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CANADIAN MECHANIC'S MAGAZINE AND PATENT OFFICE RECORD

Vol. 5. SEPTEMBER, 1877. No. 9.

On the Disastrous Results of Strikes to the Industries of a Country.

MANY months have not elapsed since we pointed out to the mechanics of Canada the disastrous results which ever follow the systematic striking of operatives in all countries; not only to those whom the employees wish to coerce to meet their demands, but to themselves, their wives and children, and a large body of the manufacturing community, and also, to many others totally unconnected with their grievances, who earn, by equally hard labour, their daily bread, and have greater reason to complain of unremunerative wages than those strikers who, by forming themselves into organized bodies, endeavour to enforce, without reason, or otherwise, their demands for an increase of pay.

In almost every instance has the paralysing effects of these strikes upon business and capital fallen heavier upon the strikers themselves than upon their Employers, and only a temporary advantage gained thereby; for as sure as by the law of Nature, water will regain its level after it has been disturbed, so by the law of average wages, which, like the tide, has its gradual rise and fall according to the fluctuations of trade, will also return to its mean level, although occasionally its waters may be agitated and rise into foaming waves by the force of over speculation and enterprise; and although its waves may bear many on its crest and onward flow to fortune, will, before they subside, overwhelm thousands in their waters and bear destruction and ruin to many who thought themselves safe and far away from where such a tidal wave could ever reach them. Yet, after the storm has subsided, there is a level to which all things must again come back, and so it is with labor; no matter to what height the speculator may disturb the waters of the industries and commerce of the world, they must ever again find their level, although, after the storm, a long calm is sure to follow. Even so is it with the state of trade now in the United States and Canada. First, in the States, came the disturbing influences between the North and the South, and the waters of strife rose high and lashed and foamed, and men were borne hither and thither on its waves. Such was the demand for soldiers, for ships, for arms, for clothing, for food, for everything necessary to supply enormous armies and navies with all the requisites of war, that manufactories had to be erected to supply it in every section of the country; the requisitions for labour also become very great, and as a consequence the rate of wages very high. The price of food and every kind of manufactured article was increased nearly four-fold. The thrifty farms of New England became neglected; for the sons of the yeomen of the country left their old homesteads, we may say forever, to fight in that great struggle, or to become merchants, manufacturers or clerks, in cities and towns where the high rate of wages and the enormous and rapid profits realized on business was too great a temptation to resist in embarking. But, from whence came the capital, first of all, to pay these armies and these navies? to pay for their food, their clothing and for all the requisites of war? Did it come from a healthy source, the unemployed capital of the country? No.—To meet these great expenses the Government of the North issued its paper or promissory notes in payment therefore, and the whole country endorsed it. This was the capital which in such times was spent in lavish profusion upon all. For five or six years there was no cessation to its flow; true it was not worth its value in gold, and when landed and household property rose in worth, it had but a fictitious value, which when the disturbed wave on which it floated had again subsided, returned to its normal value level. The circulation, however, of such an immense sum of money gave employment to everyone, thousands of poor foreigners flocked to the States and lived sumptuously even upon the crumbs that fell from the rich man's table. The farmers never knew such a time before. Every thing planted paid two hundred fold. The artisans of the country, who lived contentedly and frugally before, now built to themselves fine houses and educated their daughters to a state of refinement which could ill brook to return again to more homely times; their sons im-

bibed all the growing tastes for luxury, society, extravagance, and speculation, and the whole state of the community in those few years underwent a greater change than a century could have brought about in any older country of the world.

But what an alteration has taken place and come over the face of the country since that exciting period of the war! The great tidal wave or convulsion, which passed over the States from North to South, naturally did not subside in a day or in a year; such a mighty country could not be so disturbed without taking some time for its troubled waters to return into perfect quietness again, and the tide of business to flow and ebb within natural bounds as before. It must be borne in mind that the great Bank which circulated all this paper money, was the great National Bank of the United States, and its people were its Stockholders. This bank having issued millions upon millions of dollars, in bonds, greenbacks and scrip, in payment of the expenses of a great war, had, at its conclusion, from time to time to pay these bonds, &c., in gold. This bank could not print new paper and substitute it for the old, but was bound, like other banks, not only to pay its loans back in gold when due, but to pay interest as well, and, consequently, as the money was all expended in such a way that the bank got no return or profit from its notes, the Directors (i.e., the Government) had to call upon its stockholders (the People) to meet the demands as they fell due, and this call, which is collected in the form of an increased tax and duty upon importations, manufactures and property, is now felt very severely, since the spring from which all this money first flowed and circulated is now closed up.

The impetus given to the manufactures of the country and the demand for labour and celerity in performing every description of artificers' work, called forth the inventive genius of the country, and to such an extent has the perfection of machinery been brought, that not one-half the number of artisans are now required to perform the same mechanical work which were needed five years ago, and, as a consequence, there being no longer a demand for manufactured articles from the great depression in business, a large number of operatives are now unemployed, nor is there any reasonable probability, with the advantages now possessed by machinery over even skilled labour, of their ever being again full employment, at even moderate wages, for the whole body of working mechanics in North America; therefore the sooner that body looks this important question square in the face, the better for themselves and the country. Some other mode of living must be adopted by its younger members, and we see no way in which they can better themselves more to their advantage, than by becoming settlers in those rich and fertile lands of the West, where from their intelligence, aided by their handycraft, they will be sure, ultimately, to reap a fruitful harvest.

We have digressed a little from the subject in order to point out to American mechanics that the sources from which they have for some years past drawn these previous high rates of wages, did not come from over-flowing springs; there was a time to come, and it has come, when these springs would dry up, and the industries of the country languish. It is not because railroad companies, or manufacturing companies, have been declaring for some years past a large dividend, when business was prosperous, that those dividends will be continued; on the contrary, it is more than probable that it will be otherwise. How many of the first stockholders of railroads never even got back a portion of their invested capital, let alone a dividend? And how many companies, on the other hand, in order to uphold their stock, to keep it from becoming depreciated in the market until times improve, pay a dividend out of the capital? Hence the public conclude that those companies are making money, when they are actually losing both interest and capital. Look at the reports of our Canadian banks and the falling off in the value of their shares; and as for the truthfulness of directors' reports, we need not look further than to those circulated by the notorious City Railway Company—over which it is best to draw the veil.

The labourer in every respect is worthy of his hire, and his wages should be commensurate with the duties and importance of the position he fills, and the current rate paid generally to men filling like positions in other lines of labour or trade. If he considers that he is not paid proportionately with others, he can, if dissatisfied, leave his employment, and, if a steady man, will readily find employment elsewhere, but he has no right to dictate the rate of wages that shall be paid to him, and if refused, to unite with any organized body to stop the great arteries of commercial communication and upset the industries of a country. There are some industries and some descriptions of labor of such importance to the world, that they should no more be allowed by the Government of a country to be suddenly stopped or interrupted by an organized force of employees, than a ship's crew would be permitted to mutiny, and should be punished accordingly. And if the Governments of Canada and the United States passed a law that any body of men employed on railroads, coal mines, and public works, striking without giving a month's notice to leave their work,—even if acting peacably, but still disturbing the prosperity of an industry,—should be punished by making it a Penitentiary offence, such scenes as have just been witnessed in the United States could not again easily occur. Strikes like those which have just taken place, vibrate like the shock of an earthquake through a large portion of the community in many sections of the country, and are felt with more or less disastrous results according to the importance of the industry or public work that is directly affected by it. It shakes to the foundation public confidence, closes the doors of banks, and brings misery to thousands; not only to the strikers themselves, but to those who are not of their body, yet still indirectly affected by the destruction and ruin brought around them.

Many American papers consider that the strikers have some just cause of complaint, and that their rates of wages are too low for the arduous and responsible positions filled by the class of railway employees who this time formed the strike. To some extent, perhaps, this may be correct; but whilst those men complain of a reduction in their wages, have they given a thought how fortunate they are in these times to have any employment at all? have they ever reflected for a moment that there are thousands of men, many of them far worthier then they, who have not during the whole of the past winter been able to earn a single day's work, and who would gladly fill their places to-morrow at the reduced rate if quietly permitted so to do? Any reflective and intelligent

person who has recently travelled through the New England States (as the writer has done) and made enquiries on the subject of unemployed labourers and mechanics, will tell you that such is actually the fact, and that a large proportion of these men are natives of the country, descendants of those who fought and bled for it one hundred years ago, whilst the majority of the strikers are men of foreign birth, who came to this country to better their condition, and have done so; and many of them, too, "left their country for their country's good."

These latter are the class of men, who, where they are employed, are always the seditious instigators of evil among the rest, they are the firebrands that burn houses and cities, that they may either revel in their hellishness or profit by plunder. Probably, two-thirds of the men who so recently struck, if left to their own feelings and not compelled to act as they have done from having enrolled themselves into Trades' Unions, and Molly Maguire Societies, would have shrunk from the lawless actions and wilful destruction of property which characterized the late riots, and no doubt feel humbled now at the action they have been forced to take with others in these disgraceful scenes.

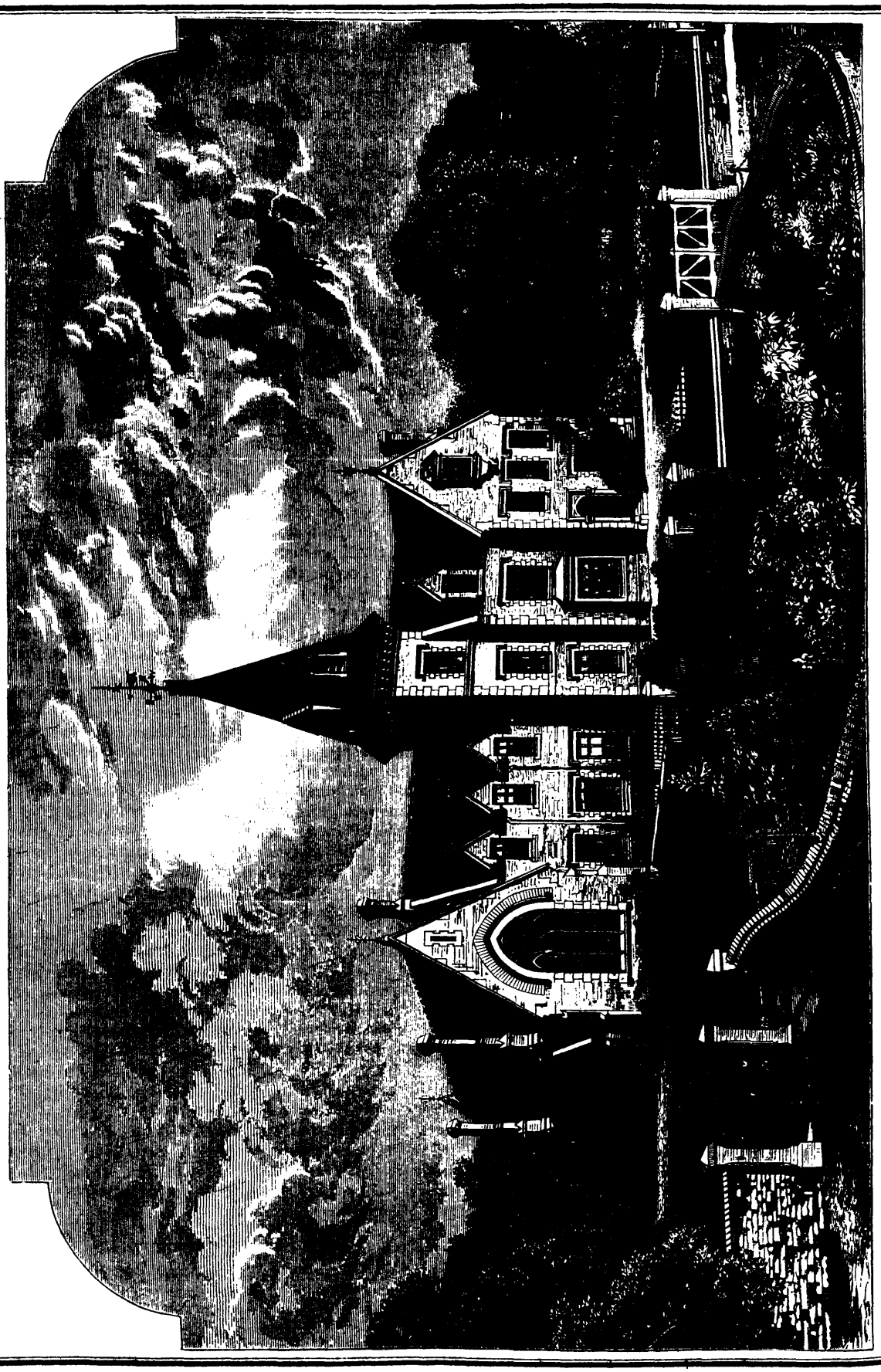
Now let us compare the position of the employees on the railroads with other classes of the community. In the first place, as before stated, whilst the railroad men have been enjoying constant employment, and have certain small privileges besides, there are thousands of artisans in the country who can obtain no employment whatever. If the railroad men consider they have a right to strike for higher wages at any moment they please, and by so doing throw the country into a state of anarchy by burning down property, stopping the main thoroughfares, and the mails too in the very teeth of the Government, have not the unemployed men of the country, who are willing to work contentedly at the same rate of wages, and who are natives of the country, a greater right to rise *en masse*, and say to the railroad companies: "We are starving, let those discontented men who are now employed by you, those foreigners who have not felt the hard times and pinch of hunger during the past winter, go to one side for a time, and give us employment until better times arrive. We are willing to work, aye, and peaceably too, for even less wages rather than want; then why should we be shut out, and a preference given to these men who, like the Israelites, having come into a land of plenty, are for ever grumbling and rebelling against the powers from which they derive more freedom, more comforts, than they ever knew before, whilst we, natives of the United States, cannot participate in a share of the earnings of the industries and public works of a country which was raised to its present prosperous state by the industry, intelligence, and wealth of our forefathers?" We say have not these men even a greater right, if such a word may be used in a sense of wrong, to demand that a large portion of the railroad men should be dismissed, particularly foreigners, on the same principle that Californians demand the dismissal of the Chinese, and their places given to them? But why do the unemployed mechanics of the United States refrain from making such a move? Simply because these men have all received a plain but useful education—they have been taught to reason, to respect the law, to respect the rights of others, and common sense tells them that the depression in the times is not because the money of the country is in the hands of a few who prevent it from circulating, but from the reasons stated in the first part of this article, viz., that a general depression has fallen upon every branch of business, and no man, however desirous he may be to invest his capital to any extent out of the ordinary lines of general commercial business, can see his way clearly to realise even the smallest margin of profit. But as soon as a more healthy feeling returns, and more general confidence is felt between business men, one with another, then the wealth of the country will issue forth from many channels, and a moderate prosperity again be felt by all. Those men who have patiently borne with their troubles and endeavoured to bridge over their difficulties until better times arrive, by small earnings gained from little industries of their own, and by frugality and economy at home, are the men who form the yeomen and real defenders of the country.

