plains and barren land, and the greater portion of it is in a northern latitude where the pine tree does not flourish. The greater portion of the water-sheds slope towards the Labrador coast, Hudson's Bay, and the Arctic ocean, and enter the sea where no lumbering could be carried on with profit, even if merchantable timber did exist in those cold regions.

Ask the lumberer, and the settlers on the great tributaries of the St. Lawrence and Ottawa, what they know

about the lumber of those districts, and they will tell you that year after year they are obliged to push further back from the river's edge into the depths of the forest, to find, with difficulty, any of that magnificent growth of pine of which, at one time, Canada could proudly boast.

It will not be many years, therefore, at the present rate of consumption, as well as needless destruction of the pine regions, before Canada will need all that remains of constructive timber for home consumption, and then a source from which her merchants have hitherto derived great wealth and her people employment, will be closed for ever, unless speedy and prompt measures are taken to check the waste and renew the growth.

There could be no nobler stimulant for the formation of a society than one chartered and organized for this great object, and the first men in the country might feel proud to be at its head. A contemporary, in writing on the subject of the destruction of trees going on in the United States, makes some most sensible remarks, a few of which are contained in the following extract :—

"Now consider the enormous amount of lumber used yearly in manufactures. Nearly $144,000,000 is invested in the sawn lumber industry alone, that is, the production of laths, shingles, and boards. Add to this the fact stated by Professor Brewer, that wood forms the fuel of two-thirds of the population, and the partial fuel of nine-tenths the remaining third, and some general idea of the enormous drain constantly in progress upon our forests will be reached. This, however, is only the direct draught for purposes of utility. Immense areas of woodland are yearly denuded by forest fires, large tracts are purposely burned as a speedy way of clearing, and thus the wooded regions are rendered more and more sparse. If forest fires were prevented as far as is practicable, if trees were constantly being planted, and if the reckless denudation of woodlands could be stopped by the laws already in existence, but apparently not enforced, there is little doubt but that we possess timber enough to supply indefinitely all our needs either as fuel or for manufacturing purposes ; but save in isolated instances trees are not being planted, we have no schools of forestry such as exist in Europe to encourage sylviculture, and, as the recent proceedings in Congress have shown, a part of the population claims the right for private ends to denude the woodlands now owned by the whole country, and defenders in the Legislature are not wanting to support them.

"We have already taken occasion to point out the dangers which result from tree destruction. The exact relation of forests and rainfall is not definitely settled ; but there are very numerous cases on record where the destruction of forests has resulted in the production of desert wastes, and where trees have been replanted humidity has returned. It is laid down, however, by such authorities as Dr. J. Croumbie Brown, of Scotland, and others who have made especial studies of the subject, that "within their own limits and near their own borders forests maintain a more uniform degree of humidity in the atmosphere than is observed in cleared grounds. They tend to promote the frequency of showers, and if they do not augment the amount of precipitation they probably equalize its distribution through the different seasons.' 'In India,' says Mr. B. G. Northrop, in a late address before the Connecticut State Board of Agriculture, 'three quarters of a million people have been starved to death since the forests have been cut off, causing the springs to dry up.'

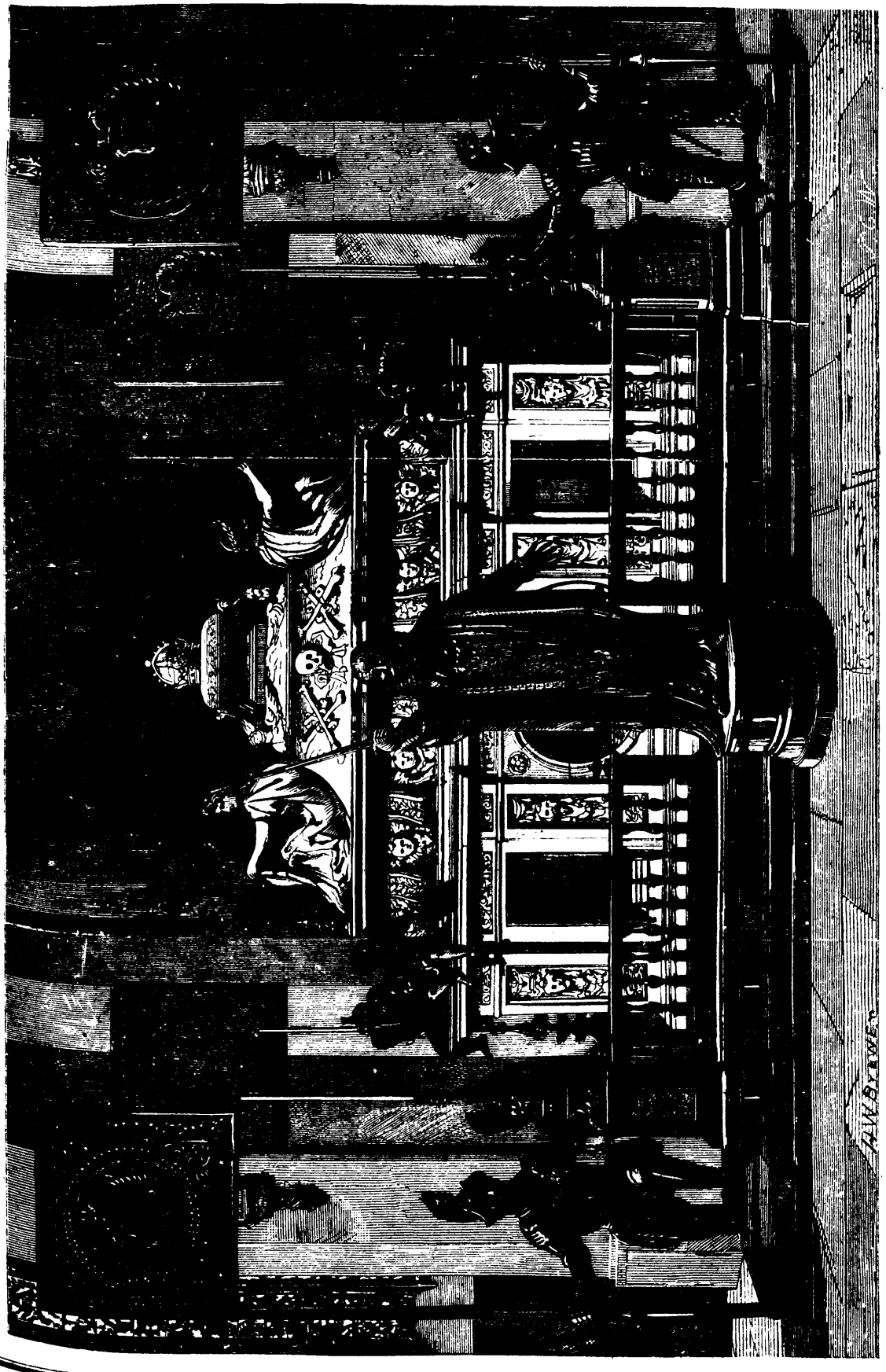
"It is needless to multiply warnings of this kind. In the thickly settled countries of Europe each generation is bound by law to leave the forests in as good condition as it found them. Forests are protected from fire, and they are regarded as public property. Until we adopt some similar course, each succeeding generation will transmit to posterity woodlands more and more depleted. The result is only a question of time. The natives in parts of South Africa tell of giant trees and forests, fertile lands, and abundant floods and showers, all existing or occurring in a region now little more than a dry and arid desert ; such will be the traditions of our own descendants. As the soil becomes unfit for agriculture, migration will follow, favored regions will receive an overplus of population which cannot obtain all its supplies from the soil, and dependence upon other nations for necessaries of life, the first step downward in a country's decadence, is taken. Exhaustion of resources must ultimately succeed, and with it the end of national existence."

We will not go so far as the writer of the above in agreeing entirely in the concluding portion of his remarks, for any country inhabited by an intelligent and thinking mechanical race, like Canada or the States, would anticipate, before too late, the loss, and find the remedy necessary to check the evil by replanting the land. But, in the meantime, there are thousands who never can realize the idea that the timber of this vast country is fast becoming exhausted and destroyed, until the facts are brought in truthful figures before them.

One of the first things necessary for a society to do would be to endeavor to renew the forests, which could be done at a very trifling cost, and these forests would, in half a century, become a source of future wealth to the country. If all agriculturists whose farms are bare and bleak from being denuded of the primeval growth of timber, of every description—this is particularly the case on the prairie farms in the Province of Quebec—would commence at once to plant groups of trees, for shade and cattle shelter, and plant the unproductive spots which are to be found on every farm with quick-growing timber, they would not only benefit from its influence on the climate, by breaking the sweep of the bleak and cutting winds, and by retaining a moist atmosphere in their neighbourhood, which otherwise would be parched up with dry winds and heat, but they would be erecting on the soil a savings bank and a mine of wealth, on which their children, in years hereafter, could, from time to time, draw a cheque. The subject is one of great importance, and well worth the gravest consideration of our statesmen.

SEEING THE EARTH GO ROUND.

The directors of the forthcoming Paris Exhibition propose to repeat Foucault's experiment on a large scale, and to demonstrate to *tout le monde* that the earth does revolve. The experiment depends upon the property of a pendulum to keep swinging in the same plane if its support is free to move ; and if we could set up a suitable pendulum at the North Pole, we should see it swinging round the circle once in twenty-four hours, but at the same time we should not know that it was the earth that was moving, and not the pendulum. At any place not directly over the axis of the earth the point of suspension partakes, of course, of the rotation of our planet, and a correction for that movement would have to be made ; but, as that can be calculated to a nicety, the demonstration of its correctness afforded by the pendulum would be proof of the rotation of the earth. Foucault's experiment was made under the dome of the Pantheon at Paris, and it was repeated in America ; but the proposed exhibition will carry it out on a larger scale. The weight of the pendulum to be erected in the Champ de Mars will be about 660 pounds, the length of the rod being some 220 feet. It will be hung in such a manner that the points of suspension will be free to move, and consequently the pendulum will continue to swing in the same plane, or nearly so, because the friction of the supports will necessarily exercise some effect. The spectator, standing on what appears to be a stationary floor, will notice that the pendulum changes its line of oscillation as regards the floor, and if he understands the question to be answered he will know that the floor upon which he stands is being carried round the pendulum by the rotation of the earth. Professor Tobin, of Richmond, Kentucky, has recently devised an improvement on Foucault's apparatus, his pendulum being hung to a stand about 6 feet high, in such a manner that the rotation of the earth is shown by the changed position of an index which moves over 1 deg. of the scale in about six minutes. His pendulum is moreover so delicately suspended that it maintains its motion for about 12 hours, and yet can be retarded, or even stopped, by blowing upon it.—*Echo.*



MONUMENT OF THE EMPEROR LEWIS THE BAVARIAN, IN THE CATHEDRAL AT MUNICH.

DOBBIN'S IMPROVED HARROW.

The advantages claimed for the improved harrow illustrated in the accompanying engravings are as follows· It is easily portable, and need not be placed upon a wagon to transport it to and from the field; the construction of the teeth enables work to be done equally well at the sides as at the middle; the parts being hinged, the harrow can be folded into small space; the teeth are especially adapted to sod ground, and work well whether the soil be rough or smooth; by removing two or three teeth for each row, three rows of corn can be cultivated at once, and this can be carried on until the plants are several inches high.

The frame is made in two sections, each consisting of five parallel crossbars with transverse pieces as shown in Fig. 1. The sections are hinged by the long bolt, A, passing through the overlapping ends of the bars. The ends of the transverse bars, B, are rounded to adapt them to serve as runners when the harrow is turned over to enable it to be drawn from place to place. The teeth are separately shown in Fig. 2, and are made wedge-shaped so that they will cut sods, etc., clear themselves of rubbish, pass through the ground easily, and enter it to greater depth. The shanks of these teeth are passed through holes in the bars and secured by nuts. Projections, C, on said shanks prevent the teeth from turning. To the front and rear bars are attached hooks, so that the harrow may be drawn with the inclined or the straight edges of the teeth forward, as may be desired. By means of the hook, D, the draught may be applied to the lower section when the two sections are folded together.

Fig. 2

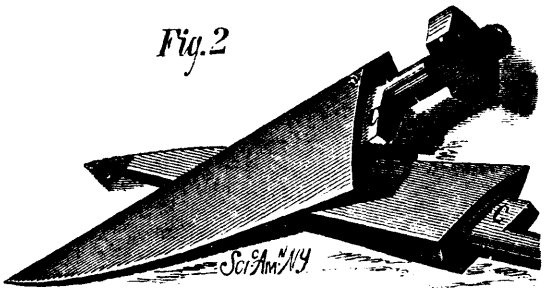
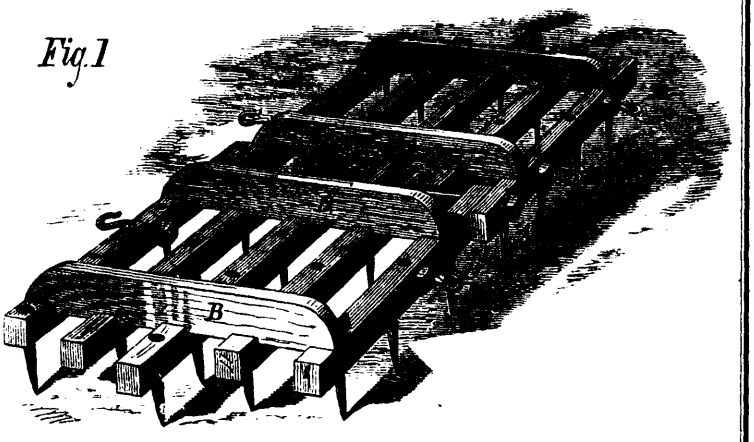


Fig. 1

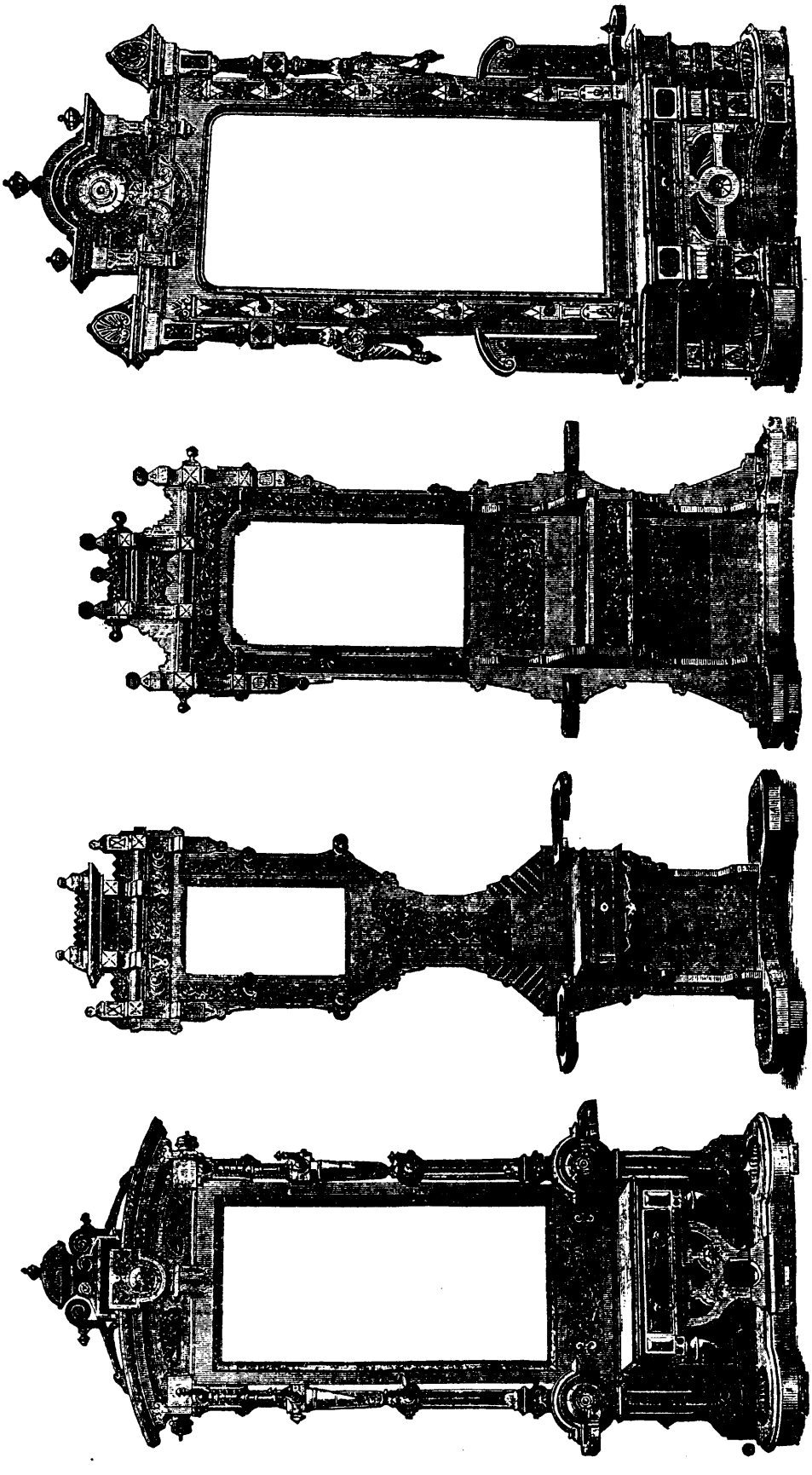


DOBBIN'S IMPROVED HARROW.

CORROSION OF MACHINERY BY THE USE OF ANIMAL OILS.—Often in removing the cylinder head and plate covering the valves of an engine, we see evidences of corrosion or action on the surfaces differing entirely from ordinary wear, and the engineer is generally at a loss how to account for it. According to the general impression grease or animal oil is a preservative of the metal, and is the last thing suspected of being the cause of its gradual disintegration.

Animal fats consist of what are known as the "fatty acids," such as stearic, margaric, oleic, etc. These acids are combined with a base, and under ordinary conditions are neutral to metals generally, and on being applied they keep them from rusting by shielding them from the action of air and moisture. But in the steam cylinder, a new condition is reached. These oils are subjected to the heat of high-pressure steam, which dissociates or frees these acids from their base, and in this condition they attack the metal and hence destroy it. This applies as well to all oils of animal origin, fish or sperm oil included, although a pure article of the latter does so only to a very slight extent, but its very high price and exceptional purity precludes its economical use. Petroleum and oils derived therefrom (generally called mineral oils) are entirely free from this objection. Petroleum contains no oxygen, and hence without that it cannot form an acid and therefore cannot attack metal. It is entirely neutral, and so bland that it may be, and is, used medicinally as a dressing to wounds and badly abraded surfaces where cerates or ordinary dressings would give pain. A conservatism, founded more on prejudice and want of proper information than anything else, has existed for some years, which clings to the use of animal oils in defiance of reason and economy, but which, like all the so-called conservatism, is gradually yielding to the advancing scientific spirit of the age. There are but few cases in which mineral oils cannot now supersede the old-fashioned organic or animal oils. Improvements have been and are now being made, and oils from petroleum are now produced suitable for nearly every mechanical process for which the animal oilshave heretofore been used, not excepting those intended for cylinder purposes. Another objection attaching to the old animal oils is absent in petroleum. Thus if, through the exhaust steam, some of the animal oil be carried into the boiler, foaming or priming is the conscquence, but the same thing happening in the case of petroleum is rather of benefit than otherwise, for it not only does not cause foaming, but it prevents incrustation or adhesion of the scale or deposit and this aids in the preservation of the boiler, and the latter is perhaps the best preventative of the many everywhere suggested.—*Iron*, ix, 234.

NEW SOURCES OF INDIA-RUBBER.—It is well known that rubber abounds in the milky juices of many plants besides the caoutchouc-tree; for example, lettuce and dandelion. A company has been formed in London, Ontario Province, for the extraction of caoutchouc from milkweed (*Euphorbia corollata*), the juice of which contains some four per cent. of rubber. The plant is partially decomposed, steamed, then treated with coal-tar naphtha, which, being distilled, leaves the residuary caoutchouc in the solid form.



FURNITURE DESIGN (FROM THE AMERICAN CABINET-MAKER).

THE BRITISH FLEET.

VESSELS IN THE NEIGHBOURHOOD OF THE DARDANELLES.—DESCRIPTION OF THE IRONCLADS.

The London *Standard* of the 16th March has the following:—The total effective force of the British Navy at present consists of nearly 400 vessels—including ships specially constructed to take part in great naval engagements, and others adapted for the purpose of cruising and coast defence. This aggregate does not include any in course of building, and 134, either laid up or permanently employed in harbour service, are also omitted. When it is remembered, however, that six armour-plated war ships and a single wooden despatch vessel constitute the entire naval detachment ordered from Besika Bay to the Sea of Marmora, and that this small number includes no turret-ships of the first-class, or breastwork monitors, it will be admitted that, in proportion to the complete naval strength of Great Britain, the demonstration which the Government has deemed it expedient to make before Stamboul in the present menacing aspect of events, is of a comparatively moderate character. But it may assist the public to realize the stupendous naval force at our command, and the unrivalled supremacy we are consequently justified in claiming upon all waters, to know that even the limited portion of the fleet now quietly guarding British interests before the Turkish capital, possesses destructive appliances which the collective navy of Russia could not possibly withstand. The six fighting ships now told off for duty at the Bosphorus are the *Temeraire*, the *Alexandra*, the *Sultan*, the *Swiftsure*, the *Agincourt*, and the *Achilles*. The despatch boat which attends them is the *Salamis*. If the strenuous efforts of the English Government to preserve peace should unhappily fail, and the honour of this country should demand that Great Britain must declare war, the present squadron would soon be reinforced by a fleet of invincible ironclads whose fighting power would cast into obscurity that wielded by the wooden walls which twenty-five years ago gallantly attacked Sebastopol.

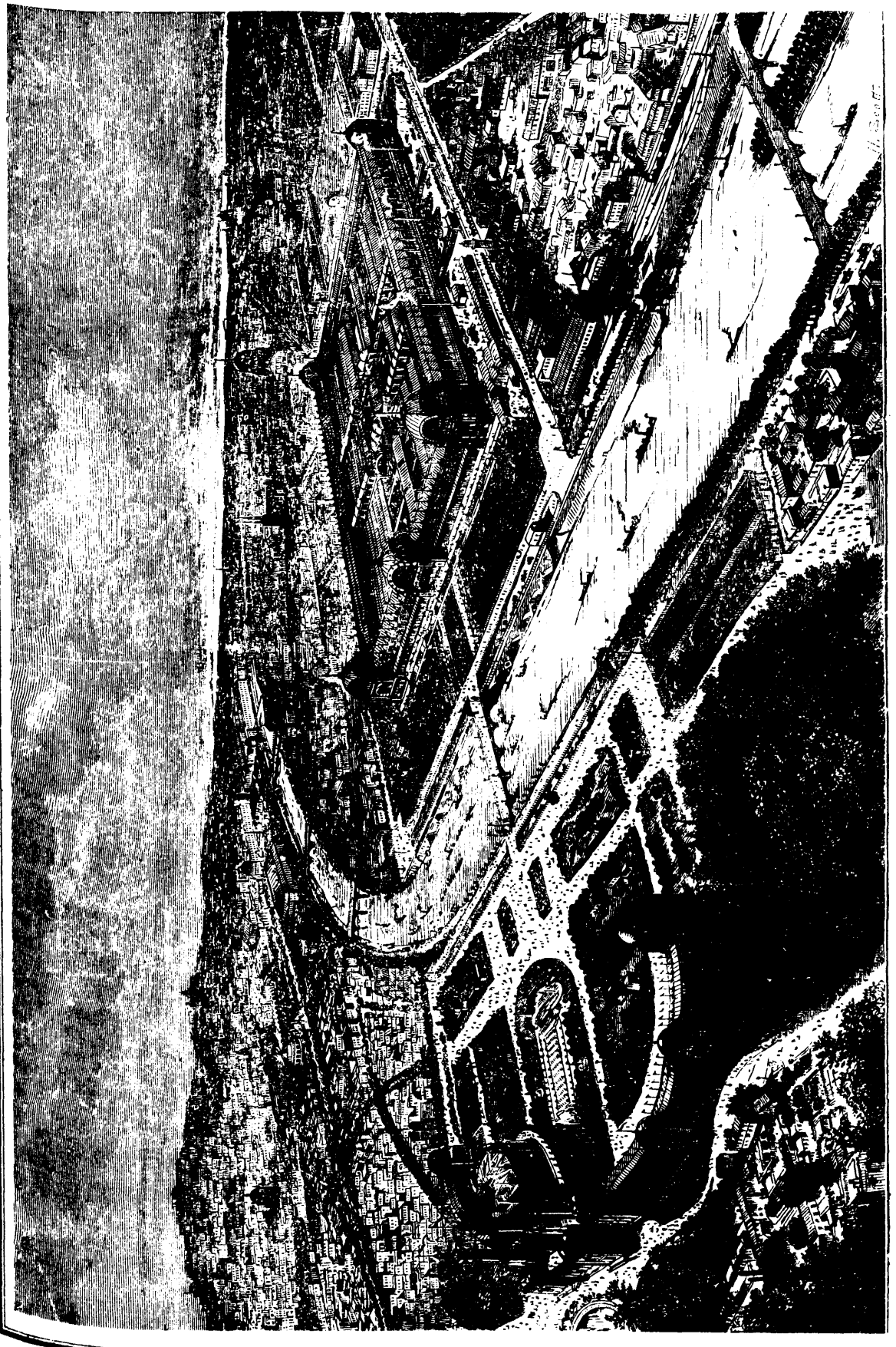
Four of the vessels we have mentioned as anchored in the Sea of Marmora belong to the category of armoured broadside ships of the first-class; and as the *Temeraire* carries the largest number of heavy guns, she is entitled to precedence among them. The feature in her construction which essentially distinguishes her from all other armour-plated vessels in the British Navy, is an upper-deck armament with two fixed turrets open at the top, instead of the ordinary arrangement of a central battery. At each end of her upper-deck is a pear-shaped tower, measuring about 33 feet fore and aft, by 21 feet 6 inches across. On a turn-table which this battery contains is mounted a 25-ton gun, worked by hydraulic machinery, by which it is raised to be fired over the edge of the tower, and lowered under cover immediately afterward to be reloaded. The foremost turret is protected by iron plates 10 inches thick, and the one situated aft by armour 8 inches thick. The guns have a clear sweep all around the ends of the ship. That fire may not be obstructed in action the bulwarks are only allowed to rise four feet above the deck. One of the 25-ton guns can be fired straight ahead and another straight astern, but both have a wide range over the broadside. Again on the main deck is a battery in two divisions, the foremost of which contains two more 25-ton guns, with angles of training extending about the beam, on each side, across the fore and aft line, so that a converging fire at some distance ahead of the ship is secured. This latter pair of guns are fired from corner ports, and the sides of the ship are set back several feet above the main deck, to afford the requisite facilities for handling them; so that this vessel fires three guns right ahead, two on either bow, one on each quarter and two on each beam—all of the calibre we have specified—besides two 18-ton guns on each beam, making four 25-ton and 12 18-ton guns. The guns of the *Temeraire* are more efficiently protected than those of any other broadside ship in the service.

Her most vital parts are plated with 14-inch armour. To guard her from exposure to the raking fire of the enemy when she is pitching in the trough of the sea, the armour is carried down over the sharp point of the ram, and equal protection in a similar emergency is given to the magazines by an armoured bulkhead across the hold, plated with 5-inch armour. The hull has the usual double bottom, and is divided into numerous water-tight compartments. The engine and boiler rooms are so constructed as to prevent the entrance of water in case of contact with hostile rams or torpedoes. The gross weight of the armour and backing is about 2,300 ions, and the guns, ordnance stores, engines, boilers, and other equipments weigh 2,200 tons. The aggregate weight of her broadside fire amounts to 2,600 pounds; of her bow fire, 1,800 pounds, and of her stern fire, 600 pounds. In common with all our great war ships of recent construction, the *Temeraire* is fitted with an apparatus for discharging Whitehead torpedoes under water through openings in her sides.

The *Alexandra* carries a central battery, and her construction admits of a satisfactory all-round fire; she can dispense with gun-towers at stern and bow. Her battery is furnished with two Woolwich rifled muzzle-loading guns of 25-tons each, and 10 of 18-tons each. She is 325 feet long, being 40 feet longer than her sister ironclad already described, and is worked by engines of 8,000 indicated horse-power, being 1,000 horse-power geater than those of the *Temeraire*. Her tonnage reaches 6,050 tons, and the total weight of her armour and backing 2,350 tons. In many characteristics she resembles her companion, so that the necessity for repeating details is superseded. The *Sultan* is the same length as the *Alexandra*, but mounts eight 18-ton and four 12-ton guns, while her armour-plating ranges from six to nine inches; the force by which she is propelled exceeds that of the *Alexandra* by 629 horse-power, and the peculiar formation of her ram renders that vessel one of the most formidable of sea-going vessels in the fleet. The *Swiftsure*, though a ship of similar dimensions and inferior armament to those hitherto described, is nevertheless capable of inflicting incalculable injury on hostile ships. She is 280 feet long, carries ten 12-ton guns, exclusive of others of smaller size, and is covered to the water-line with iron plating from six to eight inches thick. Her engines work with a propelling force equal to 4,913 horse-power. The *Agincourt* and *Achilles* are classed under a different head from the four vessels which have been noticed. They come under the designation of iron broadside of the old type, of which the *Warrior* is a prominent example. Though lacking the advantage resulting from the most recent application of science to navigation and the art of naval warfare, they are, nevertheless, still commanding vessels. The length both of the *Agincourt* and the *Achilles* is much greater than that of the longest of the preceding ships. The former is 400 feet and the latter 383 feet. Seventeen 12-ton guns are mounted in the *Agincourt*, and ten 12-ton guns and sixteen 6½-ton guns in the *Achilles*. The engines of the one vessel exert a force equal to 6,621 indicated horse-power, and the registered propelling power of the engines of the other is 5,723 horse-power. Yet the glimpse of the naval power of England conveyed by an analysis of the dimensions of these few vessels in on an extremely limited scale. If we attempt to exhaust the long list of vessels belonging to the classes which include the ships already enumerated, and then advance to a consideration of the still more formidable characteristics of such turret-ships as the *Dreadnought*, the *Thunderer*, the *Devastation*, the *Agamemnon*, the *Ajax*, and the *Monarch*—to say nothing of the *Inflexible*, which latter is destined, when ready for commission, to carry four 81-ton guns—the combined navies of the world sink into insignificance before this unparalleled array of naval might controlled by the British Government. It is also satisfactory to know provision has been made for the protection of our ships, when at anchor, from all risks of attacks from torpedoes. But even the list and description of the Admiralty does not exhaust the measure of British naval power. The British mercantile marine possesses 419 steamers over 1,200 tons and under 5,000 tons register—not a few of which are capable of high speed. In the event of war a considerable proportion of these ships would be placed at the disposal of the Government. They could readily be armed with light rifled-guns and torpedoes, and may always be relied upon as a reserve naval force. If the "decisive battles of the world" in future were to be fought at sea, the enormous naval advantage enjoyed by England over all other nations would infallibly constitute her the undisputed arbiter of the destinies of nations.

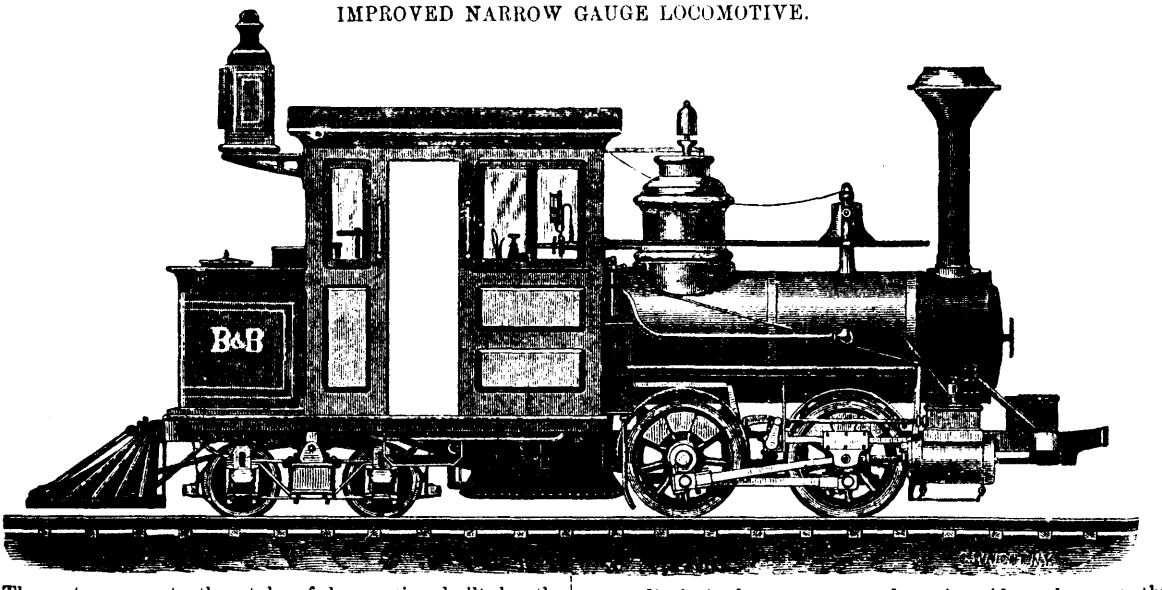
GIGANTIC ADVERTISING.

Probably the largest advertisement in the world is that of the *Glasgow News*, which displays its name on the slope of the Ardenlee, Scotland. The length of each letter is 40 feet; the total length of the line is 323 feet, and the area covered is 14,845 feet. The borders of the letters are sown with a pure white flower, the center is set with dwarf beet, the dark purple of which shows well at a distance, and on each side of this there is a row of light purple candytuft.



BIRD'S EYE VIEW OF THE PARIS EXHIBITION.

IMPROVED NARROW GAUGE LOCOMOTIVE.



The cut represents the style of locomotive built by the Hinckley Locomotive Works (Boston) for the Billerica & Bedford two-foot gauge railroad. Two of these engines, named "Ariel" and "Puck," duplicates of each other, were built for the road previous to its formal opening in October last. The plan upon which they are constructed was devised and patented by Mr. M. N. Forney several years ago, and has been adopted by this miniature road as the best suited for its traffic. A brief account of their peculiarities was contained in the *Car-Builder* for October, in connection with a description of the road, but we now give a more complete statement with the accompanying engraving.

It will be observed that the boiler, machinery, cab and tender, are all on one set of wheels, and that the whole is run in reverse order, namely—the tender in front and smoke-stack in the rear. A number of manifest advantages are secured by this arrangement. The weight of the boiler and machinery is entirely on the drivers, and that of the tender on the truck, thus securing the necessary adhesion and stability, and a wheel-base sufficiently long and flexible to pass curves with ease. The smoke and cinders from the chimney are carried over the cars to a greater degree than when they are discharged from the front; the engineer has a more unobstructed view of the track, with no smoke or steam beating down before him, the cab being in the center, and resting on the continuous frame which also supports the tender, is much steadier than with ordinary engines, and is consequently a more comfortable riding place for the engineer and fireman. The cab can be completely closed in cold or stormy weather, and the heat of the boiler in summer forced out of it, backwards, by the speed of the train, so that it is warmer in cold weather and cooler in hot weather. The whole arrangement secures compactness, and we believe the performance of the engines on this road has so far been entirely satisfactory. The drivers are only 30 inches in diameter, which brings the weight very near the track. This, with nice balancing, causes them to run with as little oscillation as a Pullman car.

The weight of each engine, in working order, is 23,750 lbs.; weight on drivers 14,370 lbs.; capacity of cylinders 8x12 inches; inside diameter of boiler 30 inches; driving wheel-base 3 ft. 6 in.; total wheel-base 13 feet; capacity of water tank 400 gallons.—*Nat. Car Builder.*

IMITATION EBONY.—The following recipe, which we take from the *Revue Industrielle*, will answer numerous correspondents who have inquired how to turn oak black so as to cause it to resemble ebony. The wood is immersed for forty-eight hours in a hot saturated solution of alum, and then brushed over several times with a logwood decoction prepared as follows: Boil 1 part of best logwood with 10 parts of water, filter through linen, and evaporate at a gentle heat until the volume is reduced one-half. To every quart of this add from 10 to 15 drops of a saturated solution of indigo, completely neutral. After applying this dye to the wood, rub the latter with a saturated and filtered solution of verdigris in hot concentrated acetic acid, and repeat the operation until a black of the desired intensity is obtained. Oak thus stained is said to be a close as well as handsome imitation of ebony.

IN-GROWING TOE NAILS.—These afflictions are a source of excessive discomfort and sometimes of almost insufferable pain; formerly the savage mode of treatment was to take a pair of pincers and drag the whole nail out, but now a prompt and painless cure may be effected simply by inserting the dry sesquichloride of iron between the nail and the flesh and powdering the latter with it also, then apply a dry bandage, and a cure follows after two or three applications, a day or two apart.

The following United States Patents were granted to Canadians during the month of March last:

James Burns, of London, Ont., March 5, 1878, No. 200,820, "Gas Retort."

M. L. Hitchcock, of Cornwall, Ont., March 5, 1878, No. 201,014, "Slashers."

A. McLean, of Toronto, Ont., March 5, 1878, No. 201,032, "Stone Preservative."

T. Robertson, of Toronto, Ont., March 5, 1878, No. 201,049, "Lozenge Machine."

G. P. Clapp, of Montreal, Que., March 12, 1878, No. 201,094, "Nail Blank Machine."

J. Currie, of London, Ont., March 12, 1878, No. 201,097, "Gang Plow Frame."

J. Foley, of Montreal, Que., March 12, 1878, No. 201,103, "Water Filter."

H. B. Dyer, of Toronto, Ont., March 12, 1878, No. 201,171, "Sidewalk."

W. H. G. Savage, of Kingston, Ont., March, 12. 1878, No. 201,203, "Brush Bridles."

C. T. Brandon, of Toronto, Ont., March 19, 1878, No. 201,322, "Painting Machines."

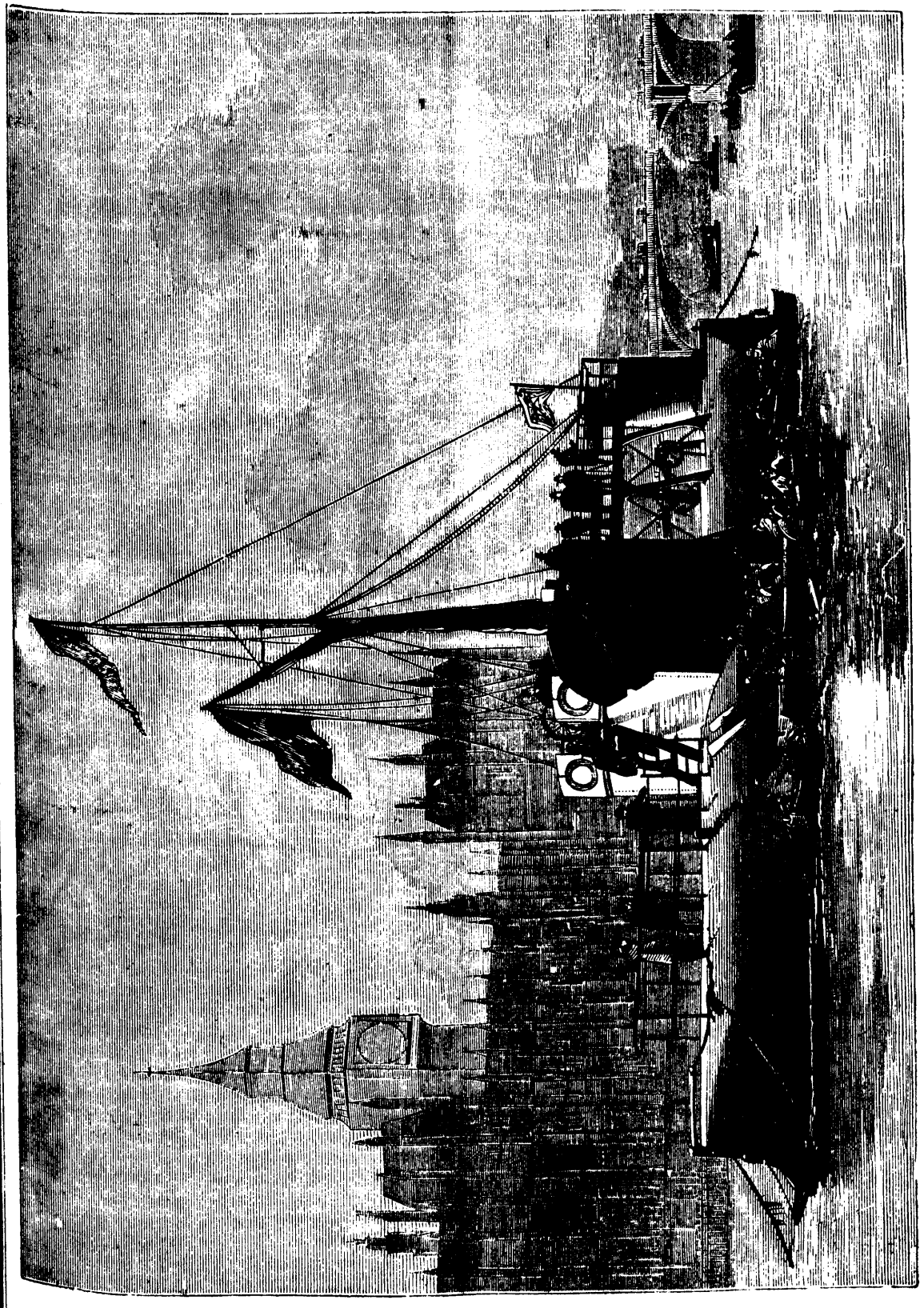
J. Farrar, of Montreal, Que., March 19, 1878, No. 201,338, "Tobacco Cutters."

T. Hodgson, of Amherst, N.S., March 19, 1878, No. 201,416, "Saw Sharpening Machines."

J. Briggs, of Montreal, Que., March, 19, 1878, No. 201,494, "Ranges."

T. H. Paling, of Woodstock, Ont., March 19, 1878, No. 201,553, "Window Shades."

L. F. Lash, of Toronto, Ont., March 26, 1878, No. 201,799, "Curtain Fixture."



THE CYLINDER SHIP CLEOPATRA.

STRAIGHTENING WROUGHT METAL PLATES.

The straightening of iron plates is an operation to properly perform which requires a great deal of judgment and careful manipulation. Every blow delivered should be directed to a definite end, for one misdirected blow entails the delivery of many others to correct its evil influence; and hence, if several of such misdirected blows are given, the plate will have upon it a great many more hammer marks, or "hammer sinks" as they are sometimes termed, than are necessary. As a result, not only will the painter (in fine work) be given extra trouble in stopping the hollows to make a smooth surface, but the following evil will result: Every blow struck by the hammer compresses and proportionately stiffens the small surface upon which it is delivered, and creates a local tension upon the surrounding metal. The misdirected blows then cause a tension acting in opposition to the effect of the

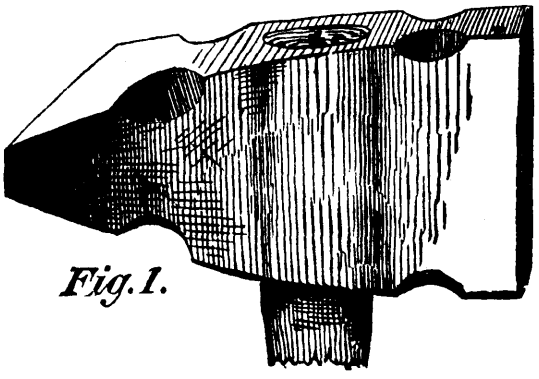


Fig. 1.

properly delivered ones; and though the whole plate may be stiffened by the gross amount of blows, yet there will be created local tensions in various parts of the plate, rendering it very likely to spring or buckle out of truth again. If, for example, we take a plate of iron and hammer it indiscriminately all over its surface, we shall find it very difficult to straighten it afterwards, not only on account of the foregoing reasons, but for the additional and most important one that the effect of the straightening blows will be less, on account of the hammered surface of the plate offering increased resistance to the effects of each blow; and after the plate is straightened, there will exist in it conflicting strains, an equilibrium of which holds the plate straight, but the weakening of any of which will cause the preponderance of the others to throw the plate out of straight; for the effects of the blows cannot be permanent unless the whole body of the iron is acted upon to an equal extent by the hammer. Suppose, for example, that we take a flat plate, and deliver upon it a series of blows round about its center. The effect will be to make it hollow on one side and rounding on the other, the effect of the blows being, not only to indent the plate in the spots where they fell, but to carry the whole body of the

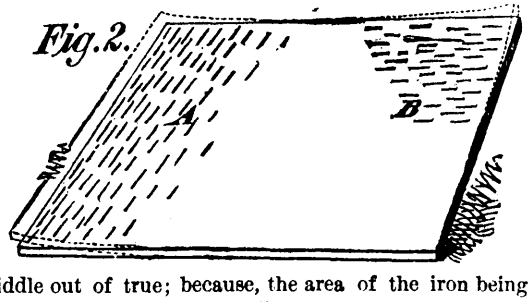


Fig. 2.

middle out of true; because, the area of the iron being increased by the stretching effect of the blows, the center leaves the straight line to accommodate the increased area. Thus, if we mark off a square foot in the middle of a plate, and hammer it so as to stretch it and increase its area ¼ inch each way, the form of the plate must alter to suit this added area, and the form of a dish or curve is the only one it can assume. If, however, the outside metal is also stretched to the necessary degree, the plate may be made flat. The skillful workman takes advantage of the stretching of the plate; and so soon as he has ascertained where the plate is out of true, he sets to work to stretch it so as to draw the crooked placed straight, taking care that the shape and weight of the hammer and the weight of the blows delivered shall bear a proper relation to the thickness of the plate and the material of which it is composed. If it is of consequence that the finished work shall bear no marks of the hammering, as in the case of engravers' plates a flat-faced hammer is employed; but for other work, the shapes, as well as the weights, or the hammers vary. The hammer shown in Fig. 1 is called a "long crossface:" "long" because it is intended to be used in both hands as a sledge, and is provided with a long handle (being used for heavy work) and "crossface" because the length of the face on one end stands crosswise with the length of the face at the other. This hammer causes the metal to rise or lift in front of it, the direction in which the rise takes place depending upon the direction in which the length of the hammer face strikes the plate. Suppose, for example, that we strike the blows shown at the end, A, or end plate shown in Fig. 2, and that we then turn the hammer upside down and strike the blows denoted by the marks at B in the same figure (this the workman can perform, by reversing the hammer, without changing his position); the result will be to curl up the plate as denoted by the dotted lines.

Fig. 3.

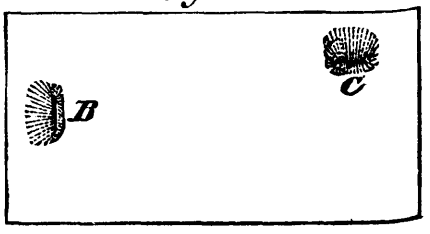


Fig. 4.

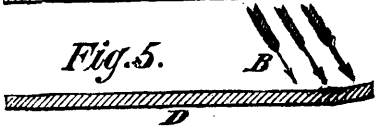
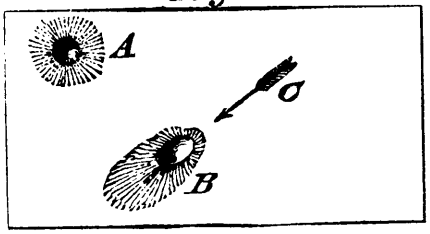


Fig. 5.

This effect is produced by two causes, the first of which is the shape of the hammer face, and the second is the direction in which the blows fall. Fig. 3 represents an iron plate with one each of the blows, respectively shown in Fig. 2, at B and C, delivered upon it. Then, the indentation of the plate being denoted by the full line, the tension caused to the surrounding iron will be indicated by the dotted lines. It will be noted that these dotted lines are in each case longer on one side of the mark than on the other, and the reason is that the effect is greater on that side, or rather in that direction, because the hammer does not fall vertically upon the plate, but somewhat aslant. If the plate shown in Fig. 2 be turned up on edge so as to appear as in Fig. 4, the direction in which the hammer would travel when striking the blows at B (in Fig. 2) is denoted by the arrows, B, in Fig. 4. While if we turn up the same plate so that its edge, D, in Fig. 2, will appear as the edge, D, in Fig. 5, the direction of the blows shown at C, in Fig. 2, will be denoted by the arrows, B, in Fig. 5; so that both the

shape of the hammer face and the direction of the blow conjointly act to draw or bend the plate in the required direction. If we take a ball-faced hammer, the effect will be produced as shown in Fig. 6, in which the circle, A, represents the mark left by a ball-face or pene hammer, and the diverging dotted lines show the effect of the blow upon the surrounding iron. B represents a blow delivered by the same hammer, which, while falling, traveled also in the direction of the arrow, C, the direction effects of the blow being denoted by the dotted lines.

Fig. 6.



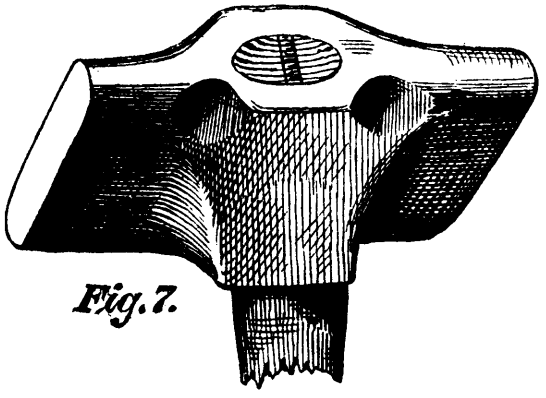
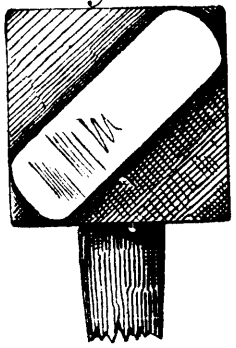


Fig. 7.

We next come to the twist hammer, shown in Fig. 7 in perspective, and in Fig. 7′ in front view. This is a hand hammer with the two faces standing parallel to each other, but diagonal to the body of the hammer; so that, by turning the handle in the hand, the direction of the hammer marks will be reversed. Suppose, for example, that in Fig. 8 the outlines represent a plate; the lines slanting one way, as at A, will represent hammer marks made with one face, and those slanting the other way, as at B, are marks made by the other face of the hammer, the direction or line in which the hammer fell being the same in both cases. By very little moving of the position of the hammer handle, then, and by turning the hammer as required, the workman can place the hammer marks in any necessary direction, as shown by the remaining marks in Fig. 8, without requiring to change his position. In referring to the hammer marks, as above, it is not to be supposed that the hammer indents the work, producing "hammer sinks:" the term marks being intended to represent the surface of the metal which received the direct impact from the hammer face.