But there is another class again, who earn but small wages, and many of whom also are out of employment, such as clerks in cities and towns. They form, too, a very numerous body, and the salaries of many, yes, very many, are less than the lowest sum per month paid to the commonest laborer on a railroad, and yet contrast the difference of one with the other—go to the house of the first, and in most cases you will see economy, frugality and thriftiness exercised, and an air of respectability kept up that you will fail to find in the great bulk of the employees on the railroads, although the railroad men have the highest rate of wages. It is in fact to the shiftlessness, want of thriftiness and general prudence on the part of these men and their wives, that a reduction of wages falls so heavy. They must have their usual quantum of drink and tobacco, and their families are the sufferers. With the railroad employees in the New England States no troubles whatever have occurred, although their wages are also low—simply because they are composed of a very different class of men.

A most important question has now to be met by the Legislature of both countries, relative to the right of employees to strike on public thoroughfares or public works, and in factories, without first giving their employers due notice of their intention. Every man of course in a free country has a right to work or not, as he may think fit, but let him retire peacably from it, and not disturb those manufactories and works that are the life-pulse of a country. The public thoroughfares of a country, now, are the arteries and veins of its existence, and any interruption to their course paralyses trade, and should be dealt with directly by the Government.

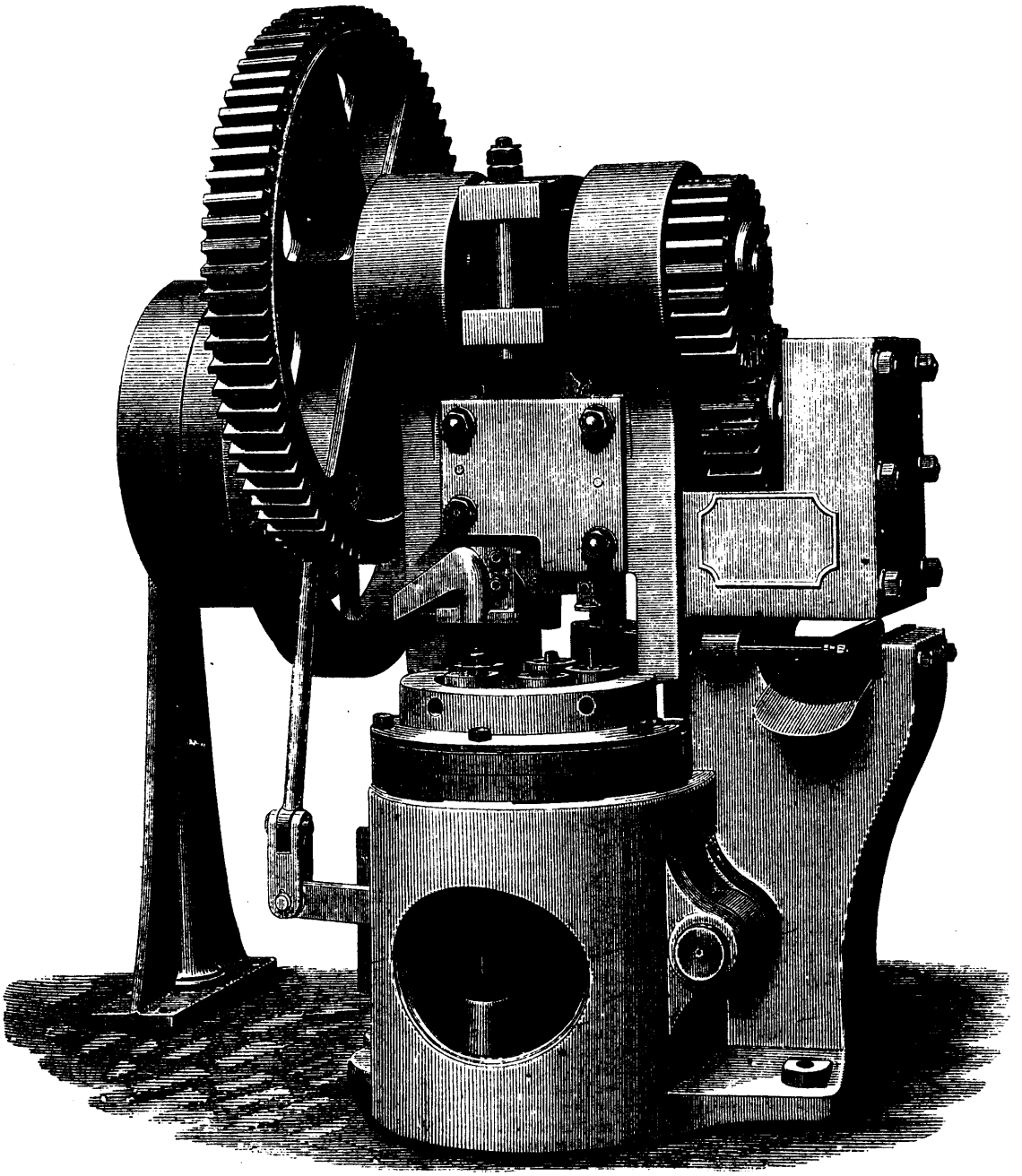
There is another question, too, of almost equal importance for the Canadian Parliament to consider, viz., the right of all Societies to walk undisturbed in the public streets. It would be better in this country if all these Societies abandoned the custom and met in a body by themselves to celebrate their national day, but if they will insist upon walking, it must be made imperative that the crossings on the public thoroughfares shall not be interrupted, and carriages and foot passengers be permitted to pass unmolested.

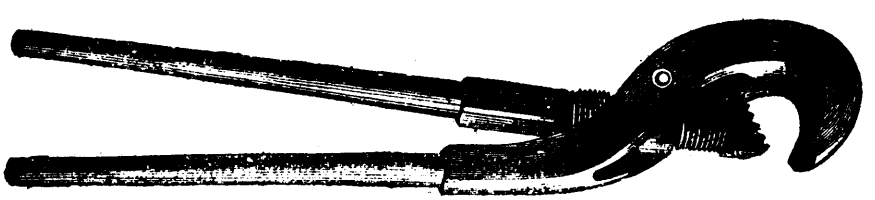
A Brilliant Signal Light.—By mixing equal quantities of powdered magnesium and powdered chlorate of potassa, an intensely luminous compound can be produced. When touched by a live coal it instantaneously produces a most intense white light that will answer admirably for signal lights.—(*Jahresb. d. phys. V. Frankfurt*), *Ind. und Gew. Blatt.*, v, xix, 212.



THE ODIHAM ENDOWED GRAMMAR SCHOOL.

COLLIER'S PATENT RIVET-MAKING MACHINE.





NEW GAS TONGS.

ENDOWED GRAMMAR SCHOOL, ODIHAM.

(See page 260.)

In accordance with a scheme prepared by the Endowed Schools Commissioners, this school has been rebuilt, and was opened in the autumn of last year under the management of an influential Board of Governors, Mr. Slater-Booth being chairman.

The site is in that portion of the town situate east of the church, and running parallel to the south of the High-street known as "the Bury." The style of the building is that of the Domestic Tudor Gothic, the materials being red brick, pointed black, with Bath stone quoins, gable copings, finials, and door and window dressings. The roof coverings are old tiles, and the spirelet of the turret is surmounted by a gilt vane. The principal school-room, about 55 ft. by 20 ft., with open ribs sustaining the roof, plastered between the principals and purlins, is lighted by large traceried windows in the north and south gables, and two smaller windows to the east. There is a large class-room and dining-hall, and these three principal apartments are finished in red brick with a struck white joint, on a deep dado faced in Portland cement. The gasfittings in the school-room and dining hall are by Hart, Son, Peard, & Co., of London. There are three dormitories, lavatories and bath-room, besides the master's residence, which is fitted for a moderate family.

The original contractors were Messrs. Newman & Son, of Winchester, but consequent upon their failure, Messrs. W. H. Frampton & T. H. Burton, of Winchester, their sureties, were called upon to complete the works. The total cost of the building, fences, anb enclosures, has been about £4,400.—*The Builder.*

MESSRS. COLLIER'S PATENT RIVET MAKING MACH

(See page 261.)

We illustrate on page 000 a new and very simple rivet making machine, recently patented by Messrs. W. Collier & Co., of the Greengate Ironworks, Salford, Manchester. One of the great defects in all previous rivet making machines has been their liability to form the head of the rivets out of centre with the shank, and one of the principal objects Messrs. Collier & Co. have had in view has been completely to obviate this, and render it impossible to make crooked headed rivets in the new machine. The general design of the machine and its mode of working will be readily understood from our engraving. The head or "snap" is carried in a vertical slide, which has a reciprocating motion imparted to it by an eccentric shaft driven by suitable gearing. The dies, five in number, are carried in a circular table and brought successively under the header or snap by an intermittent feed motion, which not only moves the table until the die is perfectly central with the snap, but locks it, and holds it firmly whilst the rivet is headed, so that should the iron get more to one side than the other it will right itself by pressure and not spring the table and form a crooked head. The motion for moving and locking the table is carefully protected from scale and water. An ejecting apparatus lifts the headed rivets out of the dies, and a simple self-acting motion picks them up and delivers them clear of the machine into a wrought iron trough or other suitable receptacle placed by the side of the machine. An apparatus is also attached for cutting the iron into the required lengths for making into rivets, with adjustable measuring stop to measure the pieces cut off the bars. Altogether this machine is a very simple, strong and substantial tool, and will probably meet a want that has long been felt in the rivet making trade. It will make thirty to thirty-five rivets per minute. Rivets made in this machine which lie before us, have truly centred heads, are well proportioned, and as far as form is concerned, leave nothing to be desired.—*Engineer.*

NEW GAS TONGS.

(See page 261.)

The importance of handy tools cannot be too highly estimated as aiding the convenience and economy with which labour may be used in building and erecting. In the case of pipe-fitting, especially quick and convenient working depends upon the fit and good grip of the pipe-tongs used for the purpose. Men with poorly fitting and inferior tools may be days effecting what could otherwise have been readily done in hours by men supplied with good tongs. Eventually, too, the joints may not be soundly made at all, owing to want of grip in the tongs.

In the ordinary course a very large number of tongs have to be used, one for each size of pipes in order to give anything like a good grip of the pipe. The tongs that we illustrate is the invention of Mr. Reuben Rignall, and is being introduced in London by Mr. J. C. Fell. It is an adjustable tongs, which will admit of being used for from four to six different sizes of pipes. It is of peculiarly strong and effective construction. The straight arm is adjustable by being capable of turning round its own axis in a swinging boss, which is pivoted in the jaw of the fixed arm with claw. By rotating this straight arm from left to right, or *vice-versâ*, the size of the gripping jaw may be altered.

A great advantage resulting from this form of construction is that the grip of the hand upon the double arms is left as good as in the ordinary pipe-tongs; whereas in many of the new adjustable pipe-tongs there is but one arm left for transmitting the turning strain, and the jaw is allowed to grip itself as best it may. The grip from the double arms must be much superior to that of any with single arm only. Mr. Rignall is a practical mechanic, and thus has had an excellent idea of what was wanted, and the most simple and effective way of carrying the same into practice.

ROLLING SHUTTERS.

(See page 264.)

The main reason of the unfavourable impression the city of Philadelphia makes upon the visitor, is the enormous prevalence of the hinged wooden blinds swung outside the fronts of most of the houses. Æsthetically considered they are abortions, which disgrace the best efforts for architectural display. Their absence is the pleasing feature of those New York streets which are occupied with private residences; but it cannot be denied that the want of more protection than the window-glass affords is often felt, and a kind of outside shutter is frequently desired if it could be applied without the use of the Philadelphia blinds.

We afford an illustration on page 264 of a rolling shutter window, and can be simply pulled down or up by hand with very little exertion. There are three kinds made: 1st, the Venetian blinds, in which the slats are separated by pieces of rubber of uniform shape, and which are connected by strong elastic brass wire; 2d, the wooden shutters, in which the slats are in contact, and which are absolutely closed; the slats are connected by means of elastic steel straps with teeth, which keep the slats in place, and by which also the use of any screws is avoided; 3d, corrugated steel blinds, which are of one piece, but by their elasticity roll up like the others and are kept in place by very ingenious devices of the same corrugated form as the blind. They are made of the best quality of Sheffield steel, and are fitted with Wilson's patent friction rollers, causing them to run smoothly and evenly in the grooves, and doing away with the objectionable leather strips. The wood shutters and Venetian blinds are the only rolling shutters in the market put together without webbing or leather bands. These shutters were exhibited at Philadelphia, in competition with the English manufacturers, and received the highest award, taking two diplomas and prize medals. In Fig. 1 we illustrate the use of these Venetian blinds outside. The cottage represented has not only its windows provided with them, but also its piazza shaded, which adds greatly to its value, protecting those enjoying its airy situation more effectively against sun and rain-showers than the roof alone will do.

To illustrate the use and appearance of these blinds when used inside, we give in Fig. 2 a view of the interior of an extension provided with windows all around, and these windows provided with the Venetian blinds described, to moderate the light which in such situations may be often in excess.

We close by adding our personal conviction, based on experience, that the common hinged shutters are a regular nuisance. We found them attached to the rear windows of our residence, where they had been placed as a protection against burglary; we were however induced to remove them, and store them in the cellar, for several reasons; they suffer much from sunshine and rain, heat and frost, are never protected, and least when open; and therefore do not last long, and require painting and repairing very often, besides being quite unsatisfactory in the function they are intended to perform. The best proof of their ugliness may be realized if the reader will imagine that in the adjoined engravings such shutters were substituted for the blinds represented.

In regard to the price, for the wood shutter it is 50 cents per square foot, including apparatus for rolling them.—*Manufacturer and Builder.*

TRAMWAY MOTORS.

(See page 264.)