Fig. 7′.



In addition to the shape of the hammer and the direction of the blows, there is to be considered the weight of the hammer and the velocity at which it travels; and in this connection the following remarks may be made: The effect of a quick blow is to cause indentations or hammer sinks, because the speed of the hammer is of as much importance as its weight. A heavy body traveling slowly may represent the same amount of stored-up energy as that of a lighter one traveling at a greater velocity; but the effect of the impact with another body will be quite different. Thus, to use a familiar example, a tallow candle fired from a gun will pass through an inch board, making a hole clear through the board; so likewise the effect of a light hammer and a quick blow will be productive of indentations. Quick blows, therefore, are never employed, the weight of the hammer being proportioned to the size of the work.

We next come to the straightening block, that is, the iron block upon which the iron plates are to rest (as shown upon an anvil) while being straightened. The size of this block should be about 12 x 18 inches, and, say 12 inches deep, which is large enough for the largest work, as will be perceived from the following considerations: It is necessary that the plate should be solid on the block, directly beneath the part of its surface which is being hammered, otherwise the effect of the blows will be entirely altered. If, for instance, A, in Fig. 9, represents the straightening block, and B, a plate resting thereon, then the blows struck upon the plate anywhere save over the very edges of the anvil will have but little effect, because of the spring and rebound of the plate; and the effect of the blow will be distributed over a large area of the metal, tending to spring it rather than give it a permanent set. If the blow is a quick one, it may indeed indent the plate without having any straightening effect. On the other hand, by stretching the skin on the upper side of the plate, it will actually, under a succession of blows, become more bent. In fact, to use a straightening block, so large in proportion to the size of the plate that the latter cannot be adjusted so that the part of the plate struck lies solid on the block, renders all the principles above explained almost valueless, and is a process of pounding, in a promiscuous way, productive of hammer marks, and altogether fatal to the production of true work. In the method of manipulation here explained, every blow delivered is given with the object of liberating the strains which may exist in the plate, holding it out of flat, or of drawing the plate so as to bring into line with the general surface those parts which are not in line with the main body of the plate.

Fig. 8.

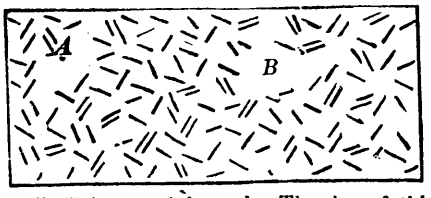
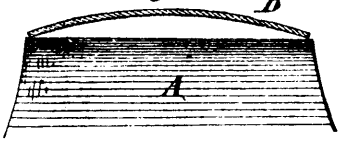


Fig. 9.



Dangerous Vails.

Ladies in traveling at this season of the year frequently wear vails of gauze, most commonly light green in color. It appears that the use of these is not wholy safe; as a case has lately been published of a child, in Troy, N. Y., whose face while asleep was covered with a green vail to protect it from flies. The infant managed to get the fabric in its mouth, sucked it, and died shortly afterward, with all the symptoms of poisoning.

Portable Washstands.

With all the inestimable advantages accruing from systems of water-works and sewerages, it cannot be gainsaid that under certain conditions they are subject to inherent objections, and this even of a serious nature. The fixed washstands in bedrooms are illustrations of some of these objectionable features; it is especially the connection with the sewers that is the great and dangerous enemy. The plumbing of a house may be ever so perfect, still from time to time the

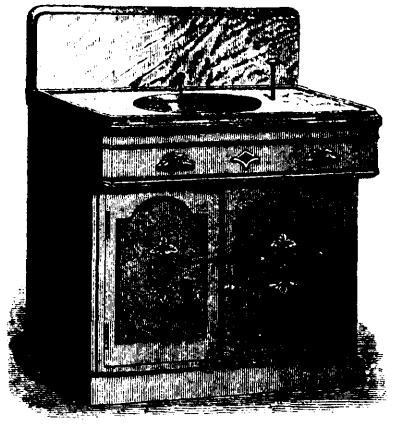


Fig. 1.

sewer gases will be smelt around the basins, ascending through the drain pipes. It is now well established that the sewer gases ascending through the latter are the principal source of all zymotic diseases of our cities, and even of our country towns.

Convinced of this, and seeing no certain way to prevent the evil so long as drain pipes are allowed in bedrooms, many people have given up fixed washstands altogether and substituted the old-fashioned arrangement of a movable piece of furniture with movable apparatus, the water being brought in pitchers and the slops carried away in the old-fashioned slop-pails.

If to this we add the expense of plumbing arrangements, their liability to get out of order, the frequency with which they get stopped up, the freezing in winter, and the other evils water and drain pipes are heir to, such as the sudden stoppage of the water by drawing it on the lower floor when needed on the upper ones, the violence of the pressure, which sometimes is quite inconvenient, and other little items, it is quite natural that a reversion of opinion has set in in regard to the desirability of fixed washstands.

The old-fashioned way of having pitchers and bowls on a movable washstand, and a slop-pail next to it, is subject to the objections of inconvenience, liability of spilling water over the carpets, and the danger of breakage, which becomes very expensive when a neat and costly set is used.

Housekeepers are therefore largely indebted to the N. Y. Portable Washstand Co., of 706 Broadway, New York, who are introducing an arrangement which combines the convenience of the fixed washstand with the sanitary virtues of the old-fashioned washstand with bowl, pitcher, and slop-pail, and costs no more than a neat arrangement of the latter kind, and considerably less than a fixed washstand and its plumber's connections. The exterior appearance is represented in Fig. 1, and is made in different styles, according to the price, which varies from $16 to $88 and over. In order to supply the bowl with water, all that is necessary is to press down the knob on the top of the vertical rod seen at the right side of the bowl; when the washing is done the plug is withdrawn by means of the chain attached and the water flows out. The manner in which this is accomplished is seen in Fig. 2, which represents the stand with the doors open, showing the interior arrangements; at the left is the slop-pail, in which the water from the basin is collected, and which may be emptied once in 24 hours; at the right is the supply tank, which is filled from time to time, according to the amount of water used; it contains a pressure pump, which is represented in detail in Fig. 3. The globular top of the pump is a hemisphere of India-rubber, which is pressed down by the rod; by valves closing at the bottom of the cylinder, the water is forced upward in the vertical tube, the top of which is connected by means of a piece of rubber hose to a side opening in the base. We are satisfied that this stand fully deserved the medal and diploma at the Centennial Exhibition for "originality of principle, combined with usefulness and convenience."

Summing up the advantages of this arrangement, we would say: No sewer gas odors, no expensive plumbing connections, no choking up of the discharge pipe, no running over and inundation of the floor, no freezing up of the supply pipe, etc., as is the case in fixed washstands; no inconvenient lifting of heavy pitchers or full bowls, no spilling of water over the carpets, no slop-pail in the way, no breaking of bowl or pitcher, etc., as is the case with the old-fashioned movable washstands. In place of all this, we have here the simple pressing on a knob to fill the bowl with clean water, the pulling of a chain to empty it, while the supply of clean water as well as the removal of the slops is left to the servants. No doubt that all who see its practical operation will appreciate it and form a better opinion of it than we can give by a mere description. These stands are manufactured under letters-patent granted Feb. 15, 1876, and sold only by the N. Y. Portable Washstand Co.

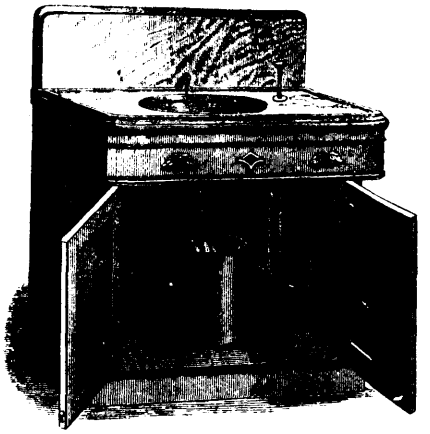


Fig. 2.

Adulteration of Honey and Maple Sugar.—Glycerin is now so cheap that honey is being adulterated with it, and also with sugar. Maple syrup is adulterated in the same way, especially with dissolved brown

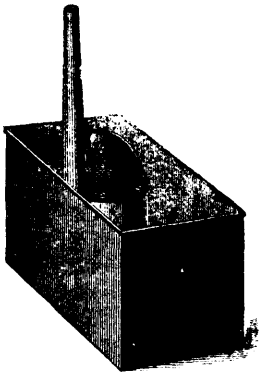


Fig. 3.

sugar. Ten per cent of honey or maple sugar is sufficient to give to a mixture of glycerin and sugar syrup, or of sugar alone, the flavor of the article it is intended to imitate.

To Heal Cuts.

We have received the following communication, which we publish with our comments:

"On page 19 of your January number for this year, a remedy is given to stop bleeding. Do not on any account recommend anything for a cut, but endeavor to persuade some of your numerous readers to try the following experiment: Take a fine needle and a double thread, (No. 60 to 80,) knot it, and sew up the wound immediately after it is cut; do not go deeper than the skin. If any one can be induced to try this, they will never do anything else for a cut. It requires no wrapping up—just keep it clean. I saw it practiced in the workshop by one of the workmen forty years ago, and was recommended to try it. I tried it a short time ago and it was quite satisfactory. By exposure to the air, the matter that oozes out sets and hardens in a short time. For a man at his work there is no time lost."

Philadelphia, Pa. Daniel McAlpin."

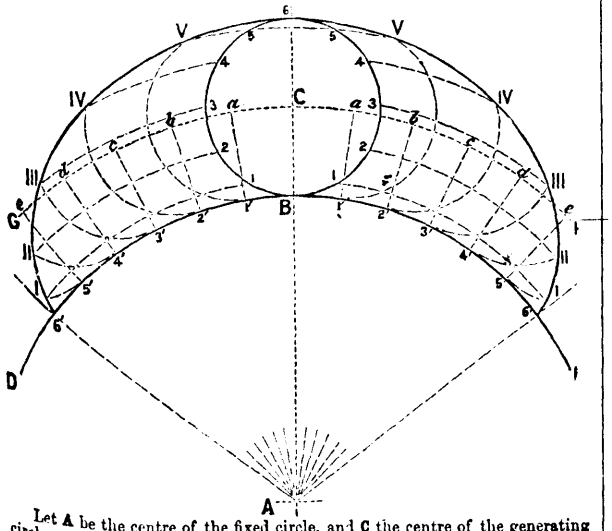
Remarks—The writer is partially correct, but not entirely, for the reason that he overlooks circumstances with which only surgical practitioners, by their large experience, can become familiar. When by a deep cut a small artery has been wounded, the closing up of the skin will not stop internal bleeding, and a swelling, inflammation and suppuration may result, which may necessitate the opening of the cut again; therefore, when there is much bleeding, it is better to introduce into the wound at first some lint or its equivalent, and when the bleeding has subsided, then it may be sewn up. We ourselves, during our practice in former years, have had more than one case where a druggist had sewn up a cut, when, after a week of much swelling and throbbing pain, the re-opening of the wound, which had been healed on the surface but not from the bottom, became necessary. Wounds must heal from the inside outward, and as long as the inside is not healed, it is not only useless but a positive harm to close the skin. When, on the contrary, the wound is shallow and only skin-deep, or slightly more, the remedy of our correspondent is correct, and it is much better to sew up the wound with a few stitches than to cover it with a plaster and shut off the access of air, which is decidedly injurious. It is a most hurtful idea that it is good to shut off the air; on the contrary, the access of air must not be shut off; the skin is made to be in contact with the air and it will heal much better without covering, if dirt and dust is only kept out of it.

Our correspondent agrees perfectly with us in that respect, as we have repeatedly insisted on these truths. In one of our back numbers we published an article headed, "Beware of Plasters and Salves," in which simple sewing up was recommended. When we practiced surgery some years ago, it was always our custom, except in such cases as referred to above. We also stated that the blood or other liquid which oozes out of a sewed up cut, and dries as a crust on the surface, is better than any salve or anything else that can be possibly put upon a wound. This truth has been recognized by the surgical profession, and it is now the rule among many to use the blood for a dressing, and to put it on and let it dry on the wound when it does not come on it of its own accord.

PRACTICAL GEOMETRY APPLIED.

(By G. Magnell.)

PROBLEM 124.—To Construct an Exterior Epicycloid, described by a point in the circumference of a Given Circle, in its Motion round another Given Circle.



Let **A** be the centre of the fixed circle, and **C** the centre of the generating circle.

1.—Draw the two given circles, touching at **B**, and from the cent **A** draw the line of centres **H C G**.

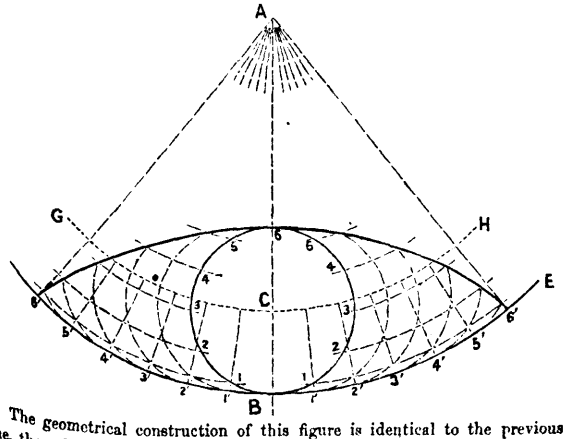
2.—Divide the generating circle into any number of equal part **2, 3,** &c., and through these points draw circular arcs from the of the fixed circle.

3.—Then set off, on each side of **B**, upon the circle **D B E**, half the number of points as the generating circle is divided into, and whose common distance is equal to the length of one of these parts, reduced to a straight line, as 1′, 2′, 3′, &c.

4.—From the centre **A** draw radii, passing through each of the points, 1′, 2′, 3′, &c., producing them till they cut the circle **H C G**, in the points **a**, **b**, **c**, &c.

5.—Then, from the point *a*, with the radius **C B** or *a* 1′, describe an arc, cutting the fifth circular arc in the point **V**; and from the point *b*, with the same radius, cut the fourth arc in the point **IV**; and from **C**, same radius, cut the third, in the point **III**, and so on. These are points in the curve through which draw the Epicycloid.

PROBLEM 125.—To Construct an Interior Epicycloid, the Diameters of the Two Circles being given.



The geometrical construction of this figure is identical to the previous one, the only difference being, that the rolling circle is inside the fixed one.

1.—Draw the two given circles, touching at **B**; then divide the generating circle into equal parts, as **1, 2, 3,** &c.: through these points draw concentric circles with **D B E**.

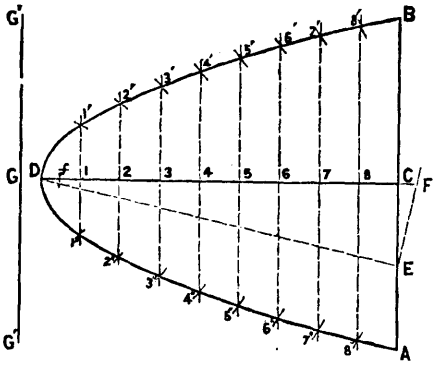
2.—Then draw radii from the centre **A** to the points 1′, 2′, 3′, &c., in the circle **D B E**, which correspond to the divisions in the generating circle; and from the points of intersection of these radii, with the circle **G C H**, describe arcs of circles, with the radius **C B**.

3.—The intersections of these arcs with the circles, passing through the divisions of the generating circle, will be so many points in the curve required.

PARABOLA.

The Parabola is a curve produced by the section of a cone parallel to one of its sides, and is such, that every point in the curve is equal distant from the directrix and the focus.

PROBLEM 126.—To Draw a Parabola, by means of Intersecting Arcs, the Axis and Ordinates being given.



Let **C D** be the axis, and **A C** and **C B** be the ordinates.

1.—Draw **A B** and **C D** at right angles to each other, bisecting **A B** in the point **C**.

2.—Bisect the ordinate **A C** in the point **E**, and join **D E**.

3.—Draw **E F** perpendicular to **D E**, meeting **D C** produced in **F**.

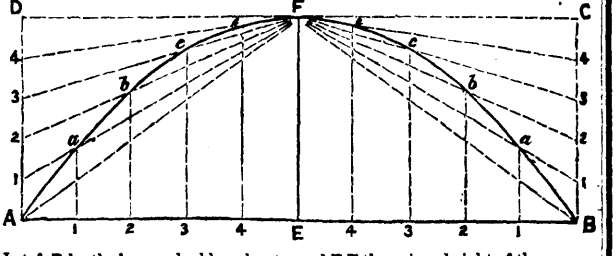
4.—From the vertex of the Parabola **D**, set off a distance upon the axis from **D** to *f*, equal to the produced part **C F**; then *f* is the focus of the parabola.

5.—Draw a line **G′ G″**, at the same distance from **D**, as **D** is from the focus *f*. This line is called the directrix.

6.—Divide the given axis **C D** into any number of equal or unequal parts, as **1, 2, 3, 4,** &c., and through each of these points draw lines indefinitely, and parallel to the double ordinate **A B**.

7.—Then, from *f* as centre, **G 1** as a radius, describe small arcs on both sides of the axis, and cutting the first parallel line in the points 1′ 1″; and from *f* again as centre, **G 2** as radius, cut the second parallel in the point 2′ 2″; and from *f* again, **G 3** as radius, cut the third, and so on, always measuring the radii from **G**, and drawing it from *f* as centre. Through these points of intersection draw the curve of the Parabola required.

PROBLEM 127.—To Draw a Parabola by Intersecting Lines, its Axis and Double Ordinates being given.



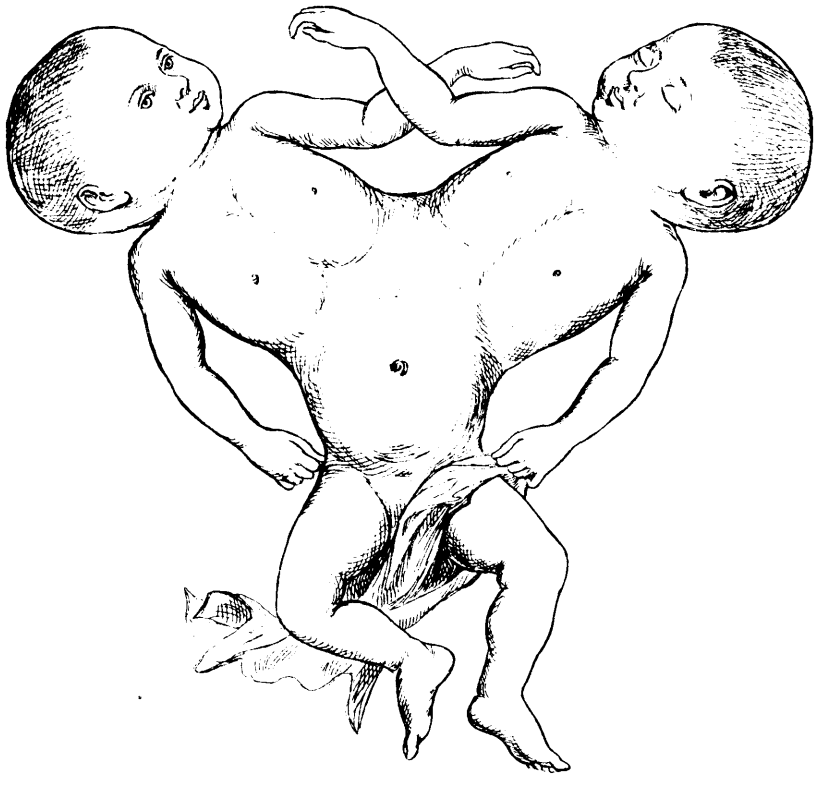
Let **A B** be the base or double ordinate, and **E F** the axis or height of the curve.

1.—On the base **A B** construct the rectangular parallelogram **A B C D**, its height being equal to **E F**.

2.—Divide the side **A D** into any number of equal parts, as **1, 2, 3,** &c., and the half of the base, **A E**, into the same number of equal parts.

3.—Join the points on **A D** to the apex of the curve **F**.

4.—From the points on **A E**, draw perpendiculars, meeting these lines in the points *a*, *b*, *c*, &c., and, through these points of intersection, draw the curve of the Parabola required.



THE LUSUS NATURÆ OF ST. BENOIT. THE MONOMPHALIAN GIRLS.

THE LUSUS NATURÆ OF ST. BENOIT.

Nothing like these monomphalian children of a certain M. Drouin, of St. Benoit, in the Province of Quebec, has ever been seen on the American Continent. They are two beautiful female infants, two months old, who are united below the ribs, and terminate by an ordinary basin and two perfect legs. In front these children present no deformity whatever, but the posterior plane offers the rudiments of a third leg inserted on the median line of the basin. For the use of this curiosity during five years, American exhibitors or showmen have offered the parents $25,000. This they have refused. But we understand that they are now exhibited in this city. We have published a pen-and-ink sketch of it entirely in the interests of science.

PERSPICUITY.——Remember that in writing, perspicuity is half the battle. The want of it is the ruin of more than half the poetry that is published. A meaning that does not stare you in the face is as bad as no meaning, because nobody will take the pains to poke for it.

THE MARBLE QUARRIES OF PAROS.

IN some notes of a tour in the Cyclades and Crete a contributor to the *Academy* gives the following account of the marble quarries of Paros :

"At the mouth of that which is considered the finest there is a curious sculptured tablet on the rock, containing numerous group of figures, conspicuous among which is a seated female deity, with a dedication to the nymphs below. This is figured in one of the plates to Stuart's 'Antiquities of Athens,' but now a large piece has been broken off the face of it. With deep indignation it was ascertained that last year an Englishman (who shall be nameless) cut this piece off and carried it to England ; subsequently, on a letter of remonstrance being addressed to him, he returned it, and it is now at the monastery in the packing-case in which it was sent. When the point was reached where daylight ceases, tapers were lighted, and the dogs that accompanied the party first whined dismally, and finally returned to the upper air. The visitors had expected to find the quarry worked in regular shafts, but, instead of this, the dip of the strata has been followed, and consequently the passage descends at a considerable incline, winding about in different directions, and the roof slopes from left to right. It varies in height from 16 ft. to less than 3 ft., so that sometimes it is necessary to crawl on hands and knees ; in these places the passage must have been wider formerly, to allow of the stone being carried out. At one point 200 bats were hanging from the roof, but fortunately they were not disturbed by the lights. The marks of the tools of the old workmen were visible everywhere on the roof and sides, the groovings being about 2 in. apart ; the amount excavated must have been immense, for the whole place has the appearance of a labyrinth, and the guides declared a stranger might wander for a day without finding the end. The marble on the surface is not usually white, but where it is broken it is brilliantly pure ; in some parts the grain is very fine. After being fifty minutes under ground the visitors returned to daylight, and proceeded to a second quarry, where, however, the marble is somewhat inferior. In places there were stalactites in process of formation, but none were to be compared with those of Antiparos. It is deeply interesting to think that from these quarries came the material for most of the famous Greek statues that have come down to us, and for several important temples, such as that of Apollo at Delphi, which was rebuilt of this stone by the Alcmæonidæ." *Scientific American.*

Caveats.—The *Official Gazette* of the United States Patent Office says : Inventors filing caveats in the office should be careful to describe their invention or improvement with accuracy, and illustrate such inventions as are capable of illustration with care and thoroughness. Caveats are placed in the hands of the examiners, who should not be expected to understand what the inventor means unless the latter has sufficiently matured his invention to clearly describe and illustrate it. Caveats are sometimes filed in the Patent Office, stating that the caveator is engaged in a series of experiments intended to accomplish certain results, and giving nothing more than a vague hint of the means by which the result is to be attained. As the courts have frequently decided that results are not patentable, the practice of the Patent Office is to the effect that a caveat cannot cover more ground than a patent. So, where a caveat describes more than one invention, the examiner frequently overlooks a portion of the caveat, knowing that under the rules caveators are confined to a single invention. Complaints are often made that caveats have overlooked and patents issued to subsequent applicants, when the fault lies in the hasty preparation of the caveat papers. The rules are explicit, that the caveat must describe the invention as fully as the inventor is able to do ; that the drawings shall be of the same size as the drawings to accompany an application for a patent (8 by 13 inches, on a sheet 10 by 15 inches, with an inch margin all around), and on tracing muslin, or light bristol board, or drawing paper, which can be folded without breaking. A careful compliance with the rules greatly facilitates the work of the office, and will go a long way toward insuring the accuracy which is so necessary in securing their just rights to inventors.

COFFEE AN ANTIDOTE FOR STRYCHNIA.—In a foreign journal are given the details of some experiments made by Dr. A. Lelli on the antidotal power of coffee against strychnia. The experiments were made in consequence of Dr. Lelli having met with a case in which a large dose of strychnia was administered in coffee without fatal consequences resulting. The animals employed were rabbits, and by comparative trials he found that a dose of five centigrammes proved fatal in a short space of time; when the same or a larger dose was given in a very strong infusion of coffee, he found that the coffee either acted as a complete antidote in preventing the poisonous effects of the strychnia, or that it materially diminished the violence of the action.

A "Half Stone" House for $3,000.

BY S. B. REED, ARCHITECT, CORONA, LONG ISLAND, N. Y.

This plan is designed for a substantial, convenient, and inexpensive country house. It has two full finished stories with well lighted apartments of good size, and a large cellar and attic. It has also the merit of architectural beauty, well adapted

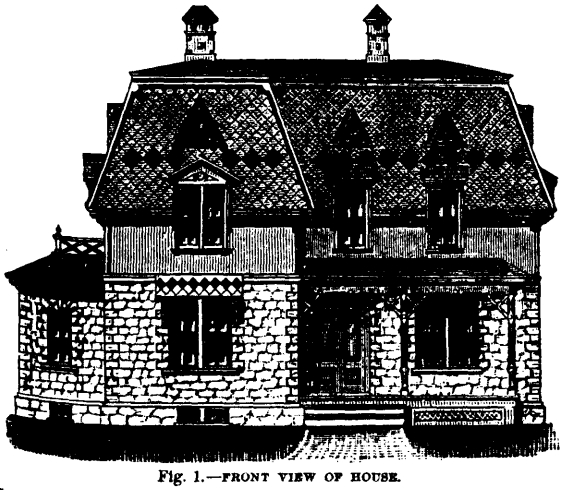


Fig. 1.—FRONT VIEW OF HOUSE.

to a commanding location....**Exterior** (fig. 1).—The "half-stone" composition of the side walls, and the strong outlines and slating of the main roof give to this structure a rustic, yet substantial appearance, affording both diversity and picturesqueness, as shown in the variety of the openings, and irregularity of the several parts. The front and rear elevations are similar; by changing the entrance doors and stairs, either side may front the road. The details of exterior finish are so simple, and easy of execution, that any "modification for the rear" is undesirable. Inharmonious and unsightly curtailments in the rear finish have a depressing influence on those obliged to face them daily, which can never be overcome by knowing there is a good front....**Cellar** (fig. 2).—Hight, 6½ feet, of which 4½ feet is below the ground surface, and therefore (with its thick walls), frost proof. It is always important to provide for carrying off the poisonous vapors always generated in damp cellars. For this purpose side openings are made near the ceiling into one of the flues of each chimney. These flues extending to the top and warmed by contact with the fires of the upper stories, have sufficient draft to constantly change the cellar air and prevent its ascent through the living rooms....**First Story** (fig. 3).—Hight of ceilings, 10 feet. Here are conveniently placed: three large rooms, a hall, china closet, and large pantry. Each large room has commodious windows with views in two directions. The Pleasant Piazzas at both the front and rear of the Parlor, extend over and protect the entrance doors....**Second Story** (fig. 4).—Hight of ceilings, 8 feet. The divisions are very simple, a hall, four chambers, four closets, and a bath-room. Light railings may be put on the roofs of the Wings and Piazzas to form pleasant Balconies to the windows of this story. One such balcony is shown over the wing roof (fig. 1); the others may be similar. The small cost of these devices is fully repaid in their usefulness for airing purposes, besides imparting a cheerful appearance....**Garret or Attic.**—This story is thoroughly floored, but otherwise unfinished. Should additional chambers be required, partitions may be set over those of the second story, duplicating that plan, with rooms having the same hight of ceilings. The Stairs are placed immediately above those of the lower stories, are ceiled in, and have a door at the foot....**Construction.**—The durability, general abundance, and substantial appearance of stone, make it the most desirable and appropriate material known for the exterior walls of any building. The cost of cutting and dressing such material ready for use is the principle barrier to its general adoption. By using bricks for corners and for the finish around the openings, the most expensive item of stone-work is saved. They need only to be "random dressed" and laid nearly in the shape in which they are quarried, as more particularly described in the July *American Agriculturist*, 1876. When such walls are carried beyond the hight that is convenient for the handling of the materials, the expense of their construction is largely increased. It is for this reason that the "half-stone" method is particularly valuable. In this plan the stone-work extends only to the hight of the ceiling of the first story; to this hight the materials may be readily wheeled on trestled scaffolding, while to double this hight would require the use of the tedious derrick, and additional help. The upper stories are framed of the usual sized timber, and raised on the stone walls, which in this case become their foundation. The main roof is constructed as shown in the *American Agriculturist* for June, 1876. The hight requiring siding is 44 feet, or including water table and cornice, 64 feet from the stone-work of the first story to the slating of the roof. The main roof covering is of dark slate laid on tarred felt. At or near the floor line dividing the upper stories, it is appropriate to indicate the division by the use of tinted slate, which may be laid in close courses or in simple figures as shown on the elevation. The roofs of the Hooded and Dormer Windows are also slated. The deck of the main roof, and the roofs of the piazzas, are covered with I. C. charcoal tin. The wood finish is made of simple design, devoid of all efforts at pretentious display, each part being chosen with especial regard for its utility and appropriateness. The Trusses, Piazza Columns, and Soffits are worked of timber neatly stop-champered, imparting a rustic appearance to them, in keeping with the stone work. The Water Tank is placed in the attic, directly above and in line with the Bath-tub and Kitchen-range, favoring the most practical plumbing. The Soil-pipe leading from the Bath-room floor passes down through the closet adjoining the kitchen chimney, to the Sewer-pipe, which is laid below the cellar bottom. The bad smells and gases arising from confined sewage may be easily disposed of by the insertion of a

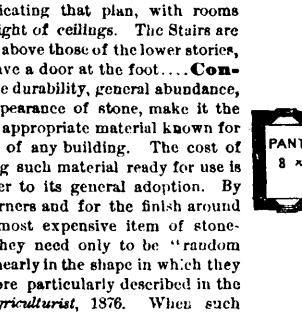


Fig. 2.—PLAN OF CELLAR.

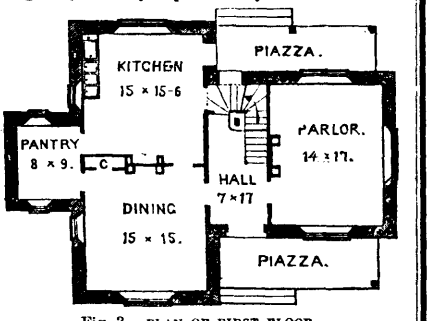


Fig. 3.—PLAN OF FIRST FLOOR.

2-inch pipe into the closet trap (at its highest point), and connecting it with a flue of the adjoining chimney. All inside plastering is of three-coat work. The casing of the bath-room and around all plumbing is in hard wood; all other trimming of clear pine. The Newel Rail and Baluster on the first story flight of stairs are of black walnut. All work usually painted has two coats of best lead and linseed-oil, with stainers to give the body (outside), a light gray, and trimmings in imitation of "Nova Scotia stone." Inside, Parlor and Hall, in grays; Dining-room in grays and drabs; Kitchen in drabs; Chambers, white....**Cost.**—Prices of building materials are nearly as low as they were before the war; many kinds are really selling for the cost of their production or manufacture. Labor is also very cheap, nearly at old figures. Those contemplating building, and having the means at hand to

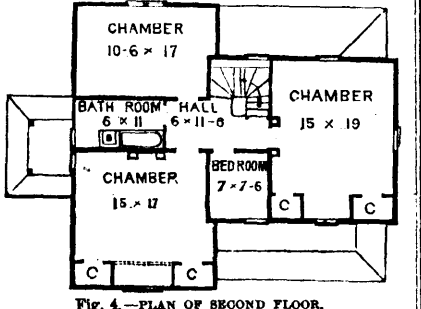


Fig. 4.—PLAN OF SECOND FLOOR.

do so, need not wait for a more favorable time. As soon as general business improves, there must be a "rise" in materials, especially such as requires to be manufactured. The estimate appended includes the cost of all materials and labor for good work at the prices now ruling near New York city.

GILDING GLASS.—Thoroughly clean the glass, then take some very weak isinglass size, and while warm float the glass where you intend the gold to be laid, with the size and a soft brush, then lay the gold on with a gilder's tip, previously drawing it over the hair of your head to cause the gold to adhere to it. Tilt the glass aside to allow the superfluous size to run away, then let it dry, and if it does not look sufficiently solid upon the face give another layer of gold the same way. Where the black lines are to show, take a piece of pointed firewood, cut to the width the lines are needed, and with a straight edge draw a line with the piece of wood, which, if made true and smooth, will take the gold off clean, and so square and sharpen up all the edges, lines, &c. When this is done give a coat of Brunswick black thinned with a little turpentine, and the lines will show black, and it will preserve the gold. Try a small piece first, so as to get all in order.

ANCIENT AND MODERN MORTAR.

It would be a useful inquiry to ascertain the nature and qualities of some of the old mortars used in buildings noted for their durability. The Romans, we know, paid great attention to the mortar they used, and Vitruvius gives us as much insight into the practical chemistry of the subject as many writers of the last century until the time of Smeaton or Higgins. Vitruvius speaks of the lime burnt from white stone or flint, the hardest being used for walls and the soft for plaster. As usual now in specifications, he gives the conventional proportion of three parts of pit sand to one of lime, and speaks of the improvement made by adding ground potsherds. The age of mortar as an element in its value is well understood. A hundred and fifty years ago we have a recipe for making good mortar that shows as practical a knowledge of the conditions necessary to produce mortar as any directions to be found now, even though aided by all the chemical investigations of the last century. In Moxon's "Mechanical Exercises," published in 1700, it states: "Well-burnt good lime and sharp sand, if very sharp, a load of sand (about 36 bushels) to a hundred of lime (being 25 bushels or a hundred pecks), to wit, to one bushel of quick lime, a bushel and a half of sand. But if the sand be not very sharp, then you may put a greater quantity of sand for mortar, which hath its due proportion of sand, is stronger than that which has less sand in it, although some think otherwise. When you slack the lime take care to wet it everywhere a little, but do not overwet it, and cover with sand, every laying or bed of lime being about a bushel at a time as you slack it up, that so the steam or spirit of the lime may be kept in and not flee away but mix itself with the sand, which will make the mortar much stronger then if you slack all your lime first and throw on your sand altogether at last as some do." It further informs us that to make strong mortar for repairs, "beat the mortar well and let it lie two or three days, and then beat it well again when it is to be used." These directions are enough to show that in actual mortar making we have not learnt much since Moxon's time, however much advanced we may have become in theoretical knowledge of limes and cements. Langley, in his "London Prices," mentions eight kinds of mortar—namely, 1, inside and outside mortar, made of lime and sand; 2, terrace (tarras) mortar, made of redstone, brickdust and lime; 4, bastard tarras, made of smith's forge ashes and lime; 5, pargetting, made of lime and horsedung; 6, furnace mortar, made of Woolwich loam; 7, plaster mortar, made of calcined alabaster; 8, fine mortar called putty, for rubbed and gauged work, made of lime only." Another useful quotation may be noticed in which it is stated that where sea-coal ashes clean from wood ashes and dirt, can be had, they are preferable to drift sand, provided that the mortar is well beaten.

But let us go back a little further, and we shall find that in the mediæval times the mortar bore, in many instances, a strong resemblance to concrete. In some old Saxon work we find a very coarse mortar, and we have repeatedly observed the large stones in much of the mortar found in old monasteries and churches. According to the "Architectural Dictionary" Bishop Gundolph (1077—1108) mixed blood with lime to make it hard, and we constantly hear of blood and wax being mixed with mortar. Britton, in Westminster Palace, notices that in 1330 wax and pitch were bought for cement. The foundation of St. Clement Danes (1605) is also described as being laid with two hundred of lime, two loads of screened rubbish, and one of sand. Another remarkable point to notice is that the Roman builders, who were masters of cement masonry, invariably used coarse sand. Seldom do we discover the fine sand used by builders now; a coarse matrix has been found by all authorities who have investigated the subject. Brickdust, chippings, pozzulana, and other ingredients, have been found added in most instances. We have observed invariably that the best and strongest mortar is that made from coarse sand or small angular gravel, with fine sand combined. Higgins, an old but one of the best authorities, says, that the best proportions are three parts of fine, four of coarse sand, one of quicklime recently slaked, and as little water or lime-water as possible. One of the best ingredients for mortar for redbrick work is coal ashes or ground mine dust. It has the effect of hardening the mortar, and in giving it a pleasing grey color.—(*London*) *Building News.*

An excellent blacking for fine harness can be made by dissolving five or six sticks of black sealing wax in a pint of alcohol.

THE JAGUAR OR SOUTH AMERICAN TIGER.

Among the many handsome and formidable creatures which are natives of the western hemisphere the juguar is entitled to the first place for beauty, strength, and ferocity. In these particulars it rivals the royal tiger of Bengal, resembling it also in subtlety. It is occasionally seen in North America as far north as Louisiana; but the southern continent is its home. We herewith publish an admirable engraving, showing a fine specimen of the race, enjoying the coolness of the shade and the river in one of the tropical forests. The picture was drawn by Mr. Joseph Wolf, and engraved by the brothers Whymper; and it first appeared in "The Life and Habits of Wild Animals," published by Messrs. Macmillan & Co., of New York and London.

The artist has well succeeded in portraying the ferocious beast in an attitude of perfect repose. But for the blinking eyes and the curl on the tip of the tail (which has evidently just touched the surface of the water), the animal gives no sign of life; and its watchfulness, even when at rest, is the only indication of its remarkable cunning, which never allows it to be surprised. In this state of rest, we can admire the immense muscles of the shoulders and neck, and the great size of the thighs and legs, as well as the ascending beauty of the coat and the configuration of its spots. Of all the larger specimens of the tribe *felis*, the jaguar most resembles in countenance the domestic cat; and the likeness is very apparent in our engraving, the *pose* of the monster increasing the similarity.

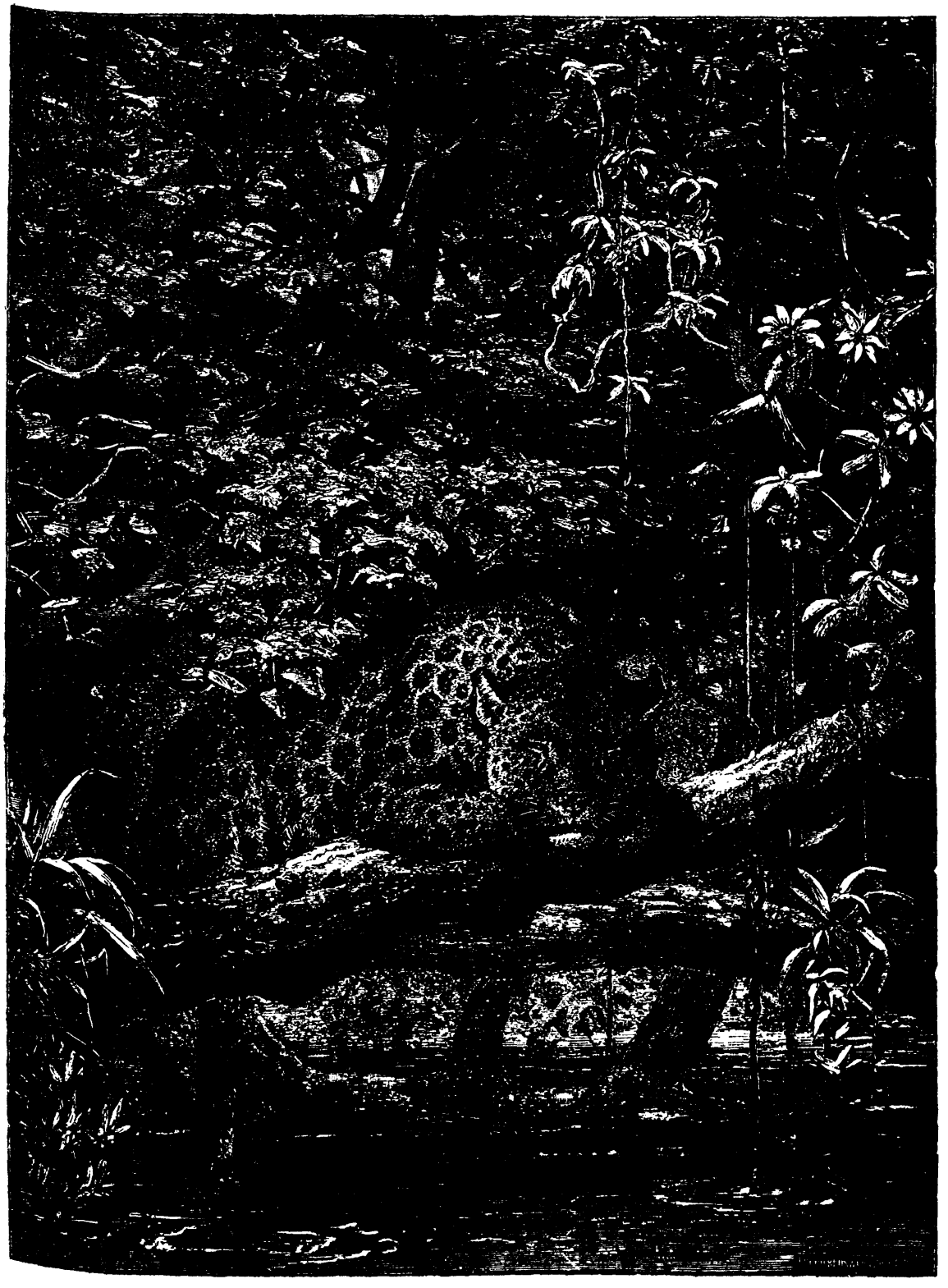
A terrible tragedy took place some time since, in a monastery in Santa Fé, New Mexico, in which the strength and courage of the jaguar were forcibly shown. One of the brothers entered the sacristy, and found himself face to face with a large jaguar. The beast clutched him at once, and dragged him into a corner. The screams of the victim brought another monk to the room, whom the jaguar also despatched with promptitude; and another comer met a similar fate. A gentleman named Irondo attempted to approach the sacristy by another door, but unfortunately the jaguar had left the room through this door, and before Mr. Irondo could reach the spot he was saluted by the cries of a fourth victim. The doors were, however, finally shut upon the jaguar, and he was shot through a hole bored in one of them.

It seems to be a merciful dispensation of Nature that the most terrible quadrupeds are not gregarious, but hunt alone or in couples. If lions, tigers, and jaguars herded like wolves, whole provinces would be depopulated by their ravages, and man would hardly be able to hold them in any subjection. But by destroying them in detail, their numbers can be kept within bounds, and their depredations confined to their native forests and jungles.

TRUST YOUR WIFE.

If you are in any trouble or quandary, tell your wife—that is, if you have one—all about it at once. Ten to one her intervention will solve your difficulty sooner than all your logic. The wit of woman has been praised, but her instincts are quicker and keener than her reason. Counsel with your wife, or your mother, or your sister, and be assured light will flash upon your darkness. Women are too commonly adjudged verdant in all but purely womanish affairs. No philosophical students of the sex thus judge them. Their intuitions, or insights, are the most subtle, and if they cannot see a cat in the meal, there is no cat there. I advise a man to keep none of his affairs a secret from his wife. Many a home has been happily saved, and many a fortune retrieved, by a man's full confession to his wife. Woman is far more a seer and a prophet than man, if she is given a fair chance. As a general rule, wives confide the minutest of their plans and thoughts to their husbands. Why not reciprocate, if but for the pleasure of meeting confidence with confidence? I am certain no man succeeds so well in the world as he who, taking a partner for life, makes her the partner of his purposes and hopes. What is wrong of his impulse or judgment she will check and set right with her almost universally right instincts. And what she most craves and most deserves is confidence, without which, love is never free from a shadow."

QUICKSILVER ALARM.—A singnal to indicate the breaking out of a fire, has just been patented. When the temperature rises above a certain point, a quicksilver thermometer is cansed to break, and the quicksilver runs into a dish, where by its weight a clock-work is set in motion which operates an alarm bell.



THE SIESTA.

CURIOUS BRAIN WOUNDS.

A FEW years ago an insane seamstress in one of our asylums made a practice of running needles into various parts of her person, several hundred being removed by the attending surgeons, before and after her death. The practice had been developed, apparently, from the employment of hypodermic injections for neuralgic pains.

The St. Louis *Clinical Record* reports a still more remarkable case of a man in Kansas who had a habit of running wires, and even nails, into his brain through holes made with a brad-awl. The habit was discovered during his residence in a penitentiary; and when he died subsequently of morphia a careful autopsy was made. Three openings were found in the skull, two near the inferior posterior angle of the right parietal, the other near the superior posterior angle of the same bone. In the brain was found a wire which had been thrust in at the upper hole, and, just missing the superior longitudinal sinus, had pierced to the base of the brain, a little in front of the fissure of Silvius. Beside the wire was a nail, one and three fourths inches in length. Although wires had been removed during life from the lower apertures, no trace of their course was discovered, no disturbance of brain function appeared to result from this strange habit. The prisoner could do his work with correctness and understanding; and, excepting a suicidal tendency, gave no signs of insanity.

The trial of Landis for shooting Carruth has given prominence to the power of the brain to withstand gun-shot and other wounds; but, barring the case of the Irishman who had an iron drill shot through his head and survived, we recall no case of brain lesion so remarkable as this.

Facts and Simple Formulæ for Mechanics, Farmers, and Engineers.

Velocity of circular saws at periphery, 6,000 to 7,000 feet per minute. Rate of feed for circular saws, 15 to 60 feet per minute. Velocity of band saws, 3,500 feet per minute. Velocity of gang saws, 20 inch stroke, 120 strokes per minute. Velocity of scroll saws, 600 to 800 strokes per minute, Velocity of planing machine cutters at periphery, 4,000 to 6,000 feet per minute. Travel of work under planing machine, $\frac{1}{20}$ of an inch for each cut. Travel of molding machine cutters, 3,500 to 4,000 feet per minute. Travel of squaring up machine cutters, 7,000 to 8,000 feet per minute. Speed of wood carving drills, 5,000 revolutions per minute. Speed of machine augers, 1½ inches diameter, 900 revolutions per minute. Speed of machine augers, ¾ inch diameter, 1,200 revolutions per minute. Gang saws require, for 45 superficial feet of pine per hour, 1 horse power indicated. Circular saws, for 75 superficial feet of pine per hour, 1 horse power indicated. In oak or hard wood, ¼ of the above quantities require 1 horse power indicated.

The area of a safety valve should be ·006 times the area of the fire grate.

On railway car axles, 20 pints of oil lubricate 8 journals of cars for 5,000 miles, or 1 pint for 250 miles.

The following is the effective horse power for different water motors, theoretical power being 1: Undershot water wheels, 0·35; Poncelet's undershot water wheel, 0·60; breast wheel, 0·55; high breast, 0·60; overshot wheel, 0·68; turbine, 0·70; hydraulic ram raising water, 0·60; water pressure engine, 0·80.

The following are the ordinary dimensions of windmill sails: Length of whip, 30 feet; breadth at base, 12 inches; depth at base, 9 inches; breadth at tip, 6 inches; depth at tip, 4½ inches. The effective horse power is found by dividing the product of the total area of sails in square feet and the cube of the velocity in feet per second of the wind by 1,080,000.

Rule for speed of screws: Velocity in miles per hour = pitch of screw in feet multiplied by the number of revolutions per minute, and divided by 88.

With hydrogen gas, having a buoyancy of about 13·3 feet to 1 lb., the diameter of balloons = the cube root of 25·5 times the weight to be raised, including that of the balloon itself, or the weight = 0·0892 times the cube of the diameter.

The unit of heat is the quantity required to raise the temperature of 1 grain of water at its maximum density 1° Fah. The absolute mechanical equivalent thereof is 772 foot grains, and the thermal equivalent of the absolute unit of work = 0·000040224.

The proper proportion for the width or hoist of the American ensign is $\frac{1}{1.9}$ its length. The thirteen horizontal stripes should be of equal breadth and begin with the red. The blue field is 0·4 of the length of the striped portion, and is 7 stripes in depth. The 37 stars are ranged in equidistant horizontal and vertical lines.

The actual horse power of pumping engines = quantity of water raised per minute in cubic feet multiplied by hight elevated in feet, multiplied by 0·0023. The indicated horse power of engines is found by dividing twice the product of the area of the piston in square inches × the average pressure of steam in lbs. per square inch in cylinder × the number of revolutions per second × the length of the stroke in feet by 550.

Useful numbers for pumps: The square of the diameter multiplied by the stroke, multiplied by 0·7854, gives capacity of the pump cylinder in cubic inches; by 0·002833, in gallons; by 0·0004545 in cubic feet; by 0·02833, in lbs. fresh water.