We lately described the steam-car made by the Baldwin Company, of Philadelphia, in which the boiler and engine is combined with the passenger car. This week we illustrate a separate motor by the same makers. Its general principles are similar to those of the combined engine and car. The boiler and cylinder are of equal capacity, and an iron framework, strongly braced, is used for attaching the machinery and wheels. The entire weight of the boiler, machinery and water tanks, for a line with ordinary grades, is 12,000 lb., which is no greater than the weight of a horse-car, when crowded with passengers. This is carried within the wheel-case, or the space between the two axles—thus doing away with all overhanging weight, front or back, and hence, with all rocking motion. The motor moves very steadily, and is no more liable to damage the track than is an ordinary horse-car; by the steadiness of its motion, it is probably less damaging to the rails than a horse car If steam is used in this manner, no changes whatever are required in the cars. The separate motor takes the place of two horses, and occupies the same space in front of the car.

One of these motors was constructed in the autumn of 1876 for the Citizens' Railway Company, of Baltimore, the president of which line, Mr. John S. Hagerty, was quick to recognize the value and economy of this means of transit. The Citizens' Railway has maximum grades of 7 feet per 100, or 369 6-10ths feet per mile. The service required by Mr. Hagerty was that the motor should draw two loaded cars up this grade. The Baldwin Works constructed one machine, which was tried on the line, and was found fully capable of drawing one car, but with insufficient power for two. A second motor was accordingly built, which weighed about 16,000 lb., and which was sent to the Citizens' Railway in December, 1876, arriving there in the midst of the exceptionally severe snowstorms. During ten days' trial it fully demonstrated its capacity to do the work required. It ascended the 369-feet grade, drawing one loaded car, when the tracks were covered with mixed snow and dirt to a depth of 8 to 10 inches, in places. Where four horses were required to draw an ordinary car, the motor ascended the grade, drawing a loaded car without difficulty. As a result of this trial, the president of the company wrote on December 22nd, as follows:—"I have not tried it with two cars, but it has had a test sufficient to guarantee us in taking it, so far as climbing the hills is concerned. It has gone up the grades with one hundred passengers on the worst day I have seen on our roads." Subsequently the motor did its regular work and drew two cars without difficulty up the grade named. On several occasions during the heavy snows of December and January, the motor was used to haul the sweeper for clearing the tracks, thus taking the place of from ten to fourteen horses, which were usually employed for the purpose. The city authorities of Baltimore, however, have not as yet granted permission for the regular use of this machine on that line, and it is therefore laid aside for the present.

Another and smaller motor, weighing only 12,000 lb., was constructed about the same time, for the Urbano Railway of Havana, Cuba. On its completion it was tried for some days on the Market Street line of Philadelphia, and drew one car regularly over the road, occasionally with as many as 100 passengers. It worked with entire success, ascending the grades of 4½ feet per 100, and was then shipped to Cuba. The results of its trial on the Urbano Railway of Havana are given in the following extract from a report in the *Commercial Bulletin* of Havana, of November 9th, 1876: "The machine which was to be tried, being attached to two cars, occupied by some forty persons, drew them with a velocity which was diminished or decreased at the command of the conductor's bell, stopping several times instantaneously without the slightest shaking being noted in the cars. The experiment was made on different occasions during the trip from the station of the 'Carmelo' to the 'Torreau de San Lazaro,' and each time, at the striking of the bell, the same result was obtained. At its usual velocity, in ascending a grade of 2 per cent., it can be stopped in three seconds, and in going down the same, in seven. The consumption of fuel in this motor was found to be about the same as in the steam street car, viz., 8 lbs. of coal per mile run. Both of the motors above described were supplied with powerful steam brakes, by which the brakes could be applied instantaneously by opening a valve, admitting steam to the brake cylinder.—*Iron.*

THE Mars mine, on Lake Superior, recently produced a nugget of copper weighing nine tons.

A SWISS STEAM TRAMWAY CAR.

(See page 264.)

In the annexed engraving, from *La Nature*, is represented a steam car used on the route between Lausanne and Echellens, Switzerland. The length of the line is nearly nine miles. There are numerous curves; some having a radius as small as 62 feet. The speed at which the car travels is about 15 miles per hour, and the time of passage, including eight stoppages, 50 minutes. The steam engine and boiler is located in one end of the vehicle, similar to the Philadelphia street steam cars, and directly over the trucks. The heating surface of the boiler, according to the builder, M. Brunner, is 143 square feet, corresponding to a motive power of 25 horse. The consumption of fuel is 220 lbs. per trip. Coke is used in the towns, and soft coal during the journey. The tractile power is 1,650 lbs., and the car can be stopped by its brake within a distance of 20 feet.

The vehicle has two stories, with 24 seats in the lower one, and places for 32 people on the deck. Eight more passengers can be carried in the lower end compartment. No turn-tables are used, the car running in either direction. The total length is 41·2 feet, breadth 7·6 feet, height 13·7 feet. The weight, empty, is 11·5 tons; or, with a load of 64 persons, about 16 tons. There are many branch roads in this country where a car similar to the above mihgt be used, and a great saving be effected in cost over the locomotive and ordinary cars now employed.

—*Scientific American.*

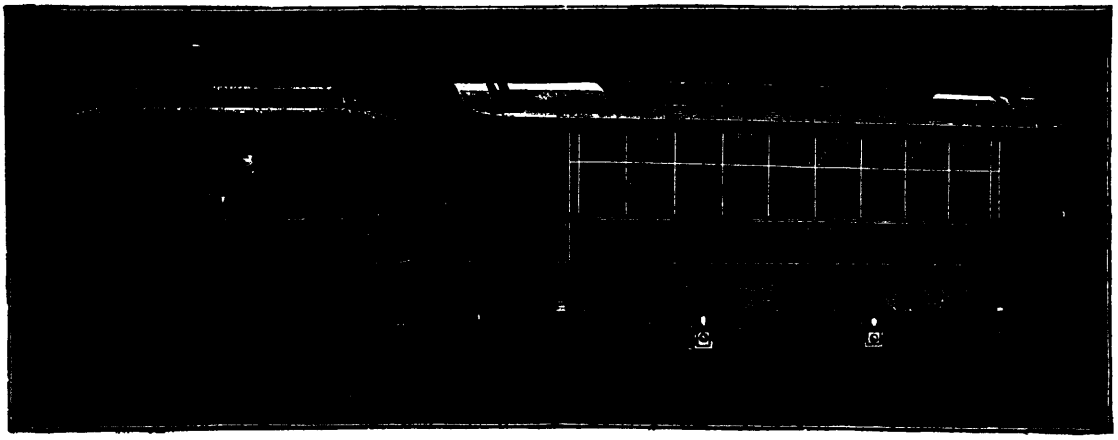
THE MANUFACTURE OF COMPRESSED MEAT.—A NEW INDUSTRY.

Many circumstances are conspiring to forward the interests of stock-breeders and graziers. The export of dressed beef and mutton, and of live cattle and sheep, is gradually increasing, and promises, not only to make an oulet for all our surplus stock, but to exert a favoring influence on the steadiness of prices in the home market. A new business is now growing into importance as an element of our foreign export trade, it having already reached respectable proportions in the domestic trade. This is the preparation of compressed, cooked meat, put up in cans of various sizes, from 2 to 14 pounds. This manufacture was begun three or four years ago by the Wilson Packing Co., of Chicago, who prepared fresh and salted beef, beef-tongues, and ham, in conical shaped cans of such a character that their contents could be turned out in a solid, shapely mass, perfectly presentable on the table without further preparation. This prepared meat met a popular want and an extensive demand, but, as might be expected, there was some competition from other manufacturers. Heretofore, canned meats have been put up loosely in the cans, and when turned out for consumption, presented a sodden, disagreeable mass, which was deficient in flavor. The compressed meats, on the contrary, are solidly packed, and free from liquid, and they retain all the savor and fresh taste of the best prepared food. Consequently the consumption of all other kinds than these has almost entirely ceased in this country, while foreign consumers are beginning to appreciate the better quality of these meats. This foreign demand, just now in its infancy, calls for greatly increased facilities for manufacture, and the proportions which this new business has assumed, will surprise those unfamiliar with it. For instance, two Chicago manufacturers, alone, produce 750,000 cans per month, using nearly 4,000 cattles weekly, and employing a large number of men and women. One of the factories referred to employs 700 men and 150 girls, paying $30,000 monthly in wages, and the floors of their packing house cover four acres. The companies own their own slaughter-houses, and the meat is cut up and selected for cooking under the closest supervision. After the best has been cut up, it is cooked by steam in wooden vats, to prevent any possibility of unwholesome taint from metallic surfaces; and when thoroughly cooked, the meat is drained from liquid, pressed tightly in the cans, and sealed hermetically. It will thus remain in perfect condition for many years, retaining its flavor and succulency indefinitely. The convenience of food thus prepared, for domestic use in summer time, is very great, and it is not surprising that in foreign countries it meets with a ready sale. Recently we noticed that in one week 11,270 cases of these compressed meats, each case being equivalent to one sheep, were received at Liverpool from the United States. Each case contained twelve four-pound cans, so that this shipment weighed over 500,000 pounds, or 250 tons of meat, free from every particle of inedible or indigestible matter. In some weeks 20,000 cases are exported, so that this was below the average business. It is expected that the present war in Europe and Asia will greatly increase the foreign demand. And this is but one of the new outlets for American meat.

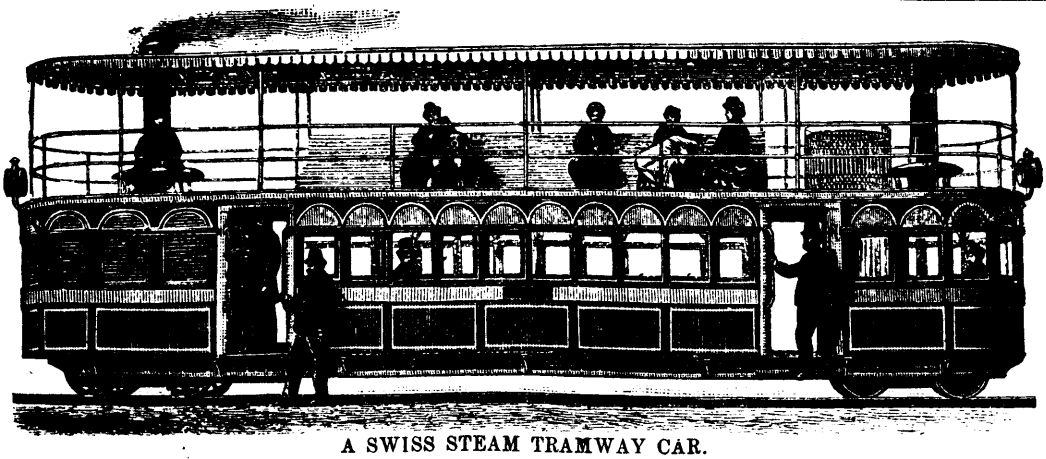
ROLLING SHUTTERS.

FIG. 1.

FIG. 2.

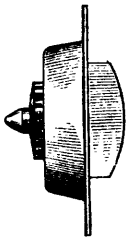


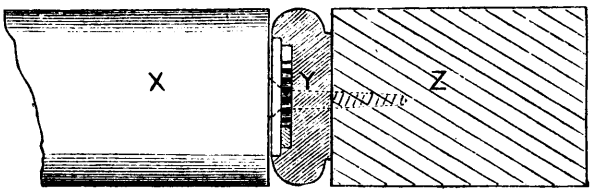
AMERICAN STEAM TRAMWAY MOTOR.



A SWISS STEAM TRAMWAY CAR.

ROLLING SHUTTERS (*Continued.*)

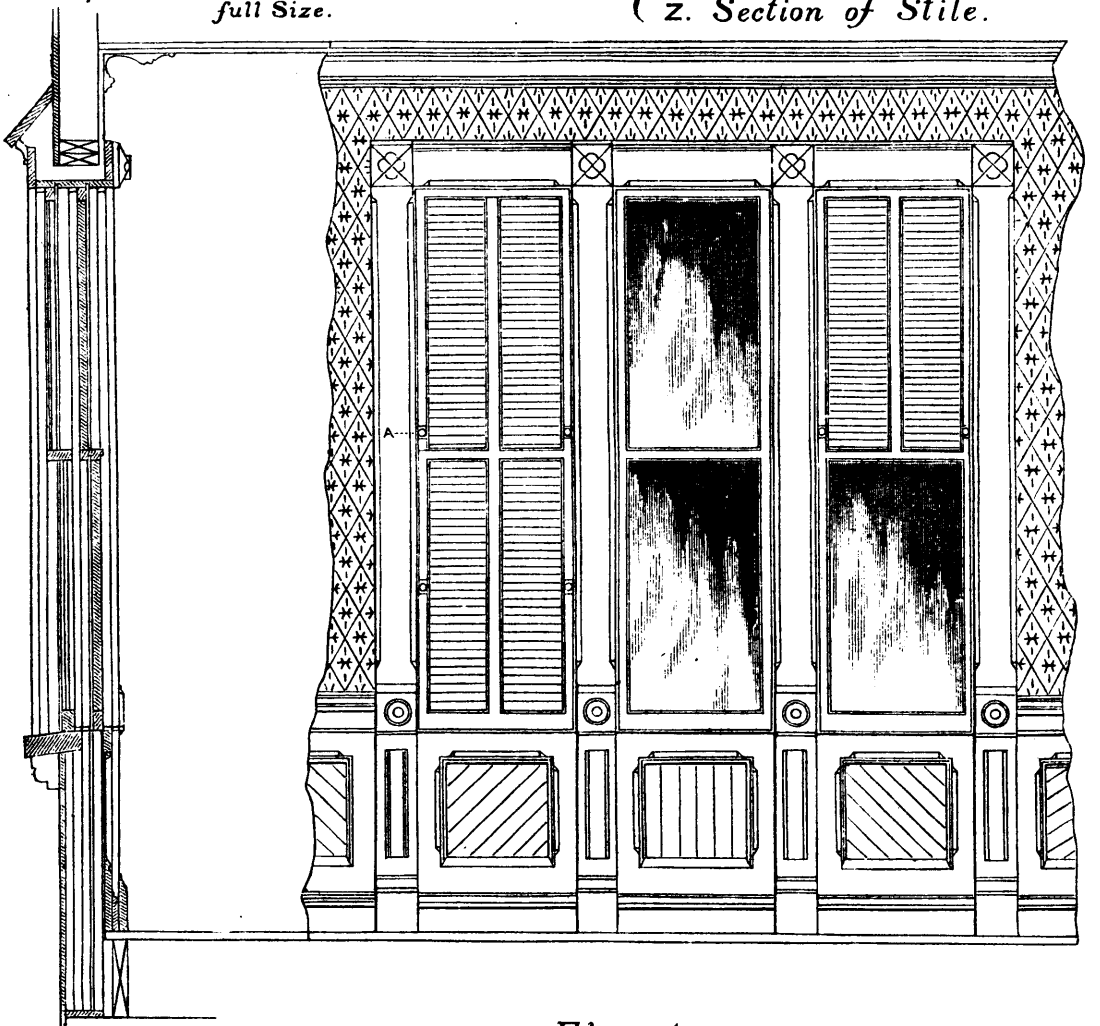




Thumb-piece and Ratchet @ A. Full Size.

full Size.