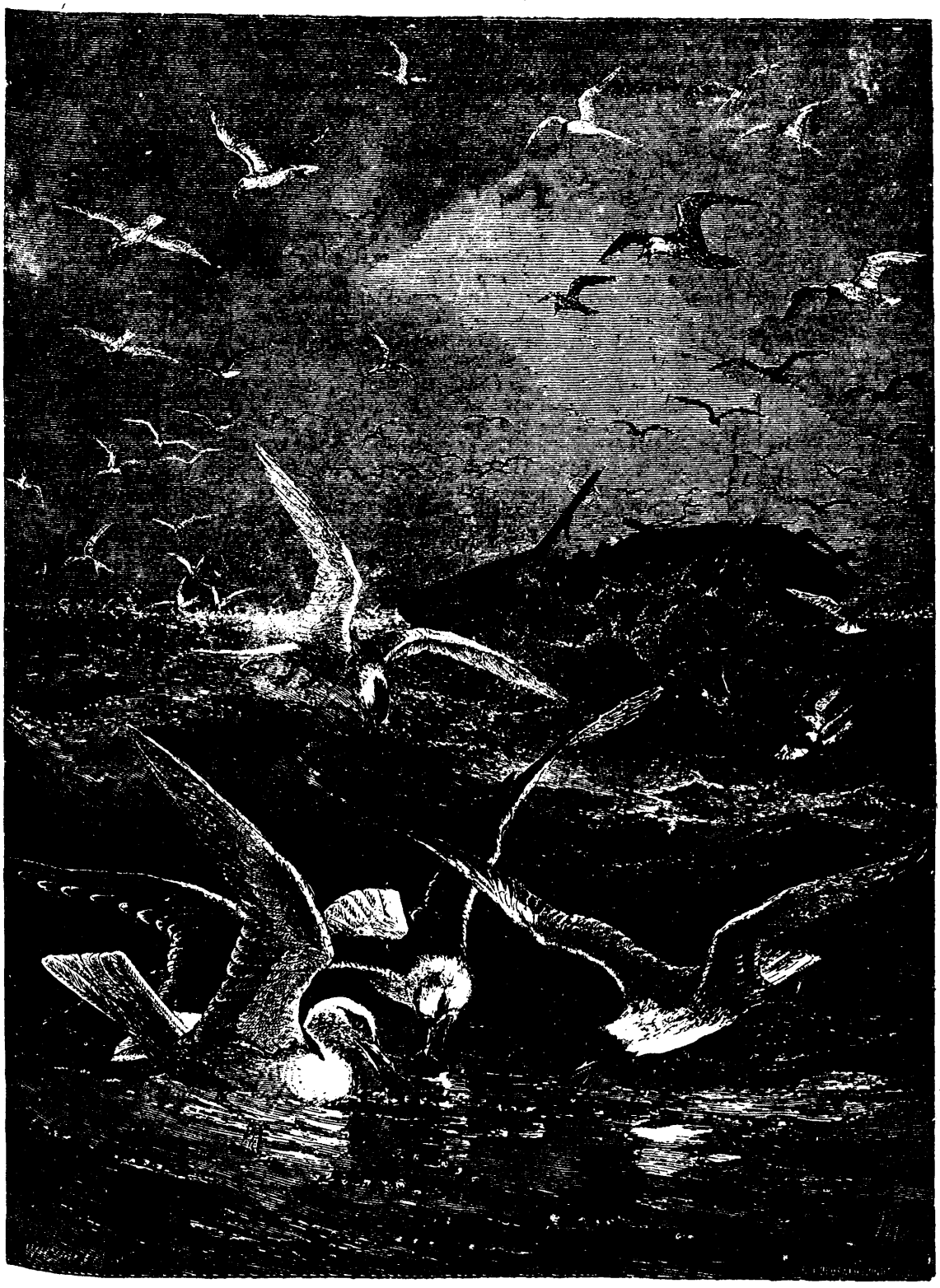
THE SEA GULL.

A traveler, making his first voyage across the ocean, is astonished to find birds following in the ship's wake a thousand or more miles from land. That such small animals should be gifted with the endurance necessary for keeping on the wing continuously, with the exception of an occasional rest on the surface of the ocean, is certainly an extraordinary proof of the muscular power and vitality of the species of the winged tribe.

These birds are nearly all members of the gull species (*larus* of Linnæus,) of which the largest *genera* are *larus glaucus* (Brünnich,) which measures 30 inches in length, and has a wing breadth of 5 feet, and the *larus marinus* (Linnæus,) which is nearly or quite equal in size to the *l. glaucus*. The gull family has several general characteristics, among which may be mentioned the curvature at the end of the bill, the length and pointed form of the wings, and the web between the toes, the hind toe being short and elevated. The *l. marinus*, commonly called the black-backed gull, may be distinguished by the dark slate color of its back and wings, its black primary feathers tipped with white, and its yellow legs and feet. This species is found in summer on the coasts of New England, and in winter travels as far south as Florida, its favorite breeding places being on the coast of Labrador. It flies high, and has a majestic carriage in the air: it encounters the fiercest gales, and swims well but slowly. It preys on fish, young birds, and carrion, indeed on anything but vegetable food; it is tyrannical towards weaker birds, but is naturally very cowardly. Its eggs are good eating, and the young birds are killed and salted by the fishermeu of Labrador and Newfoundland; but the old ones are very tough and too fishy in taste for food.

Our illustration shows a flock of black-backed gulls surrounding a wreck, and hurrying with screams of delight after small pieces of garbage or refuse food that float away from the wrecked vessel. Mr. Wolf, the artist, shows well the great wing power of these birds, and the easy grace with which they carry themselves in gale. Their endurance in flight is aided by the lightness of their bodies, which, however, makes them the sport of a high wind; but this obstacle they overcome by a novel species of tacking, which enables them to make headway against the tempest.

Many of the high rocks and almost inaccessible cliffs of Scotland and North Wales are the homes of countless millions of sea birds; and the pursuit of them, for their eggs and plumage, is one of the most hazardous pursuits in which men ever engage.



THE GLEANERS OF THE SEA.

Constructive Carpentry.

Framed and Double Floors.—In this kind of floor there is a member in addition to those forming the assemblage of timbers in a single floor. This additional member is called a binder, or binding joist, as *b* in Fig. 4, *a a* being the flooring joists, corresponding to *a a* in Fig. 1, page 85; *c* the ceiling joists, and *d d* the flooring boards; *e e* indicates the line of plaster on the ceiling. Fig. 5 is a side elevation of this double floor; Fig. 6 is a cross section, *a a* being the flooring joists, also sometimes called bridging joists, *b b* the binder or binding joists, *c c* the ceiling joists, and *e e* the line of lath and plaster ceiling. Fig. 8 is part plan.

The thickness of the binding joists varies with the bearing; as a rule, they are made half as thick again as the flooring joists of the corresponding floor; the bearing on the wall will be ample if at 6 inches. The distance between the binders, measured from center to center, (see Figs. 4 and 5), is generally from 5 to 6

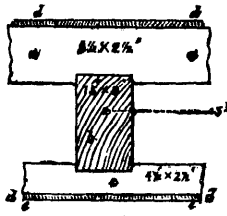


Fig. 4.

feet. When in the arrangement of the timbers of a double floor the binding joists are placed to, or come near a wall, their thickness is reduced one-third; thus, if the binder is 9 inches thick in the central part of the floor, it is only 6 inches when near a wall. When a fire-place interrupts the line of joisting, or when a hole is required to be made in a floor to receive a staircase, a trap-door, etc., an arrangement known as a trimmer, or trimming joist, is introduced, as illustrated in Fig. 9. In this drawing the jambs of a fire-place projecting from the wall show two of the ordinary flooring joists; the other joists are broken off, and instead of resting upon the wall, which cannot be used as a bearing surface for them in consequence of the fire-place, they are jointed to and are carried by a cross

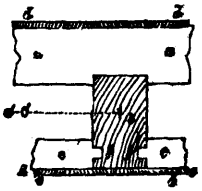


Fig. 5.

joist, which is termed a trimmer, this being at its end jointed to and carried by the trimmer, which runs parallel to the flooring joists. The trimmers and trimming joists are thicker than the flooring joists, one-sixth or one-eighth of thickness of the flooring joists being added for each joist carried or supported by the trimmer.

Molding and Founding.

Molding Hollow Ware.—Without a proper division of labor, the art of molding hollow objects would never have attained the perfection which is the admiration of all reflecting minds. An iron pot, kettle, or stove may be a very common thing, but if any one reflects upon the construction of the mold which made it possible not only to cast such objects, but to cast them light, sharp, smooth, and with well defined outlines, he must confess that a great deal of skill and dexterity, aided by the experience of more than one generation, was necessary to accomplish the production of these now so common and cheap objects.

There are at present foundries in which the casting of hollow ware is made a specialty. In such foundries the sand is fine and liberally mixed with coal powder. Nowhere in the world at present are such elegant pat-

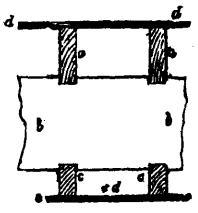


Fig. 6.

terns of stoves manufactured as in the United States, where it is a rightful boast that the art of stove and grate making has been so much improved, as well in elegant form as in adaptability to the purpose and economy of fuel.

In casting hollow ware, the main point is to have well-finished patterns, and as the articles are always thin, there is no danger of the sand burning and adhering to the metal. It is the same with small articles, such as hinges, knife-blades, latches, parts of locks, etc., of which a dozen or more are usually molded in one flask and cast at once, being connected by a small channel from the gits to the patterns.

Patterns for hollow ware require to be very accurate, if we expect the molding to be well done. The originals of these patterns are generally molded in loam, cast in brass, and turned in a lathe, or, if not of a round form, worked by other means until a perfect form is obtained. A pattern having been smoothed and polished, is then cut into such parts as are considered necessary to make it available. Pins, ears for handles, and studs for feet or handles, are generally put on loose. All dished utensils are generally cast with their mouth downward, except covers. Where the neck of a core is narrow, and there is any danger of the hot metal lifting the core, as may occur in the case of a coffee-pot, the core is fastened to the bottom of the flask by a thin iron rod with a cross at the upper end, buried in the core and fastened below the bottom. Hollow ware molders need a variety of peculiarly shaped tools and sleekers. Most of the tools are button-shaped, with short studs for handles, more or less round, or even cylindrical, to suit the various hollow forms of the patterns; others are plain and heart-shaped; and others again have double plain surfaces at certain angles with each other, to suit certain corners in the mold.

Iron boxes are generally used in this kind of molding; these are the cheapest. In iron flasks the work is done fast, well, and safe, while imperfectly made or wooden flasks always cause more or less delay in the work. From well made flasks many advantages may be derived; if they are well made and fit one upon the other promiscuously, there is no need of boards after the first drag-box is molded. Upon the first box which

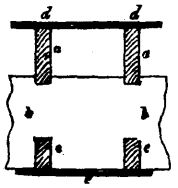


Fig. 7.

is molded its complement, the upper box, is rammed in. After parting upon the upper box, the next lower box is molded, leaving of course the pattern always in that box which serves as the bottom of the flask. In this way the top box of the first flask serves as the bottom to the next bottom box, and so on through the whole range of boxes.

In molding a water-kettle, the pattern is exactly as the kettle is to be, except the pipe, which may be solid. The flask consists of three boxes, of which the middle box is divided by a vertical division in two halves—cheeks. This division runs through the pipe and divides the mold into two halves, so that when both boxes are removed, the pipe, which is not fastened to the pattern, may be withdrawn. The upper part of the pattern may be divided just in the division of the middle box; but this leaves an unsightly division, and is likely to expose the pattern to injury. It is better to have the middle box in one piece, and divide above and below. At the pipe the upper box reaches down into the middle box, as far as the pipe goes down, and divides the sand just along the bend of the pipe; the middle box parts with the lower at the rim of the kettle, where the core also separates. In molding a kettle the lower half is put on a board and the upper box rammed in, this box turned upside down, and the other half of the pattern put on. The middle box is then set in its place and fastened to the upper box. Both boxes

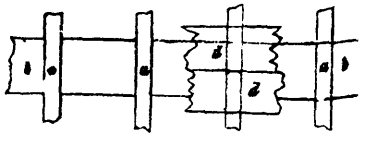


Fig. 8.

may also be put together, and rammed in together, just as conveniently. Sand is then filled in the middle box around the pattern, and after this the sand is rammed inside the kettle. The parting is made between the lower and middle box, and the lower box filled. The flask stands now inverted, and the kettle on its bottom. The lower box—as the flask stands it is the upper box—is now withdrawn, then the middle box lifted, and the upper half of the pattern withdrawn. First the middle and then the upper box is put on again, and the flask turned over, which will then stand in its original position. We may now draw the upper box, remove the lower part of the pattern, and put in the core for the pipe, which is made in a separate core-

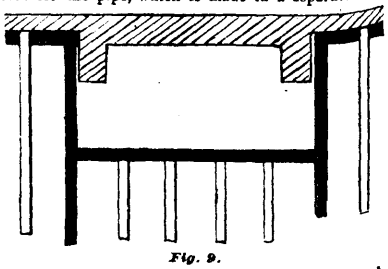


Fig. 9.

box. The git-pin is now withdrawn; this is very much tapered one way, and thin; the other way three or four inches wide, formed like a blunt wedge, with the edge ¼ of an inch thick. The box is now put on again, and the mold is ready for casting.

Employment of Carrier Pigeons.—The experiment which was tried last year of employing carrier pigeons to bring early intelligence every morning from the fishing grounds off the Scotish coast, of the results of the night's labor, is again being resorted to this season. One of the birds is taken out in every boat in the afternoon, and after the nets have been hauled on the following morning, the pigeon is dispatched with a small piece of parchment tied around its neck, containing information as to the extent of the catch, the position of the boat, the direction of the wind, and the prospects of the return journey. If there be not wind enough to take the boat back, or if it is blowing in an unfavorable direction, a request is made for a tug, and from the particulars given as to the bearing of the craft, she can be picked up easily by the steamer.

Burnishing Gold Dust.—Gold dust cannot be burnished in a proper manner on frames, &c. Gold paint will dry what is called dead gold; to burnish it would be to destroy part of the gold, and the result would not please. If bright gilt is required it should be gilt with gold leaf; the frame may be then burnished in various parts. It is not usual to burnish the whole of any gilt frame, at least in best work, the dead gold gives tone and effect to the burnished parts.

Large White Pigs.

The distribution of the different classes of pigs, both as regards color and size, would be a curious and interesting study. When the main object is pork, bacon, or hams, and their most economical production, it would seem that there must of necessity be one class of pigs that would meet these wants most completely, and which would oust all others from the competition. But instead of this being the case, we have, on the contrary, a seemingly most varied opinion as to which is the most profitable size of pig, and a most inconstant fashion as to color. It has long been considered that the black pigs were the best for the Southern States, as they most easily resisted the ill effects of the hot sun, and if it is true, as has been authoritatively stated, that they can forage with impunity upon some of the common wild plants, which are fatal to the white pigs, we have a still more satisfactory reason for this popular preference. But in the north the taste has very largely run to the white breeds, and we have many excellent varieties so nearly related in character, that it would be entirely safe to abandon all distinctions between them, excepting as to size, and to class them, as is now done in England, as the large and small white breeds. It would puzzle the most acute judge of swine to distinguish some small Yorkshires from some Suffolks, or to state so clearly that the wayfaring man could not be misled, wherein they differ; or to distinguish in the same way between the large Yorkshire, the improved Cheshire, the Jefferson County, or some of the Chester White swine. At the fairs, one has to hunt up the show-cards or the catalogue to discover the name given to the different animals, and it is not always certain to be one that meets the approbation of an expert in swine. The snub, *retroussé* nose of the Yorkshire is at home in the pen of the well fattened Cheshire, and the Chester White has the drooping ears as frequently as otherwise. Whether or not it would not both simply expedite and justify matters for the committees at the fairs to abolish all other distinctions than that here suggested, is a question we think worth attention.

"Large white breed" is significant enough, and if the good points of each of the different varieties were summed up, it would be hard to find one that was not claimed by all of them, nor one fault that was not repudiated. Our illustration represents model large white pigs, and we would be content to leave those of our readers who are prejudiced in favor of any one special variety of this class of pigs, to say if this is not a good representation of what they claim their favorite breed to be. Without doubt, the large white breeds are profitable pigs. They are prolific and good nurses, good feeders, hardy, and if they do not arrive at profitable maturity as soon as the small breeds, yet they will make an amazing quantity of pork from a bountiful supply of corn. As a manufacturer of bulky corn into readily movable and merchantable product, there is nothing better, and perhaps nothing equal to them, unless it be the deservedly popular Poland-China of the Western States. What was the origin of the larger white breeds, is lost in obscurity. Probably the "old English hog," which, being found most numerously in the two larger counties of England, Yorkshire and Lancashire, became more especially identified with these names, and were in later years known as either or both the Yorkshire and Lancashire hogs, was the original progenitor of all our large white breeds. At any rate, what is known as the large Yorkshire, is so much like the pigs here illustrated, that if they be not in fact the same, they may well be accepted as very near relatives. They are, in fact, portraits of a pair of "large white pigs," only so designated, bred by the Earl of Ellsmere, Worsley, England. And in this age of improvement, when a "dash of new blood" is considered useful or necessary to make certain desired points to perfect a hog, and breeds become rather mixed, this designation would seem to be sufficient for all purposes.

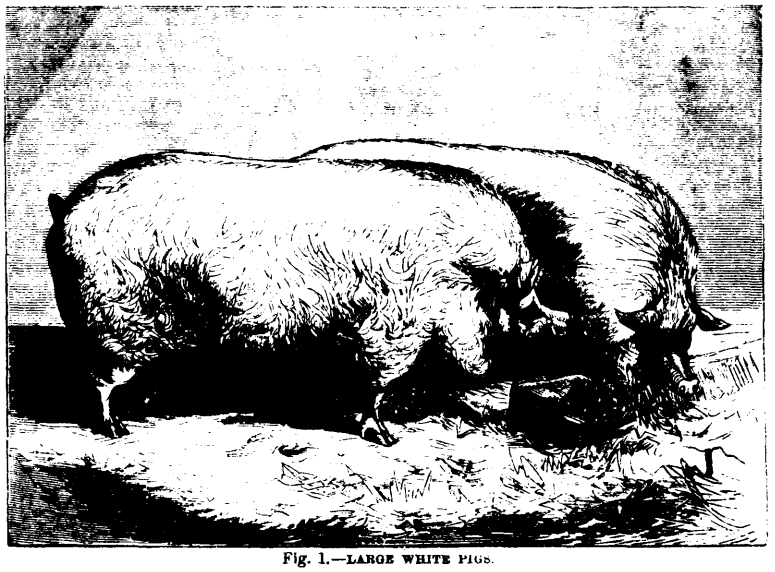


Fig. 1.—LARGE WHITE PIGS.

Fig. 2.—THE IMPROVED BERKSHIRE PIG.

The Berkshire Swine.

Decidedly the most popular breed of swine of the present day, is the Berkshire. That it is black in color, is only an objection to those who form their opinions from prejudice rather than from knowledge, as the color is not even "skin deep," and a Berkshire ham, or side of bacon, when freed from hair, is not to be distinguished from the same parts of a white pig. The Berkshire is not classed amongst the large breeds, nor can it be placed amongst the small breeds. In this respect it holds an intermediate place, though specimens occasionally reach a very respectable size, and compete favorably with the heaviest swine. No breed has undergone a more elaborate process of improvement than the Berkshire. Originally of a tawny or reddish sandy color, spotted with black, with large lop ears, hanging down over the eyes, and coarse in form and feature, the breed has been brought to a nearly entirely black color, the face, tail, and feet only, being in small part spotted with white. The form has been refined and filled out, the bone also refined, the shoulders and hams rounded and broadened, and the sides deepened, until no more handsome bacon swine now exist than these. The ears are pricked and much lessened in size, as may be seen by our illustration (fig. 2), which is from the London Field, and represents a choice specimen of the modern highly improved Berkshire pig. This animal leaves nothing to be desired in the way of a profitable pig, either for a farmer, or a feeder who keeps but one or two animals for his home supply of hams and bacon. The most conspicious remnant of the old fashioned Berkshire, left in its modern relative, is the pinkish hue of the skin, which distinguishes it readily from the other black breeds, such as the Essex or the black Suffolk. Originally there were two distinct varieties of this breed, that which was wholly white, and that which was principally black. The white Berkshires we have not seen of late, nor at all in the United States, having seen but a few of them some years ago in the yards of a Canadian breeder, who imported them. These were known as the Windsor breed, and, with the Coleshill, another white variety, still exist in England. It is, as a black breed only, that we know the Berkshire. The chief points of the breed are as follows: a moderately short head, dished face, nose straight and not turned up, as in some small breeds, ears generally pricked, although drooping ears, while not desirable, are not incompatible with purity of blood; color black, with purplish tinge, and not a dead black like that of the Essex, sometimes the color shows a slaty-bluish tinge, doubtless derived from crossing with the Neapolitan. The eyes

are not sunken and small, but large, bright, and intelligent: the back is broad and level, but the barrel is not so round; as in the Essex or the Suffolk the sides are deep, and the rump drooping, with the tail often set lower down than the line of the hips; the legs are short and strong, and the feet white; the hair varies, according to the kind of management, from a thick coat, soft, silky, and free from harshness and bristles with those that have plenty of out-door exercise, to a thinner, finer, but not weak coat in those that are closely penned; the flesh has a good mixture of fat and lean. When properly fed, the pigs reach a weight of from 300 to 500 pounds, at a year old, if the animal is well kept from birth. The history of the Berkshire as a favorite with feeders and breeders, dates back only for 15 years, and it can justly be said that it is only now that it is finding its proper position amongst farmers, in spite of the prejudice against its color and wholly through its undeniable merits.

The Farm Agriculturist.

Beware of Dust.

The injuries done by dust are among the most serious to which mechanics and operatives are subjected. Wherever filings and fine particles of any kind are produced, it is very important to prevent their introduction into the lungs; even an occasional exposure may do harm, and one continued for months and years will certainly produce fatal results.

Dr. B. W. Richardson, of London, after several experiments with inhaling air through cotton, layers of crape, etc., informs us that he finds the best arrangement to be a number of feathers arranged around the outside of a perforated breathing tube of convenient size, so as closely to cover all the perforations; by breathing through the tube the feathers are drawn down to the perforations by inspiration, and by expiration they are lifted from the openings, and all the intercepted dust is blown off. The latter makes the arrangements with cotton or crape objectionable, as their pores are soon filled with the dust as well as the moisture exhaled by the breath. The tube is attached to an arrangement which allows it to be put on and taken off as easily as a pair of spectacles.

A natural protection against breathing dust is also afforded to most males of the Caucasian race in the beard and hairs around the mouth. These should not be removed by any persons exposed to a dusty atmosphere, who therefore do a very unwise thing if they indulge in the vice of shaving, which is nothing less than an attempt to improve upon nature's protective provisions. Three evils result from this practice: 1st. Stimulating the continual growth of the hair, (which will become slow, and finally cease if not interferred with,) while this stimulated growth is a steady unnecessary drain on the powers of the vital system. 2d. The removal of a natural protection against cold from a place where this protection is more needed than is generally supposed. 3d. The removal of a dust-protector, above referred to. Men inclined to pulmonary consumption should especially guard against shaving, and let their beards grow as nature intended, only curtailing a little when it becomes inconveniently long.

Another natural protection against dust may be secured by accustoming oneself to breathing exclusively through the nose, and only through the mouth when speaking. The benefits of this habit are threefold: 1st. The olfactory sense secures it against the entrance of impure air. 2d. The moisture of the nasal passages gives a certain degree of aqueous saturation to the inspired air, the contact of which is thus rendered less irritating to the mucous membrane of the throat and larynx. 3d. The inequalities of the organ retain solid particles suspended in the air, which is proved by the quantity of dust sometimes found accumulated in the nostrils. These functions are all lost by breathing through the mouth. Further, the contact of dry air soon produces circulatory troubles in the pharyngeal region, and even an habitual catarrh, susceptible of easy transmission by continuity to the eustacian tube and cavity of the tympanum. Granular anenoid pharyngitis often has this origin. Niemeyer believed that attacks of pseudo-croup in children have their origin in dryness of the glottis produced by oral respiration. To enable the patient to breathe through the nose, we must restore the nose to its proper condition. Many cases of catarrhal deafness have been cured in this way alone.

The habit of keeping the mouth shut and breathing through the nose alone, if persisted in for a long time, has a tendency to widen the nostrils and improve the shape of the nose, while the habit of breathing through the continually opened mouth tends, on the contrary, to make the nostrils useless, renders them smaller, and also influences the shape of the nose, interferring with its proper growth. According to the theory of evolution, the habit of not using the nose for breathing, must, after several generations, end in producing a race with small, miserable, turn-up noses.

Preventive Against Lead Poisoning.—"An efficient preventive against lead poisoning would, no doubt, be welcomed by pottery glaziers and workers in the poisonous preparations of lead: but the preventive must be something that can be taken or applied with the minimum of trouble. It is stated that washing the hands thoroughly with petroleum three times a day has been found to prevent all symptoms of lead poisoning among some workers who have given it a fair trial, and who are so satisfied that they recommend it for trial by those liable to injury from salts of copper, lead, mercury, etc."—*Exchange.*

Coffee-Drinking.

How strong should coffee be taken is an inquiry of much practical importance. How much should be taken at a meal is scarcely of less moment. Coffee, like any other beverage, may wholly ruin the health; the very use of it tends to this, as certainly does the use of wine, cider, beer, or any other artificial, stimulating drink. There is only one safe plan of using coffee, and that is never, under any circumstances, except of an extraordinary character, exceed in quantity, frequency, or strength—take only one cup at the regular meal, and of a given, unvarying strength. In this way it may be used every day for a lifetime, not only without injury, but with greater advantage than an equal amount of cold water, and for the simple reason that nothing cold should be drank at a regular meal, except by persons in vigorous health.

We have personally known of the case of a lady who was for a long time in poor health, to the mystification of several physicians whom she consulted, when at last we discovered that she made a most extravagant use of strong coffee many times a day—in fact, she had a pot of coffee always at hand. Following the advice to abstain from coffee, resulted in an immediate end of all her trouble.

In regard to the strength, it is maintained by some that one pound of the bean should make 60 cups of the very best coffee. If a man takes coffee for breakfast only, one pound should last him two months, or 6 pounds a year. One pound of coffee should be made to last a family of ten persons, young and old, one week. Put about two ounces of ground coffee in a quart of water, or rather divide the pound into seven portions, one for each breakfast in the week, and make a quart of coffee out of it, which will be 64 tablespoonfuls. Give the youngest two tablespoonfuls and the oldest a dozen, the remainder of the one cup being filled up with boiled milk. This will give a cup of coffee sufficiently strong for all healthful purposes, for the respective ages; and for various reasons, pecuniary as well as physical, some such systematic plan as this should be adopted in every family in the land.