X. *Slat.*
Y. *Section of movement head.*
Z. *Section of Stile.*

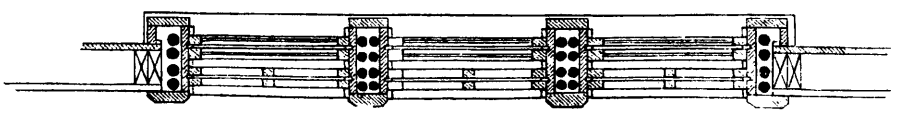


Elevation.

Scale ½ in to 1 ft.

Section.

Scale ½ in to 1 ft.



Plan.

Scale ½ in to 1 ft.

HOW TO MIX CEMENT.

(See page 272.)

In the *American Agriculturist* for Dec., 1874, were given some directions, with several illustrations, for building in concrete. Since then we have had frequent inquiries in regard to various details, especially as to the proper method of mixing the concrete. As this is a very important part of the business, we now give some directions both as regards mixing concrete, and the cement alone. The article to be used is the Rosendale cement, which is manufactured at Kingston, on the Hudson, N. Y. This is nearly as good as the imported Portland cement, and much cheaper. The cement is made from what is known as hydraulic lime-stone, that is, a rock which contains, besides ordinary lime-stone, some clay, silica, and magnesia. Pure lime-stone contains only lime and carbonic acid, in the proportions of 56 parts of the former to 44 of the latter in 100; when this stone is burned, the carbonic acid is driven off by the heat, and pure or quick-lime is left. When this is brought in contact with water, the two combine, forming hydrate of lime; during the combination, heat is given out; the operation is called slaking. When the water is just sufficient to form the combination, a fine, dry powder is produced, which we call dry slaked lime. When the water is in excess, the surplus is mixed mechanically with the lime, and forms what is called the milk of lime, or cream of lime, according to its consistence; it is this pasty substance which we mix with sand, to form building mortar. But when we have clay mixed in a certain proportion, either naturally or artificially, with the lime-stone, and this stone or mixture is burned in the same manner as ordinary lime-stone, we get what is known as hydraulic lime, because it combines with a much larger proportion of water than the pure lime, and in combining with it, instead of falling to powder, like ordinary lime, it hardens into stone again. This hardening takes place even under water; the hydraulic lime combines with just so much water as is required to "set" or harden, and leaves the remainder. It possesses this property, also, when mixed with sand in proper proportions, and when so mixed, the cement will adhere very firmly to the surface of any stone to which it may be applied. This property is made available in constructing works of concrete, which consists of broken stone mixed with such a quantity of cement, that, when it is packed closely, the surfaces of all the pieces of stone are brought into contact with the cement, and the spaces between the fragments of stone are filled with it. That there may be no more cement used than is actually needed, the mixture is rammed down solidly, until the fragments of stone are brought into close contact with each other. The composition of the impure or hydraulic lime-stone, which behaves in this useful manner, is, in the case of some of the Kingston stone mentioned, as follows: Carbonic acid, 34.20 per cent; lime, 25.50; magnesia, 12.35; silica, 15.37; alumina (clay), 9.13; and peroxyd of iron (which is useless or worse), 2.25. On account of this difference in character between lime and cement, a different treatment is necessary for each, and each is put to different uses. The cement makes a much harder and more solid combination with sand, and is therefore chosen when great strength is required. Its rapid setting, when mixed with water, also requires that it be used as soon as it is mixed, and renders a rapid mixture necessary. The cement and sand should, therefore, be mixed together dry, and very thoroughly. Four parts of sand to one part of cement are the proportions generally used. These may be mingled in a box of suitable character, and the mass is so spread as to have a hollow in the centre, into which water is poured. The sides of the heap are gradually worked into the water, with a common hoe, in such a way as to prevent the water from spreading about, and as it is absorbed, more water is poured in, until the whole is brought to a thin semi-liquid condition. A box, very suitable for this operation, is shown at figure 1. This is made of pieces of plank, prepared as follows: The side pieces are shown at figure 2; the end pieces at figure 3, and the bottom piece at figure 4. The end pieces are made with tenons, which fit in mortices in the side pieces, as shown in the engraving, and the frame thus made is held together by keys driven into the holes seen in the tenons. The bottom planks are fastened together with cleats, so placed as to receive the frame and fit snugly. Iron bolts are put through holes in the cleats, as shown in figure 4, and through the holes in figure 2, and by means of nuts with washers under them, the whole box is brought firmly together. Such a box, after having been used for this purpose, will be found very useful for mixing feed in the barn, or for many other purposes, and may, therefore, be well made at first. When the mortar is mixed, the broken stone may be thrown into it, beginning at one side, and the whole is worked up thoroughly with the hoe, so that every piece of stone is coated with the cement. A machine, that is easily made, may be used for this mixing, and is also very useful for mixing ordinary mortar for building or plastering. It is shown at figure 5. It consists of a box set upon feet, with a smaller box attached at the rear end, having an opening at the bottom where the mortar is seen escaping, and a shaft, having broad, flat arms on it, placed at a somewhat acute angle with the line of the shaft, so that they will operate as a screw to force the mass along the spout and out of it at the opening. A crank handle is fitted to this shaft, and if a fly-wheel can be borrowed from a feed-cutter, or a corn-sheller, and attached to the shaft as shown, so much the better. The materials to be mixed are thrown into the box, and by turning the handle, the whole will be thoroughly incorporated with great rapidity and ease.—*American Agriculturist.*

WOOD STAINING.

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

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

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

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

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

Green.—Mordant the wood with red liquor at 1° B. This is prepared by dissolving separately in water 1 part sugar of lead and 4 parts of alum free from iron: mix the solutions, and then add one thirty-second of a part of soda crystals, and let settle over night. The clear liquor is decanted off from the sediment of sulphate of lead, and is then diluted with water till it marks 1o B. The wood when mordanted is dyed green with berry liquor and extract of indigo, the relative proportions of which determine the tone of the green. The wood, mordanted as above directed, can also be dyed a *fine blue* with extract of indigo.

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

Brown.—Various tones may be produced by mordanting with chromate of potash, and applying a decoction of fustic, of log-wood, or of peachwood.

Grey.—Greys may be produced by boiling 17oz. orchil paste for half an hour in 7 pints of water.—*Scientific Press.*

SPONTANEOUS COMBUSTION.—Strictly speaking, there is no such phenomenon as spontaneous combustion. The inflammation of various organic and inorganic substances, without the immediate contact of any ignited matter, which has given rise to the term, is, nevertheless, as certainly the result of some direct act or acts which can be accurately traced, as is the firing of a lucifer match when struck on a rough surface.

THE REAPER AND BINDER.

(See page 269.)

The great perfection of modern agricultural implements is now such as to almost supersede every manual operation in the preparing of land and sowing and reaping of crops. A link that has long been missing in the successive harvesting operation is the binding of the grain into sheaves, after it has been cut by the reaping-machine. In England this is almost universally effected by hand-labour, binding up the sheaves with a twisted band of straw. This is a slow and laborious process, and is further open to the drawbacks, that the straw binding sometimes comes undone and wastes the sheaf, and the band may contain damaged ears, which would spoil the sheaf as a sample.

In America, where labour is so scarce and dear, much attention has been long, but hitherto comparatively unsuccessfully, paid to the designing of a binding-machine to supply this want, and they have even gone so far as to design machines to bind and then deliver the sheaves into a cart. The implement we illustrate, designed and made by Mr. Walter A. Wood, is the only effective device that we know of for the purpose of mechanically binding the sheaves.

Fig. 1 shows a general view of his reaper or harvester, with the binder attached, and the sheaf delivered, made up and bound with wire. The whole labour of binding is effected by the motive power of the two horses. The reaper is of the usual knife construction, with beaters or rakes arranged as a horizontal reel instead of the ordinary revolving rakes. The corn is thus cut and delivered on to a platform, from whence it is gathered up by a traversing web and a lifting apparatus, driven by chain gearing and thus carried over the main driving-wheel to the top of the radial slope, down which the binding-arm descends in the course of its revolution. The sheaf is here collected together, bound and delivered unto the field.

The binding apparatus is shown in detail in figs. 2 and 3, in the first of which the shuttle arm, E, is just about to collect the sheaf, and in the latter the sheaf is just being delivered bound. The grain being distributed upon the incline, A, the shuttle arm, E, with its wire shuttle, P, is constantly revolving round the top of the vertical standard, B, being driven by mitre gearing from the inclined shaft, C, which again takes its motion, through a moveable clutch, from the horizontal shaft, C, driven from the main bearing wheel. This clutch on the shaft, C, is connected to a treadle brought conveniently to the foot of the driver, so that he can at any time, by pressing down his foot, lift the clutch, and throw the binding apparatus out of gear.

The revolving arm, E, carries with it the twisting, feeding and cutting wire shuttle shown in detail in fig. 4. The two arms, E and G, both travel through a complete revolution, but not at the same uniform rate of speed. At one time, as in fig. 2, the arm, G, travels on with the arm, E, just behind the shuttle, gathering up the grain into a compact sheaf, and pushing it finally against the spring catch, F, at the bottom of the incline. Here the arm, G, waits whilst the arm, E, and the shuttle are carrying on the wire to bind around the sheaf, and at the same time the arm, F, moves up to firmly grip and hold the sheaf in a compact form whilst it is being bound. As soon as the lugs at E catch the wings of G, this action is complete. The sheaf moves on again with the arm G; the presser, F, gives way before it, and is carried rapidly upwards clear of the sheaf, as seen in fig. 3. The binding wire is then cut by a knife in the shuttle, and the arm, G, gives an accelerated push or kick, which delivers the sheaf, bound and cut, adrift from the binder, right clear of the shuttle arm, E, on to the field. The arm, F, has thus only a reciprocating motion running forward to grip and compress the sheaf when being tied, and retiring quickly to allow the sheaf to be shot clear when bound.

The manipulation of the wire is an important point in the successful action of the machine. The wire is supplied from a reel, D; is then passed over a compensating and regulating guide pulley, A; and from thence round other small guiding pulleys to embrace the bottom of the incline, and the end is firmly gripped in the shuttle-jaw.

The action of the shuttle arm then plainly is to cause the end of the wire, held in the shuttle, to form a loop round the sheaf of straw collected on the inclined plane. As the shuttle then passes under the sheaf at the bottom of the incline, the loop is completed as the shuttle again passes, the wire coming from the guide rollers at the bottom of the incline. In passing this point a pinion in the shuttle, which can be seen in the plan, fig. 4, engages into a fixed rack at the bottom of the incline. At the same time, in passing the wire from the guide rollers, the shuttle once more picks up the wire, and this now holds it at the end and in the middle, where it has completely embraced the sheaf. The rotation of the little cog-wheel or pinion working in the rack twists the wire like a rope. At the same moment, a knife (C, fig. 4) in the shuttle is suddenly brought into action and cuts the wire between the twist just effected in the two ends of the wire round the sheaf and the point at which the shuttle newly gripped the wire in passing the lowest point of the incline. The sheaf and its binding wire are thus cut loose from the shuttle, and is carried round by the revolving arm to form a fresh loop for the next sheaf. In this way the binding proceeds quite automatically, and without attention from the driver. The beater arms only lay down the grain on the platform, which is then carried to the winding elevator by a transverse endless web with cross bars, and which is driven by chain gearing. The elevator has short curved claws, which bring the grain to the top of the incline, but carry none down again, and the grain is kept slightly pressed into its place on the elevator by an apron and two sets of springs. —*Iron.*

WEIGHING THE STRENGTH OF WIRE.

The prosecution of the work on the Brooklyn bridge is calling out several special devices. One is a testing machine for the strength of the wire, and it is adapted to test up to a tension of 10,000 pounds. It was made by Messrs. Riehle Bros., of Philadelphia. Among the general points of the design, which the *Iron Age* thinks worth noticing, are the keeping the levers in position so as to resist a shock quickly without injury, and with little wear; while very sensitive it is easily and quickly controlled, whether operated by steam or hand. A specimen can be tested without cutting it from the coil, and the length of the test-piece may be one foot or five according as a long or short piece is needed.

No preparation is needed to hold the wire, as it is introduced at once directly to the center of the vises and held firmly without screw or application of the hammer. Tests can in this way be made with great rapidity and accuracy. The pulleys over which the belts run to main shaft are composed of one loose and two tight ones, which permit the working of the screw backward and forward by merely shifting the belt, which can be readily done by the operator at pleasure, while making the test. The hand-power is applied by means of a rachet, which also works both ways.

The beams are double, and are provided with gravitating poises. There are two grooved wheels, both behind the center on the inside of the poises, which have the tendency of throwing the knife edges into the notches and holding them there; this is preferable to the spring arrangement. The whole machine is constructed of metal. The screw is made of steel, the beams of red brass, and all the steel fulcrums and bearings are made true and even.

A NEW METHOD FOR THE TITRATION OF ALKALIES AND ACIDS.—Phenolphtalein, which is produced by heating carbonic acid with anhydrous phtalic acid and sulphuric acid, is colorless in a diluted state, but immediately becomes intensely purple in presence of the slightest excess of alkali.—*Fresen. Ztchr., 1877.*

EXTRAORDINARY CASE OF PERSISTENCE OF IMAGE IN THE HUMAN EYE.—Dr. P. Gorini has given an incident which is interesting as a case of persistent image on the retina. Having fallen asleep one night while reading a book, he wakened, when on the wall opposite, he observed it covered with the text of the book he had been reading; the annotations in smaller type he also distinguished. The whole appearance was vague and indistinct, but there was no doubt it was that of the page he had been reading. The apparition lasted about twenty minutes, and in this space of time was reproduced several times upon opening his eyes after closing them.—*Druggists' Circular.*

TRADE PROSPECTS.—The prospects of trade are very discouraging. The war and rumours of war, and the probable European complications, are seriously interfering with commercial affairs. Advices from the Continent show that people are afraid to do business owing to the uncertain position of political matters. Meanwhile, ironmakers' stocks are increasing, and every week the owners of blast furnaces find themselves in a worse condition. Some of the ironmasters will be obliged to suspend operations, otherwise they will not be able long to continue to meet their liabilities. Putting pig-iron into stock is a very expensive proceeding, and can only be done for any considerable length of time by men of large capital. Sanguine people hope and believe that the war will end soon, and that a lasting peace will be arranged before the close of this year, in which case prosperity will speedily dawn upon the several industrial districts which have suffered so much from the prolonged depression. —*Engineering.*

THE MACHEN BRICK MAKING MACHINE.

Fig. 1

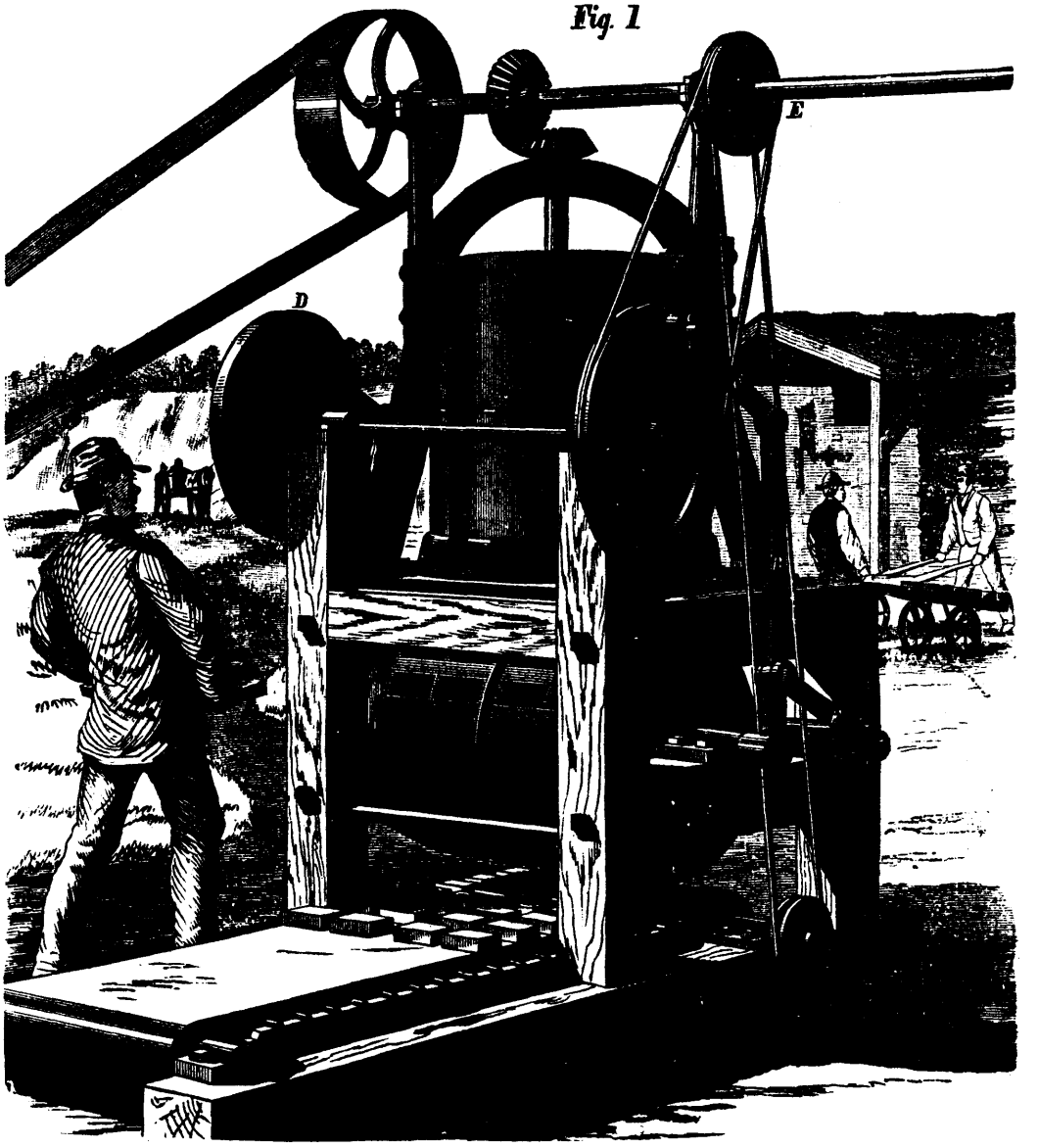
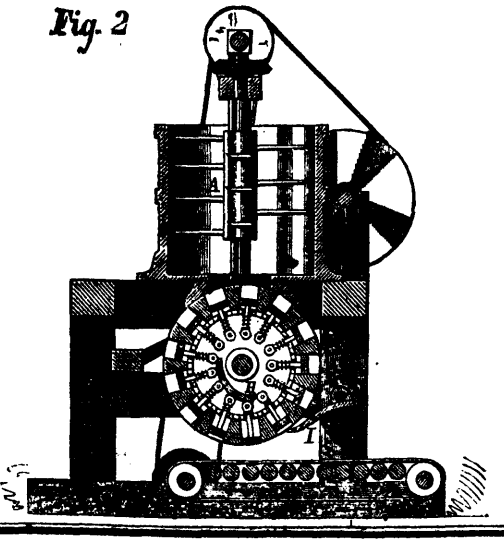


Fig. 2



BRICKS AND BRICK MAKING.

(THE MACHEN BRICK MACHINE.)

The cut herewith shows a form of brick machine in which the moulds are in the periphery of a horizontal cylinder rotating beneath a vertical pug mill. The bottoms of the moulds are plungers having springs on their stems and actuated by a fixed cam H placed against rollers on the ends of the stems. The upper moulds being filled by the wipers of the pug-mill (while the plungers are drawn in by their springs), the cylinder is then given a partial rotation. The bricks are borne off by an endless belt.

AMERICAN WOOD SENT ABROAD.—It may not be generally known that quite a large business is being done in the exportation of white birch wood from the New Hampshire forests to be made into thread spools. The firm of Coates & Co., in England, whose thread is universally known, uses very large quantities of this wood for their spools, and they find it superior to any wood they can procure in their own country. It is estimated that over a million feet were exported for this purpose last year, and the demand is increasing.—*Boston Journal.*

THE REAPER AND BINDER.

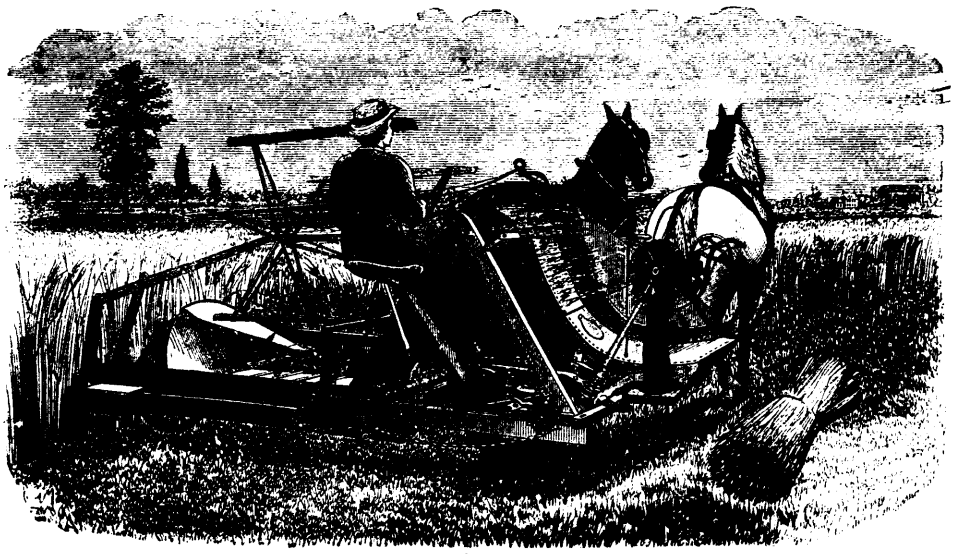


FIG. 1.

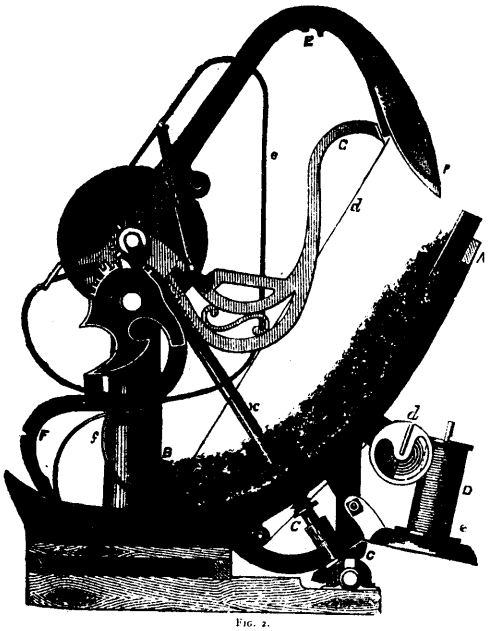


FIG. 2.

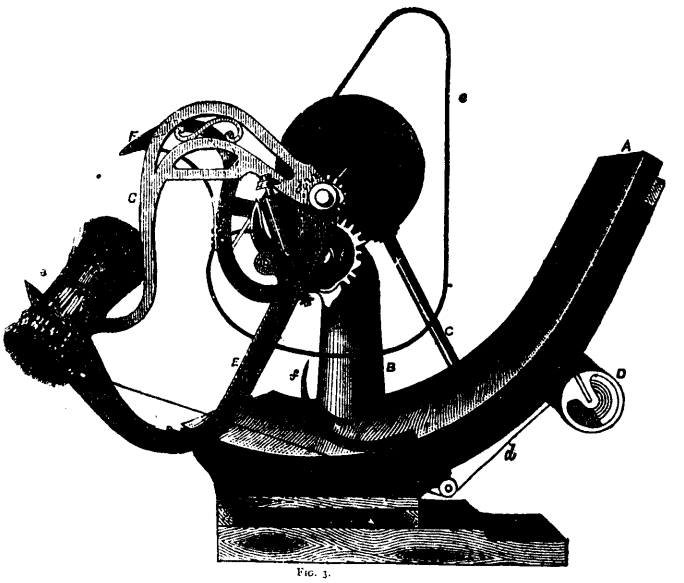


FIG. 3.

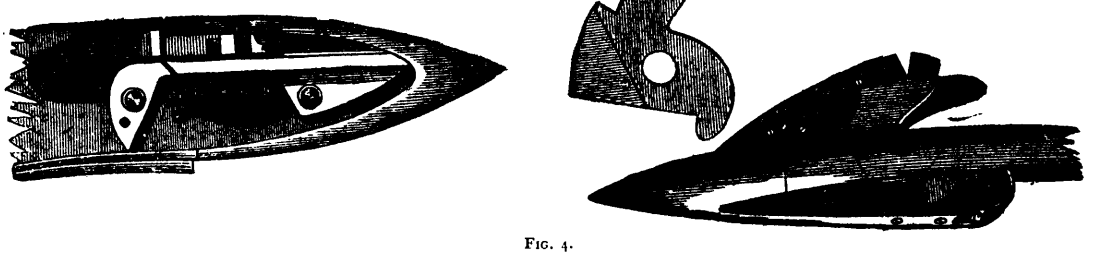


FIG. 4.

WHY CIRCULAR SAWS BREAK.

(See page 272.)

The following points are taken mainly from Messrs. Disston & Sons' "Lumbermen's Hand Book."

Makers are annoyed by having saws returned for repair in such a condition that it is impossible they should go through the wood, from the miserable way in which they have been filed and set—some jammed all to pieces, some not half filed, some not filed true on the face or back, while others are all shapes but the right one in the throat, leaving no chamber-room for dust or chips. Some saws have a bad pitch, some no pitch at all; some out of round; some with irregular or long and short teeth, one up and one down. In many cases they are returned broken, as shown at D. Why? Each tooth of a 24-inch circular saw goes through the wood 2000 times per minute, 120,000 times per hour, 1,200,000 times per day, and if not sharp, the saw is strained at the root of the tooth thus often, which frequently not only closes the set, but must eventually break the saw; for although steel is strong, continual straining will make it tender, and it must break.

Point C represents the condition the tooth should be in for work. Point B is dull, and from such cause results a great deal of breakage. The tooth becomes dull on the side or under the point in proportion to the amount of feed; thus, if the tooth takes ⅛ inch hold at each revolution, it will become dull for ⅛ inch below the point, or more if the feed be greater.

A diamond will not cut if dull; why should a saw? A few minutes filing two or three times a day would save ten-fold the amount of time and labor expended in running an imperfect dull saw, also making a saving in the amount of power consumed, and a heavy percentage in the quantity and quality of lumber cut. It is a mistaken idea that there is a saving by not taking time to sharpen a saw. If it were a razor, and the man that works it obliged to shave with it, it mould be kept sharp. It is quite as essential that a saw be sharp, as a razor or plane, or any other cutting instrument; and when proud, or full and sharp, it does not require one half the set or power on the same feed.

KEEP CIRCULAR-SAW TEETH SHARP.—In the "Lumberman's Hand Book" issued by Messrs. Diston & Sons, are found the following hints: Makers are annoyed by having saws returned for repair in such a condition that it is impossible they should go through the wood, from the miserable way in which they have been filed and set—some jammed all to pieces, some not half filed, some not filed true on the face or back, while others are all shapes but the right one in the throat, leaving no chamber-room for dust or chips. Some saws have a bad patch, some no patch at all; some out of round; some with irregular or long and short teeth, one up and one down. In many cases they are returned broken. Why? Each tooth of a 24-inch circular saw goes through the wood 2,000 times per minute, 120,000 times per hour, 1,200,000 times per day, and if not sharp, the saw is strained at the root of the tooth thus often, which frequently not only closes the set, but must eventually break the saw; for although steel is strong, continual straining will make it tender, and it must break. The tooth becomes dull on the side or under the point in proportion to the amount of feed; thus, if the tooth takes one-eighth inch hold at each revolution, it will become dull for one-eighth inch below the point, or more if the feed be greater. A diamond will not cut if dull; why should a saw? A few minutes filing two or three times a day would save ten-fold the amount of time and labor expended in running an imperfect dull saw, also making a saving in the amount of power consumed, and a heavy percentage in the quantity and quality of lumber cut. It is a mistaken idea that there is a saving by not taking time to sharpen a saw. If it were a razor, and the man that works it obliged to shave with it, it would be kept sharp. It is quite as essential that a saw be sharp, as a razor or plane, or any other cutting instrument; and when proud, or full and sharp, it does not require one half the set or power on the same feed.