How to make the cup of coffee good is a third question. It is perhaps as good and as easy a plan as any to buy the coffee unground, pick out those grains that are imperfect, wash it, parch as much as will last a day or two, with your eye upon it all the time, until it is of a rich brown, with no approach of black about it. Grind only enough for the day's use; grind it fine, for the greater the surface exposed to the hot water the more of the essence you will have; pour the boiling water on the coffee, and close it up. Some boil it a little; others prefer not to boil it at all, but let it stand to clear ten minutes, then use.

Constructive Carpentry.

If a brace has to be supported at its lower end by a vertical beam, it is well to cut the face of a part of the plane of support at such angles that no displacement can take place, but that the direction of the pressure tends to keep the brace in place. Thus in Fig. 102, the lower end is cut like a double wedge, fitting in a corresponding recess in the vertical beam, and as long as the pressure takes place no displacement is possible. When, however, there is danger that the brace may come out from want of pressure, it is well to provide it with an iron strap going around the beam, and fitting in a notch cut out of the brace, as indicated by the dotted line.

Fig. 103 represents another way of cutting the end of the brace, which is preferable in case the vertical beam is not heavy and we do not want to make a deep cut in the same.

Sometimes it is necessary to support such braces from a hanging beam; but then it is necessary to apply them at both sides, so as to equalize the sideward pressure. Fig. 104 represents such a case where the horizontal beams support the braces. This method of construction is very strong, and is applicable in cases where we wish to avoid the use of vertical props on the floor, which is objectionable in many cases.

If an oblique brace is to be supported by a wall, it is best to leave or cut a square opening in the wall of the size of the thickness of the brace, and a little deeper than this thickness: place a short piece of the beam in, after cutting its face obliquely and nearly perpendicular to the direction of the strain—that is, at right angles to the sides of the brace. This case is represented in Fig. 105.

Fig. 106 represents the manner in which a vertical beam, and brace supported by it, are both kept in place by a piece of cut stone inserted in the wall while it was being built. It is a very reliable method, and far superior to that represented in Fig. 107, where the end of the brace is inserted in a hollow left in the wall. One of the objections to this method, is that if the wall is, or becomes damp, the lower end of the brace is very apt to rot, while, being hidden, it cannot readily be perceived.

Fig. 108 represents a method not subject to this objection, and is very strong; it is applied when a wall is diminished in its thickness, and the level at which this is done is a very appropriate place for the support of beams and braces.

The Brains of Criminals.—Says the *British Medical Journal*: "We lately published a very interesting letter from our Vienna correspondent, in which a brief summary was given of Prof. Benedict's researches on the brains and skulls of criminals. The subject is an important one, both from a physiological and a psychological point of view, and it is to be hoped that more extended and more precise inquiry will be made upon it, for the results which Prof Benedict has obtained, though very important, are not sufficiently numerous to warrant any large induction. Up to the present time Prof. Benedict has examined the brains of sixteen criminals, all of which, on comparison with the healthy brain, he finds to be abnormal. Not only has he found that these brains deviate from the normal type, and approach those of lower animals, but he has been able to classify them, and with them the skulls in which they were contained, in three categories. These consist in: 1st. Absence of symmetry between the two halves of the brain. 2d. An obliquity of the interior part of the brain or skull—in fact, a continuation upward of what is termed a sloping forehead. 3d. A distinct lessening of the posterior cerebral lobes, so that, as in the lower animals, they are not large enough to hide the cerebellum. In all these particulars the criminal's brain and skull are distinctly of a lower type than those of normal men, and the interesting question arises: How far are evil tendencies of the criminal to be attributed to this retrograde development?

Oxygen and Hydrogen explode by the electric spark when mixed with five times their bulk of steam. A mixture of air and carbureted hydrogen requires a third of steam to prevent its inflammation.

ARCHITECTURAL.

CONSTRUCTIVE CARPENTRY.

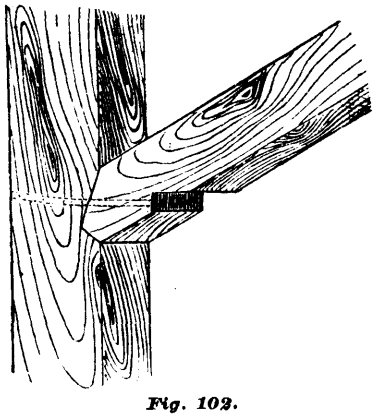


Fig. 102.

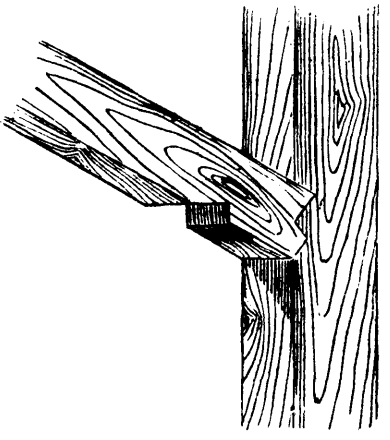


Fig. 103

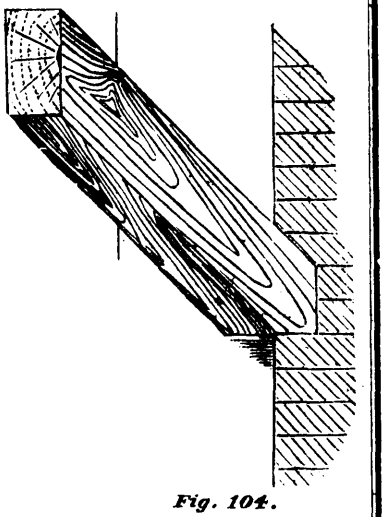


Fig. 104.

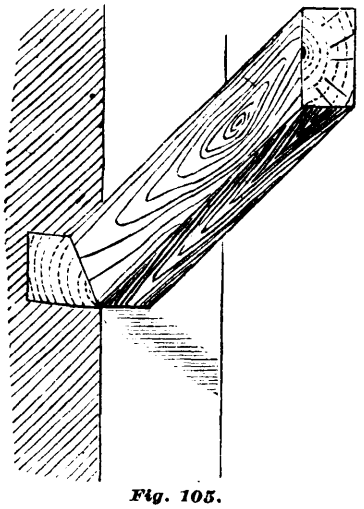


Fig. 105.

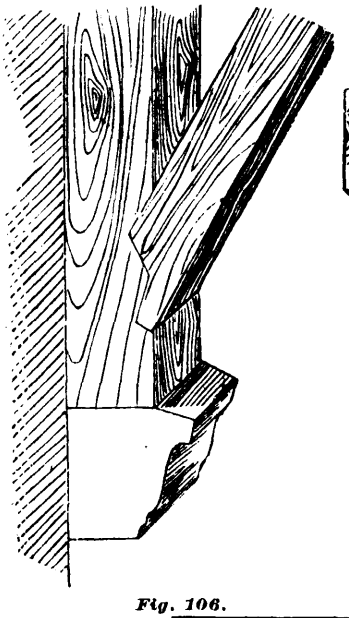
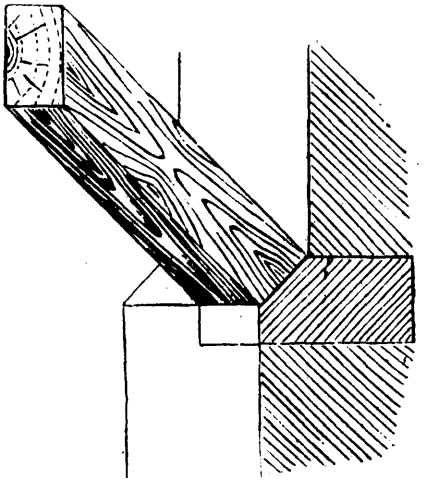


Fig. 106.

Fig. 107.



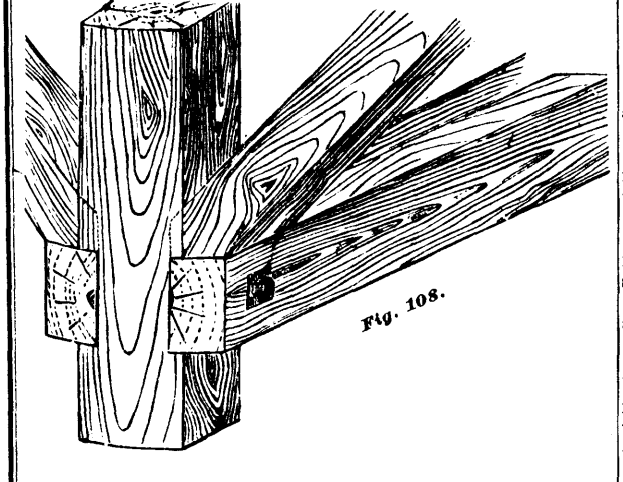


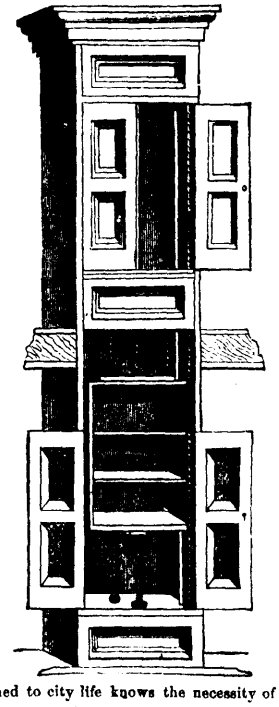
Fig. 108.

THE GREAT WALL OF CHINA.

The Great Wall of China was measured in many places by Mr. Unthank, an American engineer, lately engaged on a survey for a Chinese railway. His measurements give the height at 18 feet, and a width on top of 15 feet. Every few hund d yards there is a tower 24 feet square, and from 20 to 25 feet . igh. The foundation of the wall is of solid granite. Mr. Unthank brought with him a brick from the wall, which is supposed to have been made two hundred years before the time of Christ. In building this immense stone fence to keep out the Tartars, the builders never attempted to avoid mountains or chasms to save expense. For 1300 miles the wall goes over plain and mountain, and every foot of the foundation is in solid granite, and the rest of the structure solid masonry. In some places the wall is built smooth up against the bank, or canons, or precipices, where there is a sheer descent of 1,000 feet. Small streams are arched over, but on the larger streams the wall runs to the water's edge, and a tower is built on each side. On the top of the wall there are breastworks, or defences, facing in and out, so the defending forces can pass from one tower to another without being exposed to any enemy from either side. To calculate the time of building, or cost of this wall, is beyond human skill. So far as the magnitude of the work is concerned it surpasses everything in ancient or modern times of which there is any trace. The Pyramids of Egypt are nothing to it.—*London News.*

Improved Dumb-Waiters.

Any city dwelling-house pretending to possess the least modern improvement, has a dumb-waiter securing communication between different floors, saving a great deal of stair-climbing otherwise required to carry things up and down. They are especially desirable between dining-room and kitchen, and they can only be dispensed with where land is so cheap as to have these apartments on the same floor; but any one



accustomed to city life knows the necessity of dumb-waiter arrangements.

However, the dumb-waiters as usually constructed are very defective; they work often with difficulty and slowly, and frequently get out of order; they are noisy, improperly balanced, and wear ropes and pulleys out rapidly; they are not fit for transporting anything in the least heavy, will not stop when you want them to, and with all that they cost too much.

These circumstances naturally led some inventor to improve their construction and some enterprising firm to make the construction of such improved dumb-waiters a specialty. This was accomplished by Mr. Jas. Murtaugh, who patented certain improvements, and by Mr. Isaac Richards, of 2217 Chestnut street, Philadelphia, Pa., who manufactures all kinds of elevators and hoisting machines for warehouses, dwellings, factories, etc.

One of these forms of dumb-waiters is represented in our engraving, and is in use in several private houses, such as the new residence of the British Legation in Washington; and larger kinds have been placed in many public buildings, where they may be seen, such as the University Hospital, West Philadelphia; the North Carolina Insane Asylum; the Illinois Southern Insane Asylum; the Iowa Insane Asylum; Jefferson College, Philadelphia; the Episcopal Hospital; the Pennsylvania Hospital; the St. Joseph Convent, Chestnut Hill; the Sisters of Mercy, Philadelphia; and hundreds of private dwellings. All who use them testify in favor of their capacity and durability.

We call the attention of architects, builders, and others desiring a safe and practical dumb-waiter or elevator to the claims of the manufacturer, which are that it is adapted to any place where an old dumb-waiter has been, as well as new buildings; it has all the purchase necessary for heavy things, such as trunks, coal, etc., while its speed is such that it can be run up and down four stories in less than a minute; it requires less head-room than any other dumb-waiter, is durable, and cannot get out of order; it stops where you leave it without fastening, with an ordinary load, or without one; can be raised or lowered from any floor with which it communicates; it has a peculiar mode of hoisting coal or lowering ashes without soiling the waiter, and also a peculiar mode of indicating and making fast on any floor with which it communicates. Being a pulley arrangement, there is no noise from gearing or undue wear of ropes, and all the working parts are complete within the inclosure. It is cheaper than any other, considering its durability and the advantages gained; besides being the best dumb-waiter in all other respects, it can be used as a fire-escape in case communication with the stairs is cut off. The maker guarantees to give entire satisfaction, and thinks it should be from the cellar to the attic in every house in the land.

The manufacturer also makes large elevators for raising carriages and street cars, which are exceedingly useful in car factories, while his safety appliances according to Merrick's patent, are so perfect that he can load one of the elevators with 2,000 pounds and cut the rope by which it is suspended, simply to demonstrate the perfection of the action of the safety arrangement.

We ought also to mention in this connection a noiseless safety elevator for invalids, worked by the invalid himself, and requiring but a small place in a house, often only an unoccupied closet.

We advise those building new houses, or desirous of improving defective arrangements, to correspond with the manufacturer. *The American Agriculturist.*

Do not Face the Light when at Work.

Statistics kept by oculists employed in infirmaries for eye diseases, have shown that the habit of some persons in facing a window from which the light falls directly in the eyes as well as on the work, injures their eyes in the end. The best way is to work with a side light, or, if the work needs a strong illumination, so that it is necessary to have the working table before the window, the lower portion of the latter should be covered with a screen, so as to have a top light alone, which does not shine in the eyes when the head is slightly bent over and downward toward the work.

In the schools in Germany this matter has already been attended to, and the rule adopted to have all the seats and tables so arranged that the pupils never face the windows, but only have side lights from the left; and as a light simultaneously thrown from two sides gives an interference of shadows, it has been strictly forbidden to build school-rooms with windows on both sides, such illumination having also proved to be injurious to the eyes of the pupils.

We may add to this the advice not to place the lamp in front of you when at work in the evening, but a little to one side; and never to neglect the use of a shade, so as to prevent the strong light shining in the eyes. This is especially to be considered at the present time when the use of kerosene lamps, with their intensely luminous flames, becomes more and more common.

The Distance of the Sun.—If some celestial railway could be imagined, the journey to the sun, even if our trains ran 60 miles an hour, day and night without a stop, would require over 175 years. Sensation even would not travel so far in a human lifetime. To borrow the curious illustration of Prof. Mendenhall, if we could imagine an infant with an arm long enough to touch the sun and burn himself, he would die of old age before the pain could reach him. According to the experiments of Helmholtz and others, a nervous shock is communicated only at the rate of about 100 feet per second, or 1,637 miles a day, and would need more than 150 years to make the journey. Sound would do it in about 14 years if it could be transmitted through celestial space, and a cannon-ball in about 9 years if it were to move uniformly with the same speed as when it left the muzzle of the gun. If the earth could be suddenly stopped in her orbit, and allowed to fall unobstructed toward the sun under the accelerating influence of his attraction, she would reach the central fire in about four months. We say if she could be stopped; but such is the compass of her orbit, that, to make its circuit in a year, she has to move nearly 19 miles a second, or more than 50 times faster than the swiftest rifle-ball; and in moving 20 miles she deviates from perfect straightness by less than $\frac{1}{4}$ of an inch. And yet, over all the surface of this tremendous orbit, the sun exercises his dominion, and every pulsation of his surface receives its response from the subject earth.

White Cement for Crockery, Glass, etc.—Take 4 pounds of white glue, 1½ pounds of dry white lead, ½ a pound of isinglass, 1 gallon of soft water, 1 quart of alcohol, and ½ pint of white varnish; dissolve the glue and isinglass in the water by gentle heat if preferred, stir in the lead, put the alcohol in the varnish, and mix the whole together. This is useful for woodwork, and will firmly unite painted surfaces.

A Cement for Wood Vessels required to be watertight may be formed by a mixture of lime-clay and oxid of iron, separately calcined and reduced to fine powder, then intimately mixed, left in a close vessel, and mixed with the requisite quantity of water at the moment when ready to be used.

Epidemic Diseases and Parasitic Life.—Prof. Tyndall in the *Popular Science Monthly* says: The power of reproduction and indefinite self-multiplication which is characteristic of living things, coupled with the undeviating fact of contagia "breeding true," has given strength and consistency to a belief long entertained by penetrating minds that epidemic diseases generally are the concomitants of parasitic life. "There begins to be faintly visible to us a vast and destructive laboratory of Nature wherein the diseases which are most fatal to animal life, and the changes to which dead organic matter is passively liable, appear bound together by what must at least be called a very close analogy of causation." According to this view, which, as I have said, is daily gaining converts, a contagious disease may be defined as a conflict between the person smitten by it and a specific organism which multiplies at his expense, appropriating his air and moisture, disintegrating his tissues, or poisoning him by the decomposition incident to its growth.

Let the Brain Rest the Hands.—"There are many who get up in the morning weary from effects of the preceding day's labor. To such let me say, dear sisters, stop and think. Use your head more and feet less. Having poor health, and my own work to do, till within a few years, I soon learned to plan my work to save time and every feasible step. Thought and experience will teach you many ways of economizing strength."

Relative Cost of Water and Steam Power.—The cost of the water power equipment at Lowell was, for canals and dams, $100, and for wheels, etc., another $100 per horse power. But this, as a first experiment, was more costly than a similar equipment need be. A Maine newspaper says that at Saco the expense incurred was $175 per horse power; but at a latter period, for turbines with high heads the expense would be less. A construction and equipment, solidly carried out, with the latest improvement in wheels, would not cost over $200 per horse power, and would under favorable circumstances cost less. An estimate at Penobscot was for $113.50 per horse power. If the construction be with wooden dams, and the equipment with lower grade wheels, then the cost would be about $50 per horse power, and although the construction would be less permanent than the more solid, it would outlast any steam apparatus. On the other hand, Fall River estimates of steam equipments, exclusive of foundations and engine houses, run from $100 to $115 per horse power. A Boston authority gives $115 per horse power for nominal 300 horse power and upward, inclusive of foundations and masonry. Similarly, a Portland authority places it at $100 per horse power. The actual cost of steam equipment in the water works of various cities of the United States varies from $150 to $300 per horse power.

A BEAUTIFUL ORCHID.

A BEAUTIFUL ORCHID.

We lately illustrated some beautiful varieties of orchids, and the illustration which we present this week represents one of the most elegant of the species known. Its flower hangs in graceful bunches from the bases of the spreading leaves. The color is a deep yellow ground spotted with rich crimson points of velvet. Each flower on the bunch is spotted like a leopard's skin. It is an extremely delicate plant and hard to raise. It is known to botanists as the *renanthera Lowii.*

American Method of Preparing Canned Salmon.

The American method of canning salmon differs in some important respects from the modes of putting up fish practiced in Europe. As time and labor are of importance in the United States, the effort in preparing food has been mainly directed to arrive at immediate results. The salmon is cooked in the cans in which it is put up. In all fish put up in oil or canned in Europe, the fish is first partially or entirely cooked in distinct vessels, and then transferred to the cans, where another cooking or heating takes place before the closing of the tins is effected. The process of canning the salmon of the Columbia River, at Astoria may be briefly described as follows: As soon as the fish caught during the night are landed at daybreak at the factory, gangs of Chinamen take the fish, scale and clean them, cut off heads, tails, and fins, and place the fish in tanks filled with salt and water. Here the salmon remain for a certain length of time, and the cleansing process is known as "slimming" Now the fish are brought into the factory. A Chinaman with a peculiar machine, at a single stroke of a lever, cuts the fish into exactly the proper sized slices which will fit the cans. Another set of hands take theses bits of fish, place them deftly in the cans, whence they go to other workmen, whose duty it is, by means of an apparatus, to put in each can a small amount of brine; nothing else is added, the salmon being cooked *au jus*. Now the cans filled with the raw fish pass to workmen, who apply the lid and solder it on. Next, the cans are placed, hundreds together, in iron rings, each form holding 800 cans, and, by means of cranes, all lowered into steam-boilers, where they are cooked for an hour. Now quite a nice operation takes place, similar to that employed by the champagne-wine manufacturers, which is called venting. A hole is pricked in the top of the can, and the air and the gases generated are allowed to escape, when the little vent-hole is instantly re-soldered again. A second cooking now takes place, when the culinary portion of canning is ended. The cans are again taken from the boilers, and are showered with cold water. If the vacuum is perfect, and the package sound, the top of the can hollows in and assumes a concave form. If, however, there is the least convexity, this condition of "swell heads," as it is called, causes the rejection of the package, for the salmon would not keep a week, and manufacturers know that a single spoiled can would injure the reputation of a thousand packages. It will not even do to tinker with these "swell heads," as they would cost too much to put in order. If they are worked over, however, they are never shipped as first-class goods. It is a necessity, in order to insure the excellence of the canned product, that each day's catch of fish should be prepared within twenty-four hours. Should there be any hitch in the factory and the all day's salmon cannot be canned, what remains over is salted and barreled. So far, the barreling of salmon has by no means been profitable, a barrel of salted salmon being worth only seven dollars the two hundred pounds; and three and one-half cents a pound is very cheap food indeed. These salted fish are, however, finding a market in the United States, where they are freshened and smoked. It is, perhaps, not out of the way to say that the can of salmon, before it is completed, with a handsome label put no it, and boxed, goes through as many as a hundred different operations, from the catching of the fish until it is sold as a finished product. Through April, May, June, and July the factory has no idle moment. The fishermen ply their nets all night, and the Chinamen work all day and up to ten o'clock at night, when the canning is carried on by gas-light.

Oregon salmon, as a canned product, has nearly driven out all other similar preparations of the fish, and the Eastern establishments are fast passing out of existence. In 1875 England took 165,600 cases of Oregon salmon; New England, 2400; South America, 1500; Australia, 14,190; and New York and the Atlantic coast, some 57,571. The European demand for the canned salmon product of Oregon is steadily increasing, and the cry is a constant one for more. The value of salmon as put up on the Columbia River alone is estimated at $2,500,000. *General Report of the Judges of Group V, Centennial Exposition.*

FOR KEEPING crackers dry, unslaked lime is recommended. The wooden boxes for the crackers should be about 12 inches deep, and have a tray 1 inch deep to rest just beneath the lid, which should fit tightly. The lime is placed on the tray, and is said to keep the crackers dry for six months if the box is not opened.

PREHISTORIC RELICS IN ARIZONA.

Arizona Territory is perhaps less known, to the majority of our inhabitants, than any other part of the country; and yet it has a remarkably fine climate, moderate temperature, fertile soil, and unbounded mineral wealth. No railways, however, have as yet been constructed in Arizona; but the Atlantic and Pacific and the Texas Pacific companies have obtained charters and land grants, and, when these roads are constructed, there is every likelihood of this beautiful region being reached by settlers from the East; and its land, now chiefly occupied by nomadic tribes of Pimas, Maricopas, Mohaves, Utas, and Apaches, will be brought into cultivation.

To the traveler and antiquary, Arizona is a land possessing especial interest, as it abounds with relics of two populations, probably widely separate in point of time. There are to be found here numerous ruins of Aztec sculptures and buildings, which were probably of great antiquity when Cortes arrived in Mexico, and Don José de Vasconcellos crossed Arizona towards the Great Canon, in 1526. But the remarkable painted rocks, shown in our illustration, are doubtless much older than the Aztec relics; and there is no history, legend or tradition that even attempts to explain the origin of the inscriptions. The marks are not painted but scratched on the surface of the rock, which is a kind of gritty sandstone, of red colour; and many of the animals thus rudely depicted are not, and perhaps never have been indigenous to Arizona. The alpaca, for instance, belongs to the uplands of South America; and the buffalo's native land is far to the northeast of these rocks. It seems reasonable, therefore, to believe that the inscriptions were part of an account of some travelers' wanderings, who thus recorded news of the remarkable countries they had visited.

The pitahiya, or giant cactus, several specimens of which are shown in our engraving (which we select from the pages of the *Illustrated London News*), sometimes reaches the hight of seventy feet. It has a curiously weird appearance, with its huge pronged branches looming in the distance. The fruit is a favorite food with the natives, who knock it down with their arrows. They also use the fibres of the trunks, matting them together to roof their wigwams with.