WEATHER AND MAGNETISM.—Father Secchi, writing to a friend in Belgium, alludes in striking terms to the remarkable connection between the magnetism of the earth and the changes of the weather. He says that the variations shown by the magnetic instruments are themselves sufficient to indicate the state of the sky. Even where there is no great movement of the barometer, following such magnetic disturbances, there are, especially in summer, changes of the wind and sometimes storms.

A NEW RAIL KEY.

(See page 272.)

We give a sketch of a new rail key, which is being tried on several railways, and appears likely to prove a success. It will be seen from Fig. 2 a slight wedge is sawn out of the key. When driven through the chair the ends of the keys open, and prevent it working loose.

A short time ago some of these keys, which have been in use on the Brighton railway for a year, were inspected, and all found quite tight, while the alternate ordinary keys have worked out of the chairs four or five times.

IMPROVED LOCKING-NUT.

(See page 272.)

We give an illustration of a patent screw bolt, patented by Mr. E. T. Periam, of Birmingham, for locking the nut. One or more saw nicks are cut in the end of the bolt according to size of same, and when the nut is cut down to its proper position, the nick is opened with a hammer and chisel. The nut can be taken off with a wrench.

A NEW METHOD OF BOOKBINDING.

(See page 272.)

The annexed engravings represent a new system of binding books, for which a number of important advantages are claimed. It obviates stitching, allows of each leaf being firmly secured, and hence is especially well suited for single-leaved books. It admits of plates and maps being bound in their proper places instead of being pasted in, and renders the book much stronger and more durable. The inventor claims a saving of 10 to 75 per cent. of the time required for stitching, and of 50 per cent. of the time needed in ordinary rebinding work.

The mode of operation is as follows: On receiving the sheets, the binder folds them and places them in consecutive order, according to the printer's signature. The front and bottom edges of the book are then trimmed so as to obtain two straight sides; and the backs of the sheets are cut off, transforming them into single leaves. Horizontal lines are now marked with pencil across the back of the book for she saw cuts; and a diagonal line, A B Fig. 2, is drawn to serve as a guide in replacing the leaves in their proper places. A thin coat of glue is next applied to the back; and when this is dry, the book is divided into sections of from four to eight leaves (without counting them) entirely disregarding the printer's signatures, but placing the sheet in their original order. The binder places the first section removed at his right hand, the next at his left, and so on, forming two piles. Each pile is then straightened, and in the back of each, a little below the transverse lines, are made bevel cuts with the saw. Said cuts are ⅛ inch in length, inclined at an angle of 45°, and so placed that one half their length is above and the other half below the marked line. When one pile of sheets is thus sawn, the other pile is similarly treated; but the corresponding cuts are made at relatively opposite angles. This will be understood from Fig. 1, in which C represents the edge of the right hand pile, for example, and D that of the left hand pile.

The section of each pile are now returned in their regular order, according to the printer's signatures. Should a section have been misplaced, the diagonal line, being thus broken, will show the fact. It will be seen, however, that this arrangement involves the alternate use of sheets from each pile, so that when all are put together, the beveled cuts will cross or form dovetails as shown in Fig. 3. Half inch strips of white paper muslin E, Fig. 4, are next pasted around the back edges of the first and last sections. This is done to strengthen the hold of the twines in the back of the book, said sections necessarily bearing the whole strain of the covers. The twine used corresponds in size to the holes made by the coincidence of the bevelled saw cuts. This twine is passed through the holes by means of a blunt darning needle. The back of the book is shown in Fig. 2; and in Fig. 4, the twines are represented as passed. Nothing further remains to be done but to paste in the fly-leaves and lining, and finish the book in the usual manner.

It is evident that this is a very much stronger method of securing the leaves than that in which the twine is simply laid and glued in a straight cut. Each leaf is independently fastened; and the thread is prevented from cutting through, as is commonly the case when the book has been used to any great extent. Books can be bound to open more or less as desired; and in rebinding instead of taking the book apart and cutting threads, a thin shaving is sliced off the back, and the leaves are treated in the manner already described.

PRACTICAL TRAINING IN AMERICA AND ENGLAND.

So far as the upper grades of the working classes are concerned, technical education in the United States has reached a very fair degree of development. The majority of the rank and file of the mechanics of the States would, probably, not compare favourably in skill with those of this country; but while that is a proposition that admits of much being said on both sides, it is unquestionable that there is, amongst what may be broadly termed the working classes of America, a much larger percentage of thoroughly skilled and intelligent artisans. Here we have a dead level of excellence amongst our craftsmen: any of our large machine shops can show a body of artisans who are unsurpassed in their separate branches, but it is only a few amongst the number who have abilities above the average, and are capable of making and introducing improvements. Those generally originate amongst the class who pass through the shops as a practical training to enable them to utilise with the best effect the theoretical teaching they have received at college or in the office, and as these must necessarily be few in number, the progress of invention is comparatively slow; though, for that matter, it is none the less sure. Perhaps a little more courage in trying things that seem impracticable would be followed by a success that would encourage to further efforts, and we have had sufficient experience to know that the impossible of yesterday has become the possible of to-day. For much of their success in the fields of invention the Americans are indebted to the system of teaching pursued in many of their colleges. In this country, for many years, King's College was, we believe, the only establishment in which the students had the advantage of practice with theory, and even now the schools where such an education can be obtained are few and comparatively expensive. In the United States, however, there are several institutes of technology or colleges, at which the sons of working men can receive, at a moderate price, a sound technical education and sufficient practice to enable them to enter a work-shop; and although it is not expected that all the students will make their mark in after-life, the training is so broad in its character that it is sure to be of some value to the recipients. The system is being extended so as to become part of the regular elementary school training, and is mainly intended to overcome the prejudice against the apprenticeship system which finds little favour in the workshops of the States, where so much of the work consists of a careful and skilled attendance upon machines that manufacturers are not tempted to make a profit by the employment of apprentices, and though not averse to boy labour, where that is capable of being utilised, it is only the labour that is employed, and there is no thought of training the boys into skilled mechanics, or of retaining their services when too big to be considered boys. At Boston, then, as we mentioned some time ago, efforts are being made to give school-boys a practical training in handicraft, to teach them just sufficient of the processes of a trade as will enable them to enter at once upon their duties in the workshops and acquire skill by practice. If this plan tends to keep the lads at school longer than would otherwise be the case, it will, undoubtedly, exercise a considerable influence on their future career; but it is questionable whether the better system would not be to finish the elementary education at school, and then pass the boys into the technical school, where a longer time than usual might be devoted to practice. For instance, at Worcester, Mass., the college carries on a regular manufacturing business, building machines and taking contracts for work, to such an extent, indeed, that it is necessary to employ men to superintend the labour of the students. In so far as the value of the work done enables the directors to reduce the fees, these self-supporting colleges are valuable institutions, and those who pass through the training will, undoubtedly, receive a sound education as engineers; but it may be doubted whether the actual manufacture of machines to order is the best of training, for it will be readily understood that there is, under those circumstances, great inducements to follow in the beaten tracks instead of seeking out the best methods or inventing new ones. In other institutions the students practice chipping, filing, and scraping, hammering, welding, tempering, &c., on pieces of metal provided for the purpose, which are sent to the scrap heap when no longer fit to be experimented upon. This is, however, rather a wasteful system, and might easily be avoided by constructing articles, not to order, but to the design of the elder students, revised by the professor of mechanical engineering, which articles might, and probably would, find customers. By this means waste of both material and labour would be avoided, while, as the machines made would not be confined by the limits of an order, there would be ample scope for the exercise of the inventive faculties of the ingenious. The course in the American colleges usually extends over four years, about ten hours per week being devoted to the practical details of the workshop, and the same time to free hand and mechanical drawing. The studies at the Stevens Institute, Hoboken, New Jersey, consist of physics, mathematics, and mechanics, chemistry, languages, belles-lettres, and mechanical engineering, with mechanical drawing, presided over by professors whose names it would be invidious to mention here, but who are equal in ability to those of any similar institution in the world. There are workshops provided with first-class machinery, physical laboratories, whose appointments are unsurpassed, with excellent cabinets of instruments, and though we have mentioned this one institute by name, because it is, perhaps, best known here, there are others which, as educational establishments, are probably its equals. The system has, undoubtedly, borne good fruit, and it would be well if similar institutions could be established in this country, especially as the City guilds are beginning to understand that they have duties as well as rights. Sir Joseph Whitworth unaided has already accomplished much, but what is wanted is not so much the incentive of a scholarship as the sound technical and practical training at a moderate cost. Let us hope that the Technical University will be a real training college for the future generations of working bees, not an educational establishment for those who have little incentive to work.—*English Mechanic.*

A GOOD PLASTIC MATERIAL.—Five parts of sifted whiting mixed with a solution of one part glue, togther with a little Venice turpentine to obviate the brittleness, makes a good plastic material, which may be kneaded into figures of any desired shape. It should be kept warm while being worked. It becomes as hard as stone when dry.—*American Builder*, xii, 188.

APPARATUS FOR MIXING CEMENT.

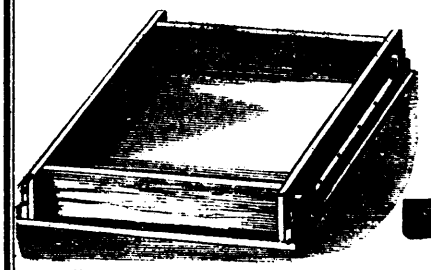


Fig. 1.—BOX FOR MIXING CEMENT.

Fig. 2.—SIDE OF CEMENT BOX.

Fig. 3.—END OF CEMENT BOX.

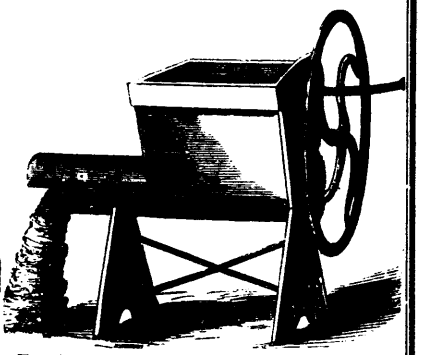
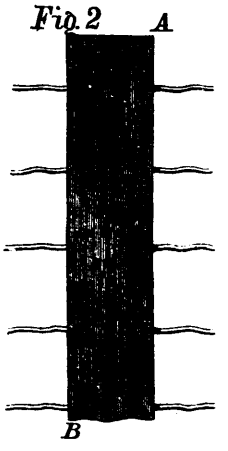
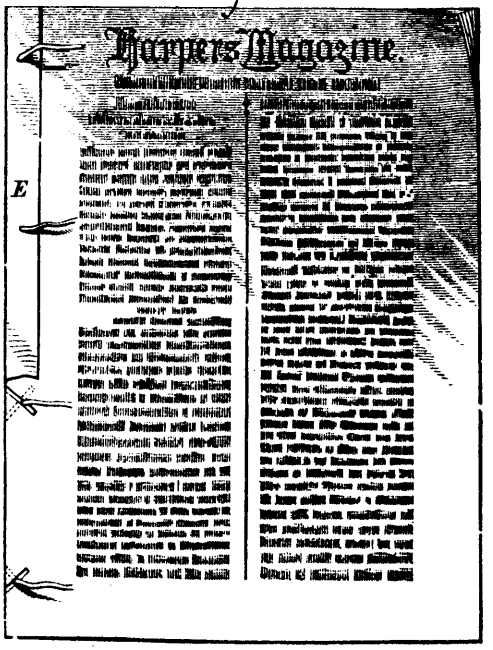
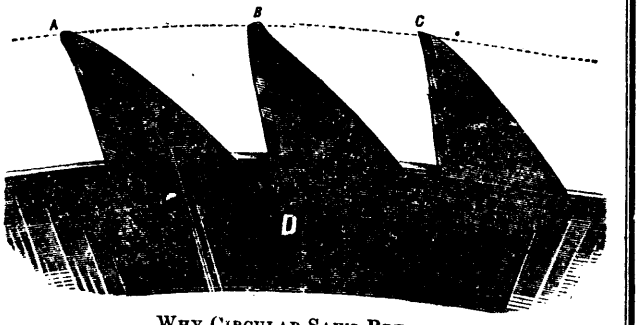


Fig. 5.—MACHINE FOR MIXING CEMENT.

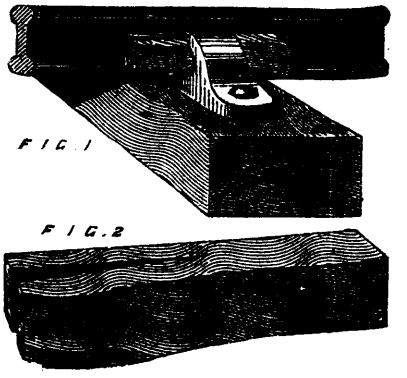




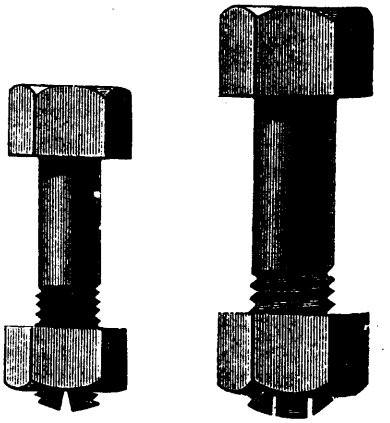
BOOKBINDING.



WHY CIRCULAR SAWS BREAK.



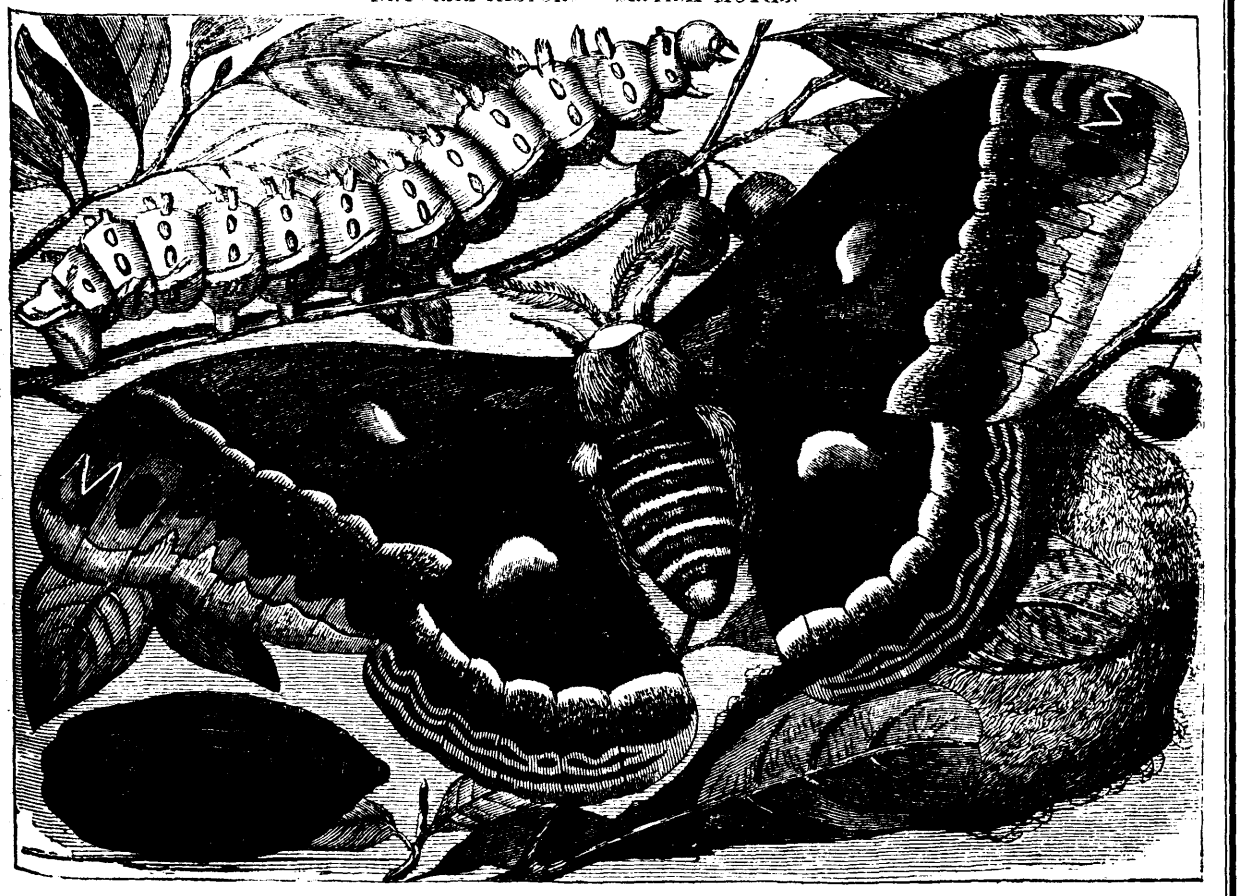
A NEW RAIL KEY.



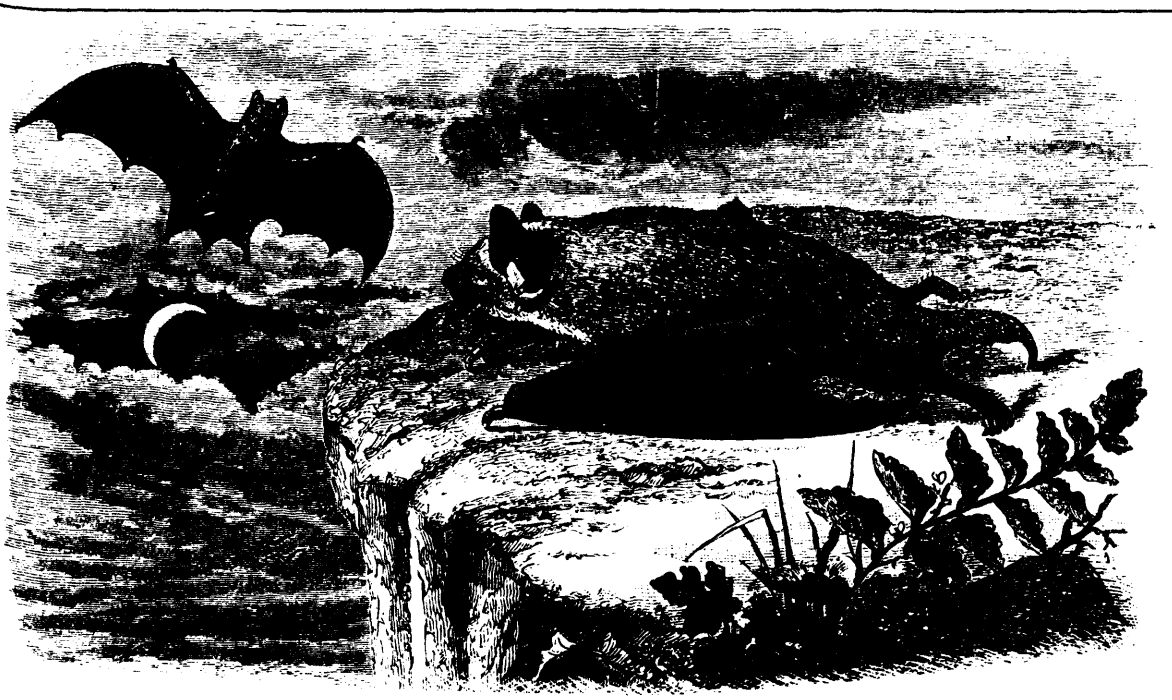
IMPROVED LOCKING NUT.

THE FAMILY FRIEND.

NATURAL HISTORY BRITISH MOTHS.



BUTTERFLY, SILKWORM, AND COCOON.



THE BROWN BAT.

BRITISH MOTHS.

(See page 273.)

What is a moth? A moth is an animal belonging to the family *lepidoptera*, or scale-winged; it has four wings, and each separate family have the wings of a different shape, some are round, others oval, others nearly square, and the females of some moths have no wings at all. The characteristics of a moth were given in No. 1, Vol. I, but I advise all my readers to trust to the antennæ and nothing else, for several of the *geometers* allow their wings to stand upright while at rest; and a great number of moths fly by day. To impress firmly on all the difference between a moth and a butterfly, I will repeat the words: "The antennæ, or feelers, of butterflies have little knobs on the end, and stand straight out; on the contrary moths have no knobs on the end of their antennæ, and the antennæ do not stand out, but are feathered, or jointed, and can be folded or twisted any way. In a future number I shall give a classification of moths, together with a history of the principal species in each family, their caterpillars and pupa, their time of appearing and the localities they frequent. The following apparatus are required by moth collectors, and although a great many things can be made at home, a few will have to be purchased. As a trustworthy man, and one who sells good and cheap things, I recommend Mr. Cooke, of 513, New Oxford Street, London. The first instrument required by a collector is a net. Nets are of two kinds, the clap net and the ring net; the last is the most convenient, and is easily made. Purchase half a yard of green or brown lens at a draper's shop, have this made into a bag; then have a strip of green baize stitched on to the top of the bag, but let there be room left for a piece of cane or wire to pass through. When this is completed get your tinman to make you a ferrule in the shape of a Y. Pass a cane through the baize round the bag, and fix the ends of the cane into the fork of the ferrule; into the bottom of the ferrule fix a stick; your net is then complete. The clap net is used for taking insects while at rest, but I do not recommend it.

A pocket box may be made out of a cigar box, lined with cork, or purchased for 6d. Entomological pins are 1s. the ounce. Small willow chip boxes can be bought at any chemist's for 3d. per doz. Sugaring nets for taking insects of trees, cost 4s. 6d. A sugaring tin with brush can be bought for 2s. 6d. A pocket insect lamp for night work costs 4s. Larva boxes, for caterpillar collecting, range from 1s. to 2s. Larva breeding cages are 2s. 6d. each, or 5s. for a double one. A pupa digger for lifting up sods, earth, or the bark of trees, while in search of chrysalides, costs 2s. Sheet cork costs from 1s. to 1s. 6d. per dozen sheets. With regard to setting boards, these are made in different sizes, but the two I generally use are 1 in. and 2 in. broad and 14 in. long; they can be got from ½ in. up to 5 in., at prices from 6d. to 2s. I will not say anything about the boxes or cabinets used to keep the insects in, for every collector has a different kind of box. Plenty of camphor should be kept in the cases, and they should be kept in a dry and dark place. Sugaring is a very remunerative way of collecting moths; the following is the way to set about it. First, "boil together some very coarse sugar and rum or beer, till it looks like very thin syrup, pour this mixture into the sugaring tin; put a lantern in one pocket, a net and some boxes and pins in another, and start off to the nearest wood, about eight o'clock in the evening. Then with your brush rub the trees pretty well with the mixture, on the side away from the wind, and then leave them till it gets dark. To while away the time, go to the nearest lane and catch moths with the net. About eleven o'clock light your lantern and return to the sugared trees; if the night is favorable, around and about the sugar scores of moths will be seen, some sipping the nectar, others crawling about the trunk, and sometimes they will be found on the ground at the foot of the tree quite stupefied. The moths that are stupefied can be knocked into small boxes or pinned on the trunk of the tree, but those who have only just settled on the sugar must be touched by the sugaring net, into which they usually drop. Several rare moths are often obtained in one night by this method, but do not be disappointed if some nights you do not catch a single moth; moonlight inghts seldom turn out well.

SWEET MILK GEMS.—There is no more delicious Graham bread than gems mixed with sweet unskimmed milk, without salt or baking powder. Like water gems, they require a *hot* oven. As there is no soda, yeast or baking powder to make them light, all depends upon the thorough stirring together of the flour and water, and a quick steady baking. Skimmed milk is little better than water.

THE BROWN BAT.

(See page 273.)

The brown bat (*scotophilus fuscus*, Beauvois) appears to be the most common vespertilion in the city of Philadelphia. It ceases to hibernate as soon as the first warm days of spring arrive, that is, about the latter part of March or the first of April, but I have, on two instances, observed it flying about at twilight as early as the middle of February. At one time, February 13th, 1869, when the thermometer marked 60° in the shade.

This animal, unlike its near relations, the aves, has no need of a nest, and therefore does not construct one. The brown bat has one or two young at a birth, generally the former, and as with the other species, they are placed by the mother amid the fur upon her breast, as soon as they come into the world, where they remain clinging until they are able to fly and provide for themselves. When the mother bat is flying about in search of insect food, or during the day when she is sleeping in some unfrequented loft, clinging, head downwards, to a rafter, she always has her baby bat with her.

We had a male bat of this species in captivity last spring; I was amused at his actions when placed in the revolving wheel of a white mouse cage, and was surprised to find him able to cause the wheel to revolve quite rapidly; though his gait was indeed ludicrous, being an awkward stumbling waddle. And to add more grace to his motions, he would fall every few minutes, and the momentum of the wheel would carry him completely around, before he could regain his footing. He was an irritable little brute. When any one would touch his cage he would squeak violently, at the same time showing in rage his sharp teeth. He refused to eat all the flies caught for him, and died of self-starvation and thirst combined, in three days after his capture. Therefore as "a cage bird" he was not a success.

Our bat, when on the floor of his cage, rested or moved upon all fours, as represented in the engraving; but seemed to prefer hanging by his feet from the side or top of the cage, head downwards, with his wings folded against body. He, as with all living bats I ever experimented with, was able to spring up and take wing from a level floor. I state this because it has been asserted that bats can only take wing by dropping from some elevated position, and never from a flat surface.

I once heard a gentleman, who had "gone through college," describe a bat to a lady as "only a mouse with wings." If he had said a little hyena with wings, or better still, a flying mole, his description or comparison would have been nearer the truth. Look into a bat's mouth, and you will observe four sharp canine teeth as in the higher *carnivora*; not four long chisel-shaped incisors, and no canines, as in the *rodentia*.

PICTURE FRAMES.—Boil 7 lb. of the best glue in seven half-pints of water; melt 3 lb. of white resin in three pints of linseed (raw) oil. When the ingredients are well boiled, put them into a large vessel, and simmer them for half an hour, stirring it, and taking care it does not boil over. When this is done, pour the mixture into a large quantity of whitening (previously sifted and rolled fine), and mix it to the consistency of dough, and it is ready for molding into the required shapes. The above compo will keep for a long time in a damp place, or in a barrel of whitening. Compo, when cold, is very hard, and is heated by means of steam, when it assumes the consistency of dough. The ornaments are made by pressing the compo into molds made of boxwood, the ornament being countersunk into the wood. The ornaments are got out as follows: — Take the mold, and well brush into it oil and turpentine to prevent the composition adhering to it. Roll sufficient warm compo in the hands into a convenient form to go into the mold, press carefully into every part with the fingers, then take a piece of board with a flat surface, wet it, and place on the back of the mold, put under an iron screw press, and the pressure, which is but for a few moments (a vice would answer the purpose), drives the compo into all the deep parts of the mold. Take out of the press, and remove mold. After the compo has hardened a little, the ornament is cut off, and the remaining compo sliced off, to be again heated and used. The ornament, when first cut off, is very soft and pliable, and can be fitted to frames having beads, hollows, &c., without fear of breaking. When dry they should be backed up—that is, the spaces between the corner and frame filled up with compo softened in hot water, which will make the ornament thicker and stronger than before.

THE PARIS UNIVERSAL EXHIBITION.

(See page 276.)

Two centuries and more have passed away since the day when Henrietta Maria, the widow queen of Charles I. of England, slowly ascended, in her by no means gaudy coach, the height of Chaillot; the unhappy Henrietta, whose father, Henry IV., had been assassinated, and whose husband had been beheaded but two short years previously, came there to found a convent, which henceforth received the name of the Monastery of the Nuns of the Visitation de Ste. Marie (1651).

Long ago as that time is, it may, without exaggeration, be said that the change has been greater on this spot within the last few months than in the two centuries that separate us from the day when the widowed queen looked from these same heights over the city of Paris, at her feet. The Revolution has passed over the spot, destroying with it the monastery, but little has it changed the aspect of the hill. How different now, when every day the Palace of the Trocadero rises, as if by enchantment.