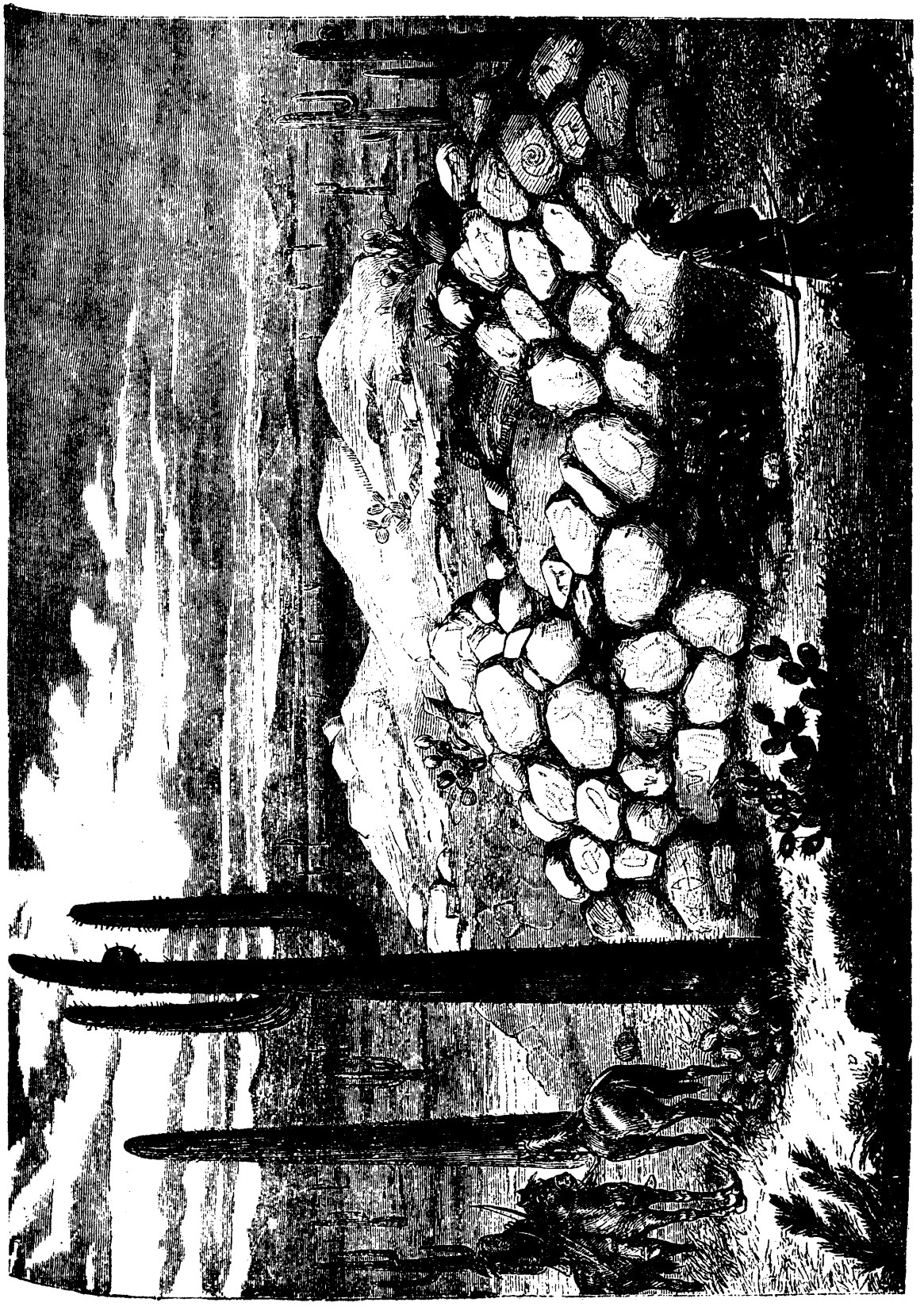
The Aztec relics are very numerous on the Colorado plateau, in the northwestern part of Arizona; and the Spaniards subsequently erected reservoirs, terraces, and buildings of great extent. Stone fortifications are also very frequently met; and it has been estimated from such indication that at least 100,000 people inhabited the Gila valley at one time. It is probable, moreover, that some further light may be thrown on the history of this wonderful region, as much of the northern part of the country has never been explored. *Scientific American.*

A CURIOUS CLOCK.

The Reading (Pa.) *Eagle* has the following: "In Mengel's building is now on exhibition in all probability the most curious clock in the world. It was built by Stephen D. Engle, a watchmaker at Hazleton, Pa. He is about 45 years of age, and has spent 20 years in perfecting the clock, for which he has received $5,000. Engle never saw the Strasburg clock—in fact, he has not travelled more than 200 miles from home at any time. This clock stands 11 feet high; the Strasburg clock is 30 feet high, yet its mechanism is not so intricate, nor has it so many figures as the Hazelton clock. The Strasburg clock's figures are about 3 feet high, while those of the American clock are about 9 inches. Every hour a pipe-organ inside the clock plays an anthem. It has five tunes. Bells are then rung, and when the hour is struck, doors open and a figure of Jesus appears; doors to the left then open, and the Apostles appear one by one in procession. As they pass Jesus, they turn towards him, and Jesus bows: the Apostles then turn again and proceed through the door in an alcove on the right. As Peter approaches, Satan looks out of a window above and tempts him. Five times the Devil appears, and when Peter passes, denying Christ, the cock flaps its wings and crows.

DIAMOND STONE-DRESSERS.

CARBONITE has been applied to the dressing of freestone ashlar by fixing a number of diamonds in a gun-metal or steel block, and giving them a reciprocating and traversing motion over the face of the stone. This machine will dress from 600 to 1000 square feet per day, or as much as 100 or 150 men can do in the same time.



THE PAINTED ROCKS, ARIZONA TERRITORY

HOW TO PREPARE PHOTOGRAPHIC BACKGROUNDS.

THE following practical directions for making photographic backgrounds are translated from the paper by Hans Hartmann by the *British Journal of Photography*. The best foundation for a background is a stretcher such as a painter uses for stretching his canvas. It must have cross-pieces at the corners, and the wood should be strong enough not to warp, as it is liable to do when the paper is stretched upon it. For a stretcher eight feet square the framework should be from three and a-half to four inches wide, and from three-quarters of an inch to an inch in thickness. If the frame can be suspended by an iron roller from a groove it may be moved easily. An arrangement by which the frame can be inclined as desired either towards or away from the light is very advantageous, as it allows of the same background producing either a light or a dark effect as is most suited to the costume of the sitter. The background may also be darkened at pleasure by furniture, curtains, or screens, by methods often described in these pages, and which cannot be too strongly commended.

Paper and linen, fine or coarse (shirting, twill, &c.), are the stuffs upon which one can paint best. Shirting is generally sent into the market with a good deal of gloss and dressing. Fasten it then upon the frame by nails only half driven in, and, having carried the first coat of paint (for which directions will be given later) over it, observe carefully whether it shrinks together. If, as is frequently the case with shirting that has been hot-pressed, it do not shrink enough, take out some of the nails, especially those at the corners, and stretch the stuff back before it gets dry. Twill is better in this respect, and on account of its roughness it is easier to paint upon it; but, on the other hand, it is heavier. If it be intended to stretch paper—say wall-paper—upon the linen foundation it is as well not to paste the latter to the edges, but, if possible, an inch or so back. This, to some extent, prevents warping. One can make excellent backgrounds for oneself by pasting upon the foundation a paper with a tasteful pattern not too harsh in colouring, and about knee-high another paper having a brown tone, and filling up the space between the wall-paper and the simulated panel with a moulding. The latter can be made more natural-looking if small semicircular sticks be stuck on so as to form squares or rectangles; and, if it be thought desirable, the ground inclosed may be filled up with painted ornaments.

I now come to the colours which are easiest to use, and which are so constituted that one can trust to their appearance to the eye without afterwards finding that one has been deceived, and that their photographed effect is really something quite different.

For size colour chalk, ochre, umber, and Cassel brown are most suitable. The chalk, ochre, and umber must all be steeped in cold water before being mixed with the size, and the last (umber) must be left somewhat longer on account of its tendency to swell. Cassel brown is sold, rubbed down in water, and is kept in a pot under water. It it be allowed to dry it becomes as hard as stone, insoluble in water, and perfectly useless; but, as mixed with chalk it gives a most beautiful warm grey tint, I use it willingly, notwithstanding. When mixed with chalk and size it may be easily and equally put on. If one wish to change the tone the ground tone can be modified by English red, chrome green, or any blue.

As a binding medium for the colour take a lukewarm 10 per cent. solution of size in water, or a strong freshly-made starch paste. The quantity of size required cannot be specified exactly, but must—and therein lies the difficulty, a difficulty which hinders many from using size colours—be determined by experiment, because the quantity of size required varies according to the under-ground. Take a thin solution of size and mix it well (preferably in a mortar with a porcelain pestle) with the colour previously stirred into water, and make a trial upon the same piece of stuff and with the same brush as you intend to use afterwards. Paint upon three places near each other—on the first somewhat thickly; on the second with natural even strokes; and on the third with colour somewhat dry. If there be too little size the colour will come off after drying if the hand be drawn across it. If there be too much it will be streaky; more raw colour and water should be added, and then the strength must be tested again. If the mixture be right the surface will be equal. The degree of thickness is easily found by experience, and the addition of water is not likely to do much harm, especially if it be tepid.

Now paint away with regular strokes, taking care not to stop at half-dry places, or the result will certainly be streaky. If it be found, on trial, that the colour sinks too much into the stuff—as is always the case with strong linen—then, before painting, a ground layer of chalk and strong size water, which must be sifted before use, should be passed over it if a perfectly clean surface be desired. This substratum must become thoroughly dry. If it have a great deal of size it will be hard and smooth; if it have little it will drink in more of the colour which follows it, and which, consequently, requires more size. This substratum may be smoothed down, to remove any loose threads from the linen, with an evenly-sawn piece of pumice-stone, and when perfectly dry it may be rubbed down evenly with soapy water (soft soap dissolved in hot water); then an extremely equal tint may be expected when it is painted over.

If it be intended to draw lines, panels, or divisions upon the background, the measurements are set off exactly with a ruler, and the lines are best drawn with a charcoal-blackened cord, which is strained upon the given measurement, and is then taken hold of by the middle between the finger and thumb, raised out a little way from the background so that when suddenly let go it flies back, striking against the background and marking on it a perfectly straight line. If a mistake occur the charcoal can easily be removed by dusting.

Ornaments are easily stencilled on. Take a piece of paper the size and form of the panel to be decorated with an arabesque, double it together, and draw upon one half the half of the symmetrical figure, so that the middle of the latter shall correspond to the fold of the paper. Then take a needle and prick the pattern pretty closely through both folds of the paper. Now spread the paper out flat, and you have the design complete. If a square design or a rosette be wanted, fold the paper twice, taking the corner as a centre; then, by pricking, the design will be transferred to the three other quarters, and a double symmetrical figure is obtained. The design can now be traced upon the subject to be painted by dusting finely-powdered charcoal, mixed with a little gum, through the holes in the paper. The design is then gone over with a pencil. As the background is generally not very sharp a very great degree of accuracy in the details is of less importance than the proper tone; the neighbourhood of the figure does not require the same lively ornamentation as the more distant places.

Good examples (models) are to be found in the numerous journals devoted to art and manufactures, in every paperhanging establishment, and, lastly, in the photographs of the ancient and modern *genre* pictures which abound in every style.

Patterns may also be cut out of oiled paper; but this plan is only to be recommended in the case of small ornaments. A brush with shorter and stiffer bristles is required for this, and it must be carefully drawn across the stencil paper for fear of any of the superfluous colour running down between the pattern and the ground and disturbing the cleanness of the outline.

The materials for size colour painting are cheap. A few paint-pots a ruler, a line, and suitable brushes—that is all. The latter are, unfortunately, not always to be had good; but, at all events, get them as large and long in the bristle as possible. Fine hair pencils are not used for size colour. The fine lines are drawn with a long, thin pencil made for the special purpose.

The advantages of size colour, its great cheapness, the equality of its washes, and, above all, the absence of gloss, adapt it for use in backgrounds in a way that is not counterbalanced by the ease with which it is injured by damp or frequent rubbing against; but when it comes to be a matter of painting furniture, pillars, balustrades, and such often-handled requisites, wax paint is preferable. It stands damp, can be as equally laid on, and is as free from gloss as the size colour. When it is used the chalk is replaced by zinc white or white lead, rubbed down with oil or finely powdered. Cassel brown must also be laid aside, and in its stead Russian sienna, burnt ochre, or burnt umber may be taken. The binding medium is equal parts of wax and mastic resin melted together in turpentine over a slow fire. The greatest care must be taken during this process, as the substances employed are very inflammable. To this mixture a small quantity of copaiba balsam may be added. If it be found necessary during use to thin yet further colours to which this mixture has been added, a weak emulsion of wax in turpentine will be found suitable.

If it be desired to paint a large surface of linen with size colour the linen must first get a foundation coat of chalk and linseed varnish, and be thoroughly dry. Upon wood, *carton-pierre*, metal, porcelain, &c., the paint can be laid on at once. By brushing lightly any degree of gloss can be conferred upon it. If the gloss be too great a single coat of turpentine is enough to render the surface perfectly dead. This method is more costly and is not so easy for the amateur, but it gives more durable results, and allows one to work upon any sort of foundation. If the painted parts may remain glossy linseed oil can be added to the colour instead of the solution of wax. Oil colour may also be made pretty matt by a thin coating of turpentine or wax.

Very good ornaments can also be made out of vases, boxes, and similar accessories by gilding them with gold bronze mixed with gum water. A simple box with a coat of paint cleanly put on, and a pretty ornament painted upon it, has a very good effect.

Finally, upon paper backgrounds one can work with water-colours. Take some cakes of sepia and dissolve them the evening before using in a sufficient quantity of water; then paint in pale washes, with a soft flat hair pencil fixed with tin, until the desired tone be secured. When the first wash is dry it may be gone over again, only care must always be taken not to touch the half-dry places, or streakiness will be the result. While it is best to keep the frame perpendicular during the time the background is being painted with size colour, it is preferable to lay it flat while being painted in water colour, as the colour is not then so spotty. *English Mechanic.*

Colouring Drawings.—I did not intend to answer this query, as most of my experience has been in mechanical engineers' offices, and you seem to want to know about tints used in architectural drawings. However, as I think Mr. Fennell has hardly given the answer you want, the following is pretty nearly correct as far as it goes:—As to metals, the following tints are mostly used: Cast iron, neutral tint (if you mix it yourself a mixture of blue, indigo is best, and Indian ink and crimson lake). Wrought and malleable: Prussian blue. Brass: Indian yellow; or, failing that, gamboge. Copper: Indian yellow and crimson lake. Steel: light purple, crimson lake, and Prussian blue (about 75 per cent. of the former). Other metals, such as lead and patent metals: Prussian blue and Indian ink. For other materials the following tints are used:—Wood, light burnt sienna; the graining is done with Indian ink. Brick, light crimson lake. Firebrick, yellow ochre. Stone, warm sepia; but many other tints and mixtures with this are used according to the kind and state of the stone. For instance, in a set of drawings I once did for an architect all the dressed stone was coloured gamboge and Indian ink, and the rough stone warm sepia; slates, indigo; tiles and earthenware ornaments, Indian red; concrete, foundations, &c., mixtures of sepia, yellow ochre, and Indian ink. Most of these colours are used almost universally to represent the annexed substances, but others are used differently in different offices according to taste. As my work in years past has been in some of the leading engineers' drawing offices—and I have had to do with work from very many others—I think I can warrant this list to be, "take it for all in all," the one most usually adhered to.—MATHETES.

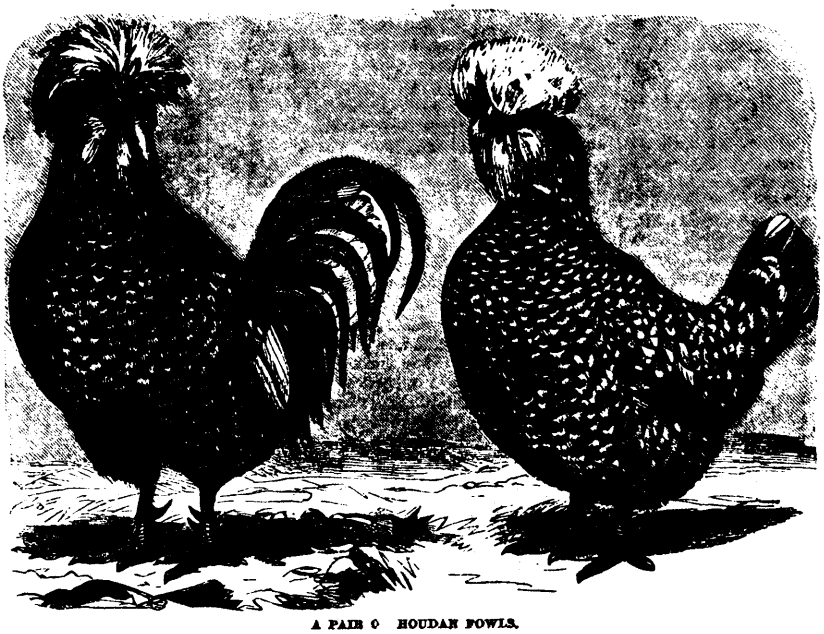
Novelties in Paper.—When the usefulness of compressed paper for railway wheels was demonstrated two or three years ago, people asked "What next?" The question can now be answered. The latest use of paper appears to be for chimney-pots. They are made in Breslau, and are light and durable. Before the paper pulp is moulded and compressed into the required shape, it is treated with chemicals which render it non-inflammable. Specimens of paper and cloth made from the California cactus were recently exhibited before the Maryland Academy of Sciences. The cactus grows abundantly in many of the Western States and Territories, and it is found on arid soil where nothing can be cultivated. The success that has been met with in making paper from this plant is so marked that the business will probably be attempted on a large scale.

CHOOSING A SCYTHE.—The disposition of steel in a scythe is to be best understood by seeing one which has been broken across the blade. Sometimes tools of this class are steeled "naked," so that all the steel shows itself at once on the top side of the blade, but this plan is not to be recommended. It is better to have iron on both sides of the steel which just shows itself along the edge, and runs in toward the back to stiffen the blade and to form a constant cutting edge as the tool wears away. Now, in buying a tool, bear in mind that the most steel may show in the one steeled naked, because all that is there is in sight, but in the other case there would be a great deal more steel useful for carrying an edge, although it would show less because the bulk of it would be hidden between the iron. It will not do, then, to be deceived by appearances. The best plan is to depend on a good maker for good steel and sufficient of it.

The French Breeds of Poultry.

The American Agriculturist.

If profit is the chief end of poultry keeping, and this is certainly the purpose for which farmers and those who raise poultry for the market, as well as those who compete for prizes at the poultry shows, are all in pursuit of, then the French breeds of fowls are worthy of high consideration. There is no other country in the world where poultry is so popular a product in the market, or so frequent a dish upon the tables as in France, and a breed that is in favor there must possess positive merit. In addition to the vast number of eggs which are consumed in every possible shape in cookery, and in various arts, millions of dollars worth are exported from France every year, and the *poulet*, variously presented, is not only a very conspicuous item on the bills of fare, but its delicacy and succulence entitle it to the prominence it there enjoys. That it is acceptable in France should be to a breed a passport to popular favor everywhere. Yet the French fowls are not nearly so popular in America as they deserve to be. We confess we never could banish the light Brahma from our yard to replace it with either the Houdan or the Crevecœur, but this is rather for its friendly, amiable disposition, and its excellent, and fairly plentiful eggs, especially in winter, rather than for the quality of its flesh; for a Brahma is inclined to be "scrawny" in its youth, and yellow and tough in its age, and not particularly toothsome at any period of its life; while the Houdans and the Crevecœurs are both prolific egg producers, grow rapidly, and possess white and juicy flesh. Yet we have admired these fowls in the yards of other people, and have listened favorably to frequent praise of their profit and their beauty. The Houdan is doubtless a very handsome and attractive bird, and a flock of them, well bred and well cared for, is very showy in the yard or the field. They are square and massive about the body, with short legs, a spirited or even a fierce carriage, on account of their peculiar crest, beard and muffling, and the lively markings of their plumage; which, when perfect, is of a mixed "pebbly" black and white. They have the fifth toe, a useless, objectionable member, which they inherit from the Dorking strain in their ancestry, although along with it they have the fine flavored flesh and plump breast of that race. Their legs are gray and their bones remarkably light. They are egg producers rather than breeders, and if properly fed, the hens will lay on without stopping to "sit." They will thrive in confinement, when properly kept, as well as when roaming at large, and when allowed to range, exercise the liberty now and then with greater freedom than is convenient upon the farm. The standard of excellence of the poultry fanciers for the Houdan is subject to some variation as to minor points, such as the shape of the comb; the fifth toe, however, is insisted upon; the feathering should be of black and white, evenly mixed, and not patchy; the saddle of the cock is tipped with straw yellow; the crest is of black and white feathers, evenly mixed, and thrown back so as to show the comb, which is double, evenly toothed upon each side, and with both sides alike in shape; the hackle is black and white, the beard and muffle almost hide the face, and the wattles are long and evenly rounded at the ends. The hen is square bodied, and low framed, with plumage like that of the cock; the crest is full and round and not loose and straggling or shaggy. The fifth claw is large and turned upwards, as with the cock. If good birds are procured to start with, they should breed very true to the marks, but if long closely bred they will in time become mixed in appearance.



A PAIR OF HOUDAN FOWLS.

The Crevecœur, like the Houdan, is named from the village in France, in the neighborhood of which it has long been largely bred for market. These birds are remarkably stately and handsome, although sombre in color, except in the sunlight, when the golden green reflections from the plumage make them very brilliant, but this peculiarity is only brought out in a favorable light. They are much more rarely seen than the Houdans, although as producers of eggs, and for non-sitting, as well as for early maturity, and whiteness, and sweetness of flesh, they surpass these. They are not winter layers, which is an objection, but when the cock is crossed upon Brahma hens, the eggs produce table birds of heavy weight, excellent quality, and in time for early marketing. They suffer nothing from confinement, and a dozen can be easily kept in a yard of 20 feet square. They are very tame and friendly when petted. They excel as table birds, notwithstanding their black legs, which, however they may be objected to by the market men or the cooks, have no ill effect upon the color, flavor, or tenderness, of the flesh, which is very white and of delicious flavor. Young birds will fatten when 3 months old, and have been made to weigh 4 pounds at that age, and at 6 months, with two weeks fattening, have weighed 7 pounds. The Crevecœur cock should be a heavy, compact bird, mounted upon short, thick legs; the thighs being well feathered, tend to give the birds a heavier and more solid build. The back is broad and flat, giving a robustness to the figure, and slopes but slightly towards the tail, which is carried high. The general carriage is dignified, their sedateness being somewhat hightened by their sombre coloring. The comb is two-horned or "antlered," and the crest is formed of lancelet shaped feathers which fall backwards and do not straggle wildly in all directions as in the Houdan. The chicks are hardy when properly cared for, but early chicks of this breed are rare, on account of the late habits of the hen. The breast is full; the hackle is long and sweeps gracefully down the neck; the beard and muffle are full and low on the throat, and the plumage, as previously described, when perfect, is of a solid black with greenish and sometimes bril-

A CREVECŒUR COCK AND HEN.

liant reflections. The hen is similar in color and special points to the cock; her body is massive, and her legs strong to match her stout body. Her plumage is perfectly black, the crest is large, and the beard full and profuse, and the comb, which is horned, is much hidden in the crest. As these birds become aged a few stray white feathers will appear in the crest, which, however, should be an objection in young birds. When but one breed is kept, the Houdan would be preferable to the Crevecœur, on account of its more lively color, but were cross-bred birds are not objected to, a few of the latter with their remarkably beautiful color, when in a bright light, their large size and handsome carriage; their desirable table qualities, and the habit of the hen to lay when all others are broody, would make a very desirable addition to a flock of light Brahmas, or white Cochins. Black fowls do not seem to become popular very readily, just as black breeds of cattle have few admirers, in spite of their many claims on the grazier and the butcher, but if any black fowl is to be chosen, we would certainly give the preference to the Crevecœur.

Hints and Helps for Farmers.

FASTENING FOR SWINGING DOORS.—L. M. St. John, Canajoharie, N. Y., sends the sketch of a fastening for a swinging barn-door, shown at fig. 1. The center-bar is made of a piece of hard wood, 1¼ inch thick, and 3 inches wide at the ends, tapering gradually from the ends to the central part of the door. They are made to slip loosely through iron staples on each batten of the door, and are joined together by halving the ends, and putting a bolt through them, and also through the narrow end of the guide which lies beneath them. The latter is fastened to the door, as shown in the engraving, by a rivet or screw which permits it to play back and forth. When the central points of the bars and the guide are pushed to the right or left, the ends of the bars are made to project beyond the door, and engage with the straps or mortises made to receive them. The bars are then firmly held in place by the guide, as shown by the dotted lines. The advantages of this fastening are that it is always in place; is easily opened and shut; and when frozen fast at the bottom, the power of the toggle-joint easily loosens and draws the end. The door is also fastened at the strongest place, and cannot spring open; the bar will hold without slipping, although the mortises should become worn, and although it should be but slightly caught, because the guide holds it rigidly. The ends, too, are entirely out of the way when the door is opened, and if it should blow to, they will not drop of themselves.

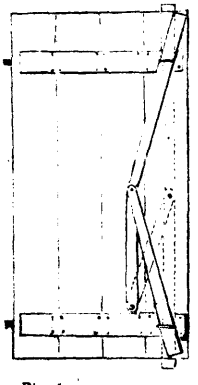


Fig. 1.—FASTENING.

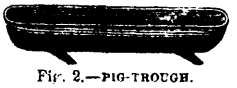


Fig. 2.—PIG-TROUGH.

AN IRON PIG-TROUGH.—In looking over a catalogue of the New York Plow Company, we find an iron pig-trough mentioned. Having some time ago used similar iron troughs, we found them very durable, and very cleanly, and far preferable to wooden ones of any kind. The trough referred to is shown at figure 2, and can be procured at a cheap enough rate to make them generally used.