A more detailed account of the Exhibition than we have as yet given for some time past is necessary fully to appreciate the immense progress made within the last few months. Happily no political events, either at home or abroad, have in any way been allowed to interfere with the works of the Exhibition, and the numerous contractors rival in their activity.

As is well known, a vast hall (the diameter of which will exceed 50 yards) will occupy the height of the Trocadero, in which accommodation will be afforded for 7,000 spectators. The difficult problem of emptying the hall of these spectators has been happily well looked into, and the whole has been surrounded by a double wall pierced with numerous doors. From each of these, in the two-yard space which separates the walls, ascends a staircase, which will give access to the different rows of boxes; each place will have its special means of exit. We see thus that the plan of the Roman arenas has been strictly carried out, and by this means the chances of grave accidents are greatly diminished.

To the right and left of this hall the wings, of semicircular form, are rapidly approaching completion. On the side which looks on to the Champ de Mars extends the gallery *promenoir*, the columns of which are soon to be put in position. These columns, which will be of white stone, relieving on a red-coloured background, heightened with gold, will certainly produce a handsome effect.

With regard to the plan of the cascade, one of the great attractions of the Exhibition, it is now alone awaiting execution. The works possess some interest, as, to form the bed of the future fall, it will be found necessary to use blasting-powder. When completed, the cascades will be considerably larger than the famous fountains of St. Cloud; it remains, however, to be proved whether in the present century we can equal the beauty of the old cascade which forms so conspicuous a feature in that superb masterpiece of Lenôtre, the Park of St. Cloud. No expense is to be spared, some 28,000*l.* having been voted for the purpose.

On the Champ de Mars the same activity reings as on the Trocadero, and since the recent visit of the Marshal President the progress has been great. Now that the immense work of masonry is completed, the public can easily observe the advance made daily by the different contractors. As we have already stated, the gallery of the Fine Arts is completed, while the building in which the city of Paris is to show a number of marvels to the world, is advancing. Thus at present one is able on the spot thoroughly to take in at a glance, as it were, the immense works of the Exhibition, all of which are now far above ground on each portion of the Champ de Mars. On every side rise huge pieces of cast-iron work, ready prepared, and alone waiting to be placed in their proper positions. It is owing to this fact that, in a few hours, a small gang of intelligent workmen are able, with the aid of powerful cranes, to set up masses of iron weighing many tons. Eight contractors divide the works of the Champ de Mars. The great galleries parallel to the Seine and the École Militaire are under the charge of Messrs. Eiffel & Cail. The other gallery, parallel to the Avenue Labourdonnage, is being constructed by the Compagnie des Fives-Lille; that on the side of the avenue Suffren by the Compagnie du Creusot.

As a proof of the extraordinary activity that reigns we may mention that on the 25th of May, when the Marshal President visited the Champ de Mars, not a pillar of the gallery parallel to the river had been posed, while now nearly half of the construction is completed. Each extremity of this gallery will be terminated by domes, while in the centre a circular pavilion, looking on to the Pont d'Iéna, will serve as the principal entrance. The pavilion alone will have a circumference of forty yards, the gallery a breadth of twenty-six.

As may be imagined, great interest is shown by the public, who may be always seen watching the progress of the immense works. As each huge piece of iron arrives it is rapidly hauled to its proper position by immense cranes, and there firmly riveted. While one end of a gallery is thus hourly progressing, may be seen at the other the glaziers rapidly filling in the iron sashes.

Thus, by means of skilful co-operation, no time is lost, and every day makes it more evident that it alone remains with the rest of the world to decide whether the solemnity of next year shall take place.

When at length the Exhibition opens, not a little interest will be added, in the minds of some few of the numerous Anglo-Saxon visitors, from the fact that the spot on which a part of the Palace is built has seen the sorrows of the unhappy queen of Charles I., and in later years the philosophic dreams of Benjamin Franklin.

We publish in our present number the first correct view of the intended building that has yet been given. It shows the entrance-front, next the Quai d'Orsay, with the arrangement of the grounds as definitely determined on. The contracts already made in respect of the Exhibition amount in the whole to 25,000,000 francs (1,000,000*l.* sterling), of which 8,200,000 francs have been already expended, viz., 6,000,000 at the Champ de Mars, and 2,200,000 at the Trocadero.—*The Builder.*

THE SEA MONSTER.

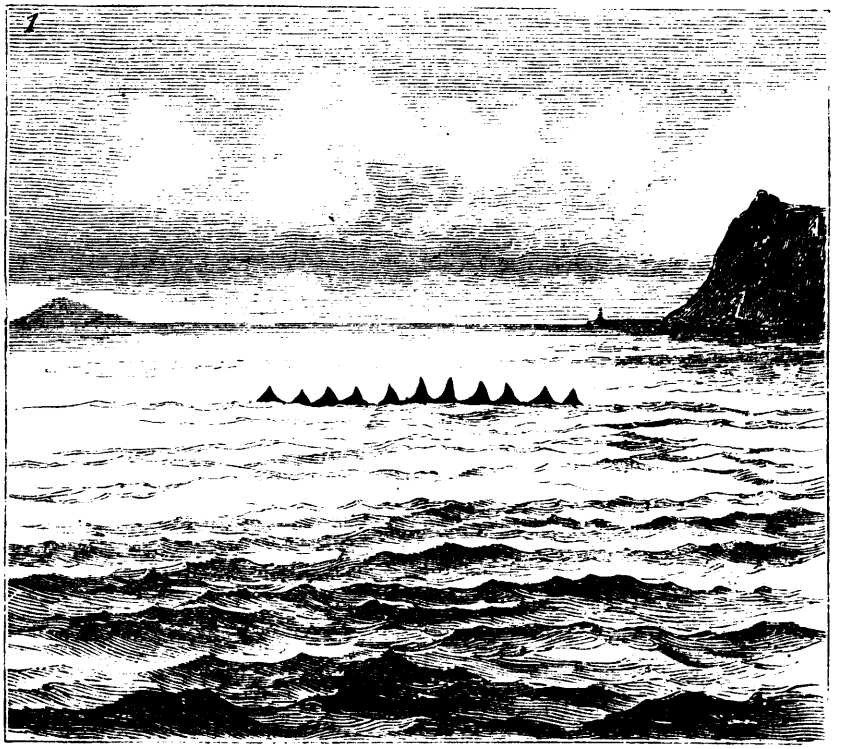
(See page 277.)

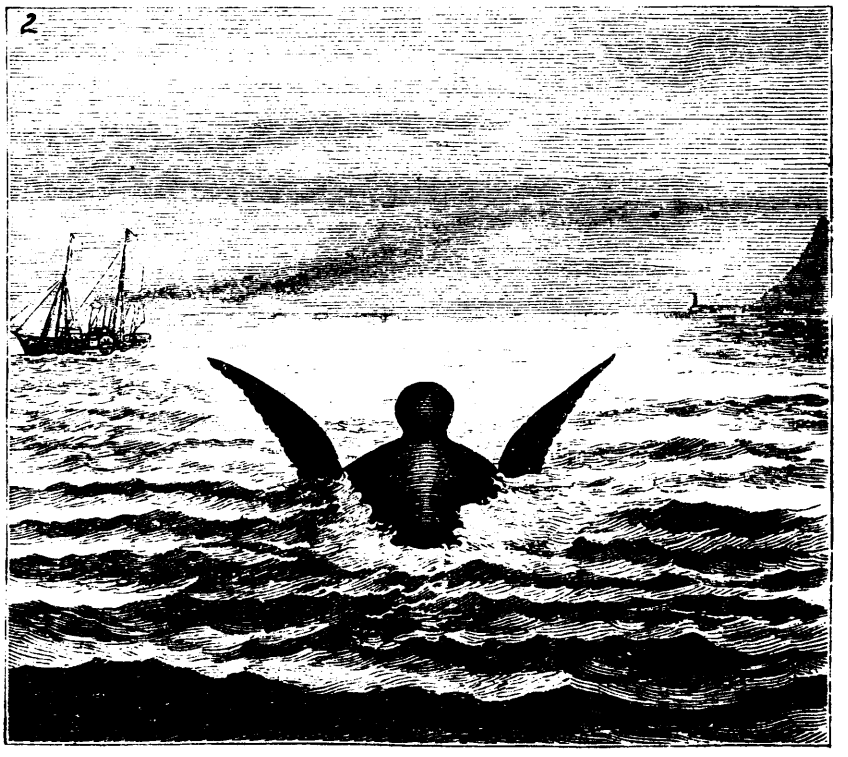
We are indebted to Lieut. W. P. Haynes, of H. M. S. *Osborne*, for the sketch of the sea-monster seen by the officers and crew of that vessel off the north coast of Sicily on the 2nd instant, notice of which was given in the *Scientific American* for July 14th. In a letter accompanying the sketch he says: "My attention was first called by seeing a long row of fins appearing above the surface of the water at a distance of about 200 yards from the ship, and 'away on our beam.' They were of irregular heights, and extending about 30 or 40 feet in line (the former number is the length I gave, the latter the other officers); in a few seconds they disappeared, giving place to the fore part of the monster. By this time it had passed astern, swimming in an opposite direction to that we were steering; and as we were passing through the water at 20½ knots, I could only get a view of it, 'end on,' which I have shown in the sketch. The head was bull-shaped, and quite 6 feet thick, the neck narrow, and its head was occasionally thrown back out of the water, remaining there for a few seconds at a time. It was very broad across the back or shoulders about 15 or 20 feet, and the flappers appeared to have a semi-revolving motion, which seemed to paddle the monster along. They were about 15 feet in length. From the top of the head to the part of the back where it became immersed, I should consider 50 feet, and that seemed about a third of the whole length. All this part was smooth, resembling a seal. I cannot account for the fins unless they were on the back below where it was immersed."—*London Graphic.*

PRESERVATION OF WOOD.—During the excavation of a canal in Berlin the workmen struck upon twelve perfectly preserved coffins, which laid apparently in four graves, each containing three superimposed coffins. The site of the discovery corresponds with the cemetery that existed even as late as 1620 in connection with the poor-house and pestilent hospital. The corpses must in consequence have been in the earth for at least 260 years. Notwithstanding this long period, the coffins, as well as their contained bones, are in a perfect state of preservation; articles of clothing have even been found still clinging to some of the bones. Prof. Virchow found upon investigation that the coffins were coated on both sides with a thick layer of tar, the wood itself appearing to be young oak of three cm. thickness. A silicious crust was likewise found on the inner side of the coffins. The wood is so hard that axes and saws were broken in the attempt to cut it. The wood is held together by long wrought iron nails which appear very different from those used at present. They are 8 cm. long, 4 mm. wide, and 2 mm. thick. They all have a groove running along their entire length, apparently to increase their surface contact. The nails are very much rusted, but are still sound in their interior. *D. A. Polytech, Ztg.*, v, 318.

DISCOVERY OF A GOLD NUGGET IN NOVA SCOTIA.—A nugget of gold, for which five thousand dollars has been offered, was found in a new "diggings" at Moose River, east of Halifax, Nova Scotia. It is said to be the largest ever found in that province, and its discovery will refresh the fainting hopes of those who were in doubt whether gold mining in that district could be made to pay.

FAÇADE OF THE PARIS INTERNATIONAL EXHIBITION BUILDING.





THE SEA MONSTER.

KINGS AT TABLE.

Though Frederick the Great could dine on a cup of chocolate in war time, he loved good eating and drinking, and undoubtedly hastened his death by refusing to conform in any way to proper rules of diet. "The king," wrote Mirabeau, who was in Berlin at the time, "eats every of ten or twelve dishes at dinner, each very highly seasoned, beside, at breakfast and supper, bread and butter covered with salted tongue and pepper. We are at the last scene." No wonder. A short time before a gentleman dined with Frederick, when an eel-pie was brought to the table, which he declared was so hot "that it looked as if it had been baked in ——." The king was immoderately fond of these eel-pies, peppered to excess. But about six weeks before his death we have the record of a breakfast such as a sick man has rarely eaten. Our authority is again Mirabeau:—"On the fourth of July, when the doctor"—the celebrated Zimmermann, from Hanover—"saw the king in the afternoon all had changed for the worse. He had applied himself to public business from half-past three in the morning till seven. He then ate for his breakfast a plate of sweetmeats, composed of sugar, white of egg, and sour cream; then strawberries, cherries, and cold meat." Frederick's illness was dropsy. He died on the seventeenth of August, 1786. Every school-boy will remember the parallel of the English king who died of eating too many lampreys. King John, too, is said to have died of a surfeit of peaches and new ale. The verdict of modern epicures will probably be, "Served him right." From Henry VIII.'s pictures we may safely infer that his appetite was not bad. Descending to the Stuarts, we find Henrietta Maria, at her first banquet in England, eating pheasant on a Friday, notwithstanding the signs and even open remonstrances of her French confessor. Poor girl! she was scarcely seventeen, and the sea-passage had probably given her an appetite. Her estimable son, King Charles II., of glorious memory, delighted in eggs and ambergris, of which we may hope he partook moderately. His death was supposed by some to have been occasioned by poison administered in this his favorite dish. William III., the savior of our liberties, both ate and drank more than was good for him. He loved to sit many hours at table; indeed, dinner was his chief recreation. Nothing must interfere with his enjoyment; the Princess Anne might look wistfully at that dish of young peas, but she looked in vain, for the king ate them all and never even offered her a spoonful. She revenged herself by calling the deliverer "Caliban." Among other sovereigns we find the great Napoleon a voracious eater. Some one has attributed the loss of the battle of Leipsic to the effects of a shoulder of mutton, stuffed with onions, with which the Emperor literally gorged himself, so as to become incapable of clear-minded and vigorous action. He ate very fast. The state banquets at the Tuileries lasted about thirty-five minutes. On the other hand, he was no lover of wine. In that melancholy voyage to St. Helena he offended the English officers by rising from table before drinking had fairly begun. "The general," one of these prigs had the brutality to say in his hearing, "has evidently not studied manners in the school of Lord Chesterfield." Their idea of politeness—certainly not Lord Chesterfield's—was to drink on till you dropped under the table.

EXTRAORDINARY LONGEVITY.—Dr. B. Ornstein, surgeon-in-chief of the Greek army, gives the following interesting item: A citizen of Smyrna died at the age of 132 years. Though he lived rather an intemperate life, he was at the last moment in full possession of his senses, as also of his teeth. He pursued the occupation of baker to the end of his days; was quite active, and could dance and sing when intoxicated. His longevity is remarkable in connection with the historical changes. The