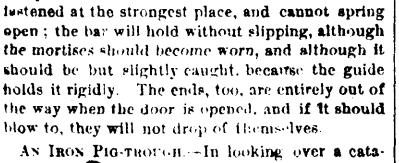


Fig. 3.—WAGON-JACK—DOWN.

Fig. 4.—WAGON-JACK—RAISED.

AN IMPROVED WAGON-JACK.—A reader of the *American Agriculturist* sends a drawing of a wagon-jack, which speaks for itself. It is shown at figure 3, as down, and at fig. 4 as raised. As seen by its structure, the weight is thrown over the center of the pin, or pivot, so that the jack can not come back, and no fastening for the handle is necessary.

A Case for Carrying or Keeping Eggs.

Eggs are the most fragile of things, and to be carried or even stored safely, they need to be packed in the most careful manner. Many devices have been used for this purpose, but although some of them have been found available for business purposes, none of them have been adapted to domestic uses for the storage of eggs. A "Safety Egg-carrier," devised and patented by A. R. Sprout, of Lycoming Co., Pa., here illustrated, seems to meet both of these requirements in the most effective manner. Figure 1 shows the box, with the trays, of which it contains eight, and holds altogether 36 dozen eggs. The eggs are held in place by means of pins inserted in the bottom of each tray, and forming a circular supporting wall around each egg, as shown at figure 2. Some soft material is wound around each pin, forming an elastic padding by which the eggs are held firmly and securely. The trays, when filled, are placed in the package, one above the other, the bottom of one forming the cover of the one below it; the lid of the box holds all tightly in place. Small holes are bored through the bottom of each tray, the small end of each egg rests, and is thus held in the position, which is the best for long and safe keeping. Each tray of eggs may be inspected at any time, by holding it to the light to determine their soundness. For household use, each tray forms an independent receptacle for eggs; the package or box being provided only for the purpose of the shipper or dealer.

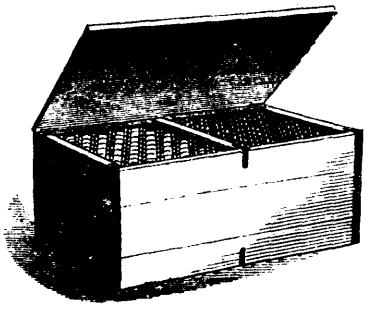


Fig. 1.—EGG CARRIER COMPLETE.

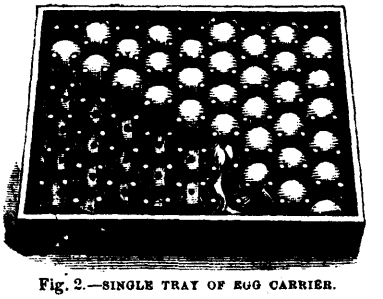


Fig. 2.—SINGLE TRAY OF EGG CARRIER.

Stove for a Poultry-House.

A simple and safe method of warming a poultry-house in winter, is as follows. With a few bricks and common mortar, build up a wall in the shape of an oblong rectangle, twice as long as it is wide, leaving an open space in the front about a foot wide and the same in hight. Lay upon this wall, when 18 inches high, so as to cover the space within the wall except about 6 inches at the further end, a piece of sheet-iron. Build up the wall over the iron another foot, and then build in another sheet of iron, covering the space enclosed all but a few inches at the front. Then turn an arch over the top, and leave a hole at the end for a stove-pipe.

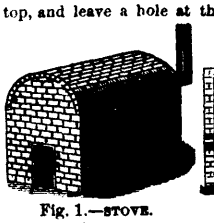


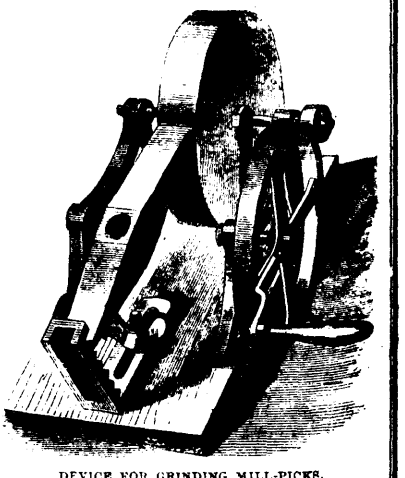
Fig. 1.—STOVE.

Fig. 2.—SECTION.

The stove thus made will appear as at figure 1, and a section of it as at figure 2. A small fire made in the bottom at the front, will then heat this stove very moderately, the heat passing back and forth, as shown by the arrows, will warm the whole just sufficient to make the fowls comfortable, and there will be no danger of injury to their feet by flying up upon the top, as it will never be hot if a moderate fire only is kept. The stove will be perfectly safe, and may be closed by a few loose bricks laid up in front, through which sufficient air will pass to keep the fire burning slowly. Ordinarily a fire need only be made at night during the coldest weather.

Grinding Tools.

The useful effect of many tools depends greatly upon the exact grinding of their edges to a proper bevel. A cold chisel, for instance, requires an edge of a certain bevel to cut hard metal, and one of a different angle for softer metal: the harder the work to be cut, the greater should be the angle formed by the edge, and the softer the material, the more acute the edge. The same rule is to be observed in wood-cutting tools. But there are no tools which require more exact and careful grinding than mill-picks, and the first business of a miller is to know how to grind his picks. Upon this depends the dress of the stones, and the quality of work turned out by them. The illustration represents a small grindstone for sharpening picks, which is run by means of friction wheels covered with leather, and provided with a gauge for setting the pick at a variable angle to the stone. This gauge has been recently patented, but is so serviceable as to be worth a moderate fee for its use. It consists of a series of steps raised upon a slotted plank, which is screwed upon the frame of the grindstone. By means of the slot and a set screw, seen below the pick, the gauge can be set for tools of different lengths, and each step causes the tool set in it to be ground at a different angle.



DEVICE FOR GRINDING MILL-PICKS.

Some Household Conveniences.

A SELF-WINDING CLOTHES LINE.—A clothes line well cared for will last very much longer than one exposed to the weather, and though it is but very little trouble to take in a line, it is often left

Fig. 3.—COAT-HANGER.

out from one week to another to the great annoyance of those who have to pass across the place it occupies. It is not difficult to contrive an affair which shall be self-acting and will wind up the line as soon as it is loosened. Figure 1 shows a large wooden spool with an axle or journals; the spool *B* is about six inches, and the journals about one

Fig. 4.—VEST-HANGER.

inch in diameter, the journal *A* being four inches long, while the other is but one inch in length. The ends of these rest in holes in supports which are not here shown. A small strong cord is fastened to and wound around the journal *A*, and there is attached to the cord a weight *T*, of about six pounds. A common cotton or hemp clothes line is shown at *M*, this is fastened by one end to the spool, and at the other end is an iron ring, or

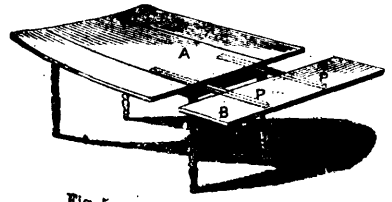


Fig. 5.—EXTRA LEAF FOR TABLE.

a stick will answer. When the weight *T* falls three inches, the spool will revolve once, and wind up 18 inches of the line; if it falls five feet it will wind up 30 feet of line. For convenience, both the clothes line and that carrying the weight, are shown wound up. In use when the clothes line is wound up on the spool, the weighted line will be unwound, and the weight at the floor. To stretch the line, take hold of the ring and walk to the point where it is to be attached; this will unwind the line and wind up the weight. When the clothes are taken down, unhitch the line, and the descent of the weight will wind it up at once, and it will be housed without trouble. The spool may be placed in any convenient shed or out-building, or a column may be constructed for it which will at the same time answer as a support for a bird house, as in figure 2.

HANGING UP COATS AND VESTS.—If coats are hung up by the loop attached to the collar, they will, especially if heavy, and not frequently worn, become stretched out of shape, and when put on show an unpleasant distortion. To avoid this, careful persons use some kind of a hanger, which will keep the back and shoulders in shape. A very common expedient is to use a portion of a barrel hoop, but it is not so suitable as the one shown in figure 3, which is made from a piece of ¾-inch board 5 inches wide. The length will be from 16 to 22 inches, according to the size of the garment, it being an inch longer than the distance from the outside of one arm to the outside of the other, measured either across the chest or the back. A heavy wire, bent as in figure 4, answers to hang up vests. Supports for both vests and coats, made of heavy copper wire, are sold by the street venders in cities, but any one can make equally useful, if less showy ones, out of ordinary fence or bailing wire

EXTENSION LEAF FOR A COMMON TABLE.—It is often desirable to extend or enlarge a common side-leaf table, and this may be readily done by a contrivance shown in figure 5. This shows a board, *B*, about 18 inches wide, and as long as the table is wide. Two hard wood sticks, *P, P*, one inch square, and three feet long, are secured to the leaf *B* by screws; two holes one inch square are made in the end close under top *A*, through which the supports

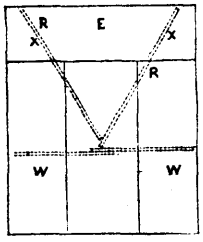


Fig. 6.—TABLE EXTENDED.

P, P, pass as indicated by dotted lines. This is a very convenient method of attaching a portable leaf, the only objection being the disfigurement of the table by the two square holes. To avoid this we would suggest the plan shown in figure 6, in which *W, W*, are the side-leaves, and *E* the extra or portable leaf, which is connected with the table by swinging arms *R, R*, loosely attached to leaf *E*, each by one small bolt, placed near *X, X*, in the figure; when in use, the arms *R, R*, are in the position indicated by dotted lines, when not in use, fold lengthwise of leaf and occupy but little room.

The Effects of Cigarette Smoking.

Several of the prominent physicians of New York city unite in declaring that cigarette smoking is much more injurious than cigar smoking, because the smoke is generally inhaled, and often ejected through the nose. It has a particularly harmful local effect on the mucous membrane of the nasal passage. People who use cigarettes are more liable than others to be afflicted with local irritations that produce catarrh. In persons of nervous temperaments the doctors say cigarette smoking always produces constitutional effects. The pulse is increased in frequency, is smaller than is natural, and is irregular. Such persons are said by physicians to have a "tobacco pulse," and a "tobacco heart." The action of the pulse in this respect is not to be mistaken. Persons who constantly smoke cigarettes are said by physicians to be easily excited, and to have a tendency to vertigo and dimness of vision, besides being troubled by dyspepsia. Bronchial and throat diseases are much more readily caused by cigarette smoking than by cigar smoking, and during the last six or seven years a large increase in diseases of the air passages, due alone to this habit, has been observed. Physicians state that there is not one-fiftieth as much of the mucous surface covered by cigar smoke as by the inhaled smoke of a cigarette. Excessive indulgence in any form of tobacco smoking may produce general paralysis, while by enfeebling the circulation, lowering the vitality of the system, and interfering with assimulation of food, it tends to produce anæmia, which is one of the first steps towards softening of the brain. Vertigo, when resulting from smoking strong cigars, or from the inhaling of cigarette smoke, is due anæmia, or in other words to a diminishing supply of blood to the brain.

By some it is claimed that the paper wrapping of cigarettes is as hurtful as the tobacco. This claim is grounded upon the belief that the products of the imperfect combustion of the paper or other vegetable fiber are pyrogallic and pyroligneous acids, which make their presence unpleasantly felt in the mucous membrane.

SILVERING MIRRORS.—The process of depositing metallic silver upon glass is as follows:—(A) Dissolve ten parts of nitrate of silver in 50 parts of distilled water, and neutralise with about 6 parts of liquor ammonia; add to this a solution (B) of 1 part tartaric acid in 4½ parts of water, and dilute the whole A and B solution with 500 parts of water. The things to be silvered should be placed conveniently in a vessel, the solution poured in, and then put away in a quiet place for a few hours at a temperature of from 40 deg. to 50 deg. C. When silvered they may be washed by a gentle solution of water, dried, and varnished with a solution of amber in chloroform.

Cure for Burns.

Glycerine, which may be considered the ethereal part of oil, has the property of penetration to a most remarkable degree; it penetrates the solid bone. Being thus penetrating, it is recommended by *Hall's Journal*, as the very best application for all feverish sores, for inflamed or dry surfaces simply from its quality of penetration and want of evaporability; the first and highest value of any poultice is its capability of keeping moist for the longest time; no one ever thinks of a dry poultice; glycerine keeps a part moist longer than any substance known, hence its value as above, mixed with an innoxious dry powder, called sub-nitrate of Bismuth, so as to make a thin paste or poulice. It is one of the very best applications known for burns, whether in children or adults, giving an almost instantaneous relief from suffering, by its entire exclusion of the air and by its moistening, hence cooling, soothing effects, promotes a speedy healing process, always safe, simple and efficient. A few cents will buy half a pound of it at any good drug store, and every family should have some at hand, in a bottle, plainly labelled, with a bottle of glycerine at its side.

A SIMPLE REMEDY FOR CINDERS IN THE EYE.—Persons traveling much by railway are subject to continual annoyance from the flying cinders. On getting into the eyes they are not only painful for the moment, but are often the cause of long suffering, that ends in a total loss of sight. A very simple and effective cure, is within the reach of every one, and would prevent much suffering and expense, were it more generally known. It is simply one or two grains of flax seed. They may be placed in the eye without injury or pain to that delicate organ, and shortly they begin to swell and dissolve a glutinous substance that covers the ball of the eye enveloping any foreign substance that may be in it. The irritation or cutting of the membrane is thus prevented, and the annoyance may soon be washed out. A dozen of these grains stowed away in the vest pocket may prove, in an emergency, worth their number in gold.

FOREIGN BODIES IN THE STOMACH.—*L'homme a la fourchette*, so famous in Paris a year or to ago, is distanced by a man in Australia now undergoing imprisonment for being unable to restore a gold ring which he swallowed, being to the prosecutor. He is being treated by the visiting surgeon of the jail with the view of making him disgorge a large steel Albert chain and a common brass ring. The chain can be distinctly felt at the bottom of the stomach, and the prisoner states it is now nine months since he swallowed it, and it is the only one he has had any difficulty about. The jailor has a collection of objects, such as Albert chains, penknives, and rings, which he has procured by making him vomit by emetics. The prisoner is an intelligent young man of twenty-three.

WARPED FRETWORK.—Well damp it on the hollow side with warm water, and well warm it in front of fire; so soon as quite warm lay it on a flat surface and place a flat board on top of fret-work, on which place heavy weights. If not quite flat, go over the same process; when you have it flat it would be quite as well to glue a thin slip of wood the reverse way of the grain on the back of the fretwood.

VARNISH BRUSH KEEPER.—Into a wide-mouthed glass jar, placed on a rack for keeping it in the proper position, place a wire shelf fitted so as to keep its place in a horizontal position; then fill a jar to within an inch of the shelf with spirits of turpentine, cover the mouth with a close fitting tin cover, and the keeper is complete. Varnish brushes may be kept in this way by simply wiping them out on the varnish cup, and laying them on the wire shelf until they are wanted again.

SAW MAKING.

The manufacture of saws, from the plain hand-saw to the immense circular and gang saw, has been brought to such perfection by the firm of H. Disston & Sons, in this city, that a description of the process as carried on in their establishment, at Front and Laurel streets, might be of interest.

Their raw material consists of "blister bars," which are blistered from a particularly pure brand of Swedish iron.

These bars, together with steel scraps, are melted in crucibles; furnaces used for this purpose are of the ordinary construction. The melted steel is poured into moulds, and the ingots are forged out into blooms under a heavy steam-hammer.

In hammering, as well as in rolling, great care has to be exercised to obtain uniformity of density and tension, otherwise the hardness and temper could not become uniform, and there would be a tendency to buckling and consequent heating.

These blooms are brought under a train of rolls, similar to those used in plate mills, and, after having been re-heated several times, at last acquire the necessary thickness and width. It is of course important to make the saw blade as thin as can be for its work, so as to effect a saving in first cost, in the lumber to be cut, and in the power for cutting. (As a good sawyer can cut with a thinner saw than a poor one, it is but questionable economy to employ green hands.) After being annealed they pass to the trimming shears, where the ragged edges and all other superfluous material is removed, and they are then ready for teeth cutting.

The big coarse teeth of the larger circular and gang saws are cut out by punches; some of them are driven by power and resemble an ordinary punching machine, the punches and dies being formed according to the shape desired for the teeth. A number of hand presses are also used for some particular kind of work.

The machine for cutting the teeth of hand saws consists of a rapidly revolving disk, into which a steel cutter of proper shape is inserted. In front of it are four friction rollers, which take the steel blade between them and propel it past the revolving cutters at such speed that the proper pitch of teeth is attained. For small hand saws, with very fine teeth, a number of hand lever presses are still used, although they work much slower, and at greater expense, than the above power machine.

The angle and frequency of teeth must be adapted to the work to be performed, and consequently differ greatly; but a general rule is that they should be a uniform distance apart and all of equal length. Clearance or chamber space is required in large saws, to hold the sawdust until it can escape, and in some gang saws a special deeper clearance space is arranged after every second or third tooth. Soft wood, requiring greater feed, thus also necessitates more clearance. With large teeth the clearance space or gullet should have rounded outlines, to prevent cracks from starting, as they frequently do in sharp corners.

Another important point in shaping teeth is to adopt a form that will allow the greatest amount of sharpening (and refiling) with the least expenditure of material, labor, files and time, and diminish, in circular saws, their diameter, in gang saws their width, by the least possible amount, so that they can be used for a longer time with the same efficiency.

Messrs. Disston & Sons have adopted and patented a system for shaping teeth, in conformity with the above conditions, and their saws have lines marked on them, to serve as guides for sharpening and adjustment.

The saws now go to the hardening and tempering room where they are heated in ordinary reverberatory furnaces, and then plunged into an oil bath, which makes them hard and brittle as glass; sometimes they are also distorted and twisted out of shape. All this is to be corrected in the tempering furnace, to which they are now taken.

The tempering furnace is built around a hydraulic press, the head of the plunger being surrounded by the flames; this head is of such size as to take in the largest circular saw. When such a one, or a number of smaller saw blades are placed upon it, the pressure is put on, it rises slowly, and at last presses the saw blades against the top plate of the press, and holds them until the necessary temper is given. When the blades come out they are straight and surprisingly flexible. They are generally tested by being forcibly bent nearly double, and if any one should crack, or not return to its original straightness, it is rejected.

The principal requisites in hardening and tempering are that the metal be hard enough to cut well and to remain keen, while not so hard as to crack, to prevent swedging or to resist filing. It should also have sufficient stiffness, without brittleness, so as to permit setting.

The saws now go to the hammering benches, where they are placed upon iron straightening blocks and treated with peculiar hammers. These hammers have long narrow faces at both ends, parallel to each other, but at 45° to the direction of the handle; it will thus be seen that the marks made by one face will be at right angles to those made by the other, so that the hammerer can place his marks in almost any direction without changing his position.

This hammering process requires great skill, so as not to produce deep hammer marks, or create any unequal strains that might cause buckling.

The saws are now ready for grinding; some of peculiar shape, especially those that require a thicker cutting edge, are ground on ordinary grindstones by being pressed against them by the grinder. This is of course a very slow process and must be a terrible strain on the workmen.

There are several very ingenious grinding machines in use; in those for circular saws, a bed is placed across the face of the grindstone. A frame sliding on this bed contains a pivot pin, on which the circular saw is slowly revolving, and this is effected by two friction rollers (also attached to the sliding frame), which take the edge of the saw between them.

Opposite the grinding face of the stone the saw is supported by a set of rollers, and thus it is ground while it is slowly revolving, and moved along on the sliding bed. In another machine the saw moves between two grindstones opposite each other, and thus the two faces are ground at the same time. In another machine, destined for large gang saws, two grindstones are also used, one above the other, while the saw is slowly dragged between them horizontally.

Common hand saws are ground on a machine with one stone, the saw blades being placed in an arched block connected by arms with a swing shaft in front of the stone.

The arc of this block is described from the centre of the swing shaft, at the same time forming a tangent to the stone; the block, after the saw is put in being moved up and down, will insure a uniform thickness of blade.

After being ground the saws go into the polishing department; a rapidly revolving pulley, encircled by a leather belt, on which emery is glued, is the means by which small saws are polished. On some of these pulleys the emery is not glued on, but the article to be ground is wetted, dipped in emery, and then held to the polishing wheel. The circular saws are fixed on a shaft, which is then revolved at great speed, and a polishing block with emery is pressed against them.

In grinding and polishing, great care has to be taken to obtain a uniform thickness and a smooth surface, so as to reduce friction in sawing.

After being polished the hand saws go through the blocking process, that is, they are hammered on a block of hard wood, whereby any buckle or twist is taken entirely out.

Undergoing all these different treatments, the saws have become a little too loose and flexible, and it becomes necessary to give them a certain stiffness, which is done by heating them in a small reverberatory furnace until they attain a violet or blue hue. When they come out they are wiped with diluted muriatic acid, which takes off any color, leaving them bright and shining as before. The acid is removed by immersing them in lime water, and they are then put into saw-dust, which takes up all the moisture.

The grinding and polishing has still left some cross marks and irregular lines on the surface of the saw; to give them a smooth appearance with a uniform stroke of polish they are subjected to the *rubbing* process. A box, running on slides, is reciprocated by a connecting rod from a rapidly revolving crank-shaft; into this box the saw is put, covered with polishing powder, and a block fixed to a lever, which can be raised and lowered, is pressed hard down on it while the box is reciprocating; when taken out, the blade has a beautiful gloss, and a regular and uniform stroke of polish.

The saws are now taken to the work benches, where their teeth are set by hand with a small hammer; they are then put, two and two together, in a vise and filed, so as to give their cutting edges the proper bevel.

The teeth of large circular and gang saws are beveled by a machine with an emery wheel having a rim in accordance with the shape of the teeth.

The hand saws are now ready to have their handles put on; the necessary holes are punched, the blade is put into the slit of the wooden handle, and a number of brass screws are put in and tightened up by counter-sunk nuts. The saws are then again overhauled on the block and any little irregularity corrected by hammering.

They are now taken down to the storeroom, where they are again overhauled, cleaned and packed into packages, which are properly labeled and put into their proper places.

In the sample room of Messrs. Disston & Sons', their magnificent glass case exhibit, shown at the Centennial Exhibition, can still be seen. Innumerable drawers and closets contain samples of all the different saws and other tools manufactured by the firm, and their systematic arrangement clearly shows the spirit that pervades the entire management.

The transportation of materials, etc., throughout this entire establishment, is effected by means of small cars running on a railway of about 16 in. gauge; communication with the different floors of the building is kept up by several elevators.

To give an idea of the extent of these works, it may be stated that 1900 workmen are employed, and about 40 tons of new steel used up per week.

J. HAUG, M. E.

The *Engineering News* says: When steam cars are once successfully introduced upon street railways, we shall look for the adoption next of traction engines for handling the heavy loads, which are now conveyed from foundries and iron working shops by the aid of large teams of horses, taking up much space and seriously interfering with public convenience. These engines have been used in considerable numbers in some of the cities of England and Scotland, but we believe the only shape in which steam appears in the streets of our American cities, except as previously noted, is in driving the heavy road rollers, so effective in consolidating the roadway.

BLACK INK.—Nutgall ink writes very pale at first; manufacturers used to "age" it by keeping it several months, stirring two or three times daily, in order to darken the color. This time can be considerably shortened by blowing air through the ink, which can very conveniently be done by means of a soft rubber syringe. Since the idea is to oxidize the iron salt, the oxidation can be obtained in a short time by putting chlorate of potassa and cupric oxide (or powdered glass, or similar substance) in a test-tube; close the latter with a cork, through which passes a bent tube, and heat over a spirit lamp. Oxygen will be evolved, and five grains of the salt, equal to three fluid-ounces of oxygen, will considerably darken half a gallon of ink. The use of the addition of cupric oxide to the chlorate is merely mechanical, to facilitate its fusion. —*Drugg. Cir.*, xxi, 67.

SPONGY GOLD.—From our contemporary, *Industrieblätter* (1876, 401) we glean the following method of obtaining the finely divided gold so much used by dentists. A solution of gold is made with *aqua regia*, not necessarily free from copper, is evaporated until the excess of nitric acid is driven off. Oxalic acid and carbonate of potassium are then added in such quantity as will retain almost all the gold in solution. An excess of oxalic acid is then added and the solution boiled. The gold is then precipitated, while such impurities as copper remain in solution. The precipitated gold is carefully washed until it is entirely free from acid. It is dried on filter paper and is then ready for use.

An English engineering paper commences a lengthy illustrated article on "The Ashtabula Bridge," as follows: "When a bridge gives way suddenly under the weight of its ordinary working load, it may be taken for granted that there is something radically wrong in either the design or the construction, and the event cannot be called an accident." This is a proposition that can neither be flanked nor climbed over.—*Hardware Reporter.*

HARDENING PAPER.—The French papers speak of a method of rendering paper extremely hard and tenacious by subjecting the pulp to the action of chloride of zinc. After it has been treated with the chloride it is submitted to a strong pressure, thereafter becoming as hard as wood and as tough as leather. The hardness varies according to the strength of the metallic solution. The material thus produced can be easily colored. It may be employed in covering floors with advantage, and may be made to replace leather in the manufacture of coarse shoes, and is a good material for whip-handles, the mountings of saws, for buttons, combs, and other articles of various descriptions. An excellent use of it is in large sheets for roofing. Paper already manufactured acquires the same consistency when plunged, unsized, into a solution of the chloride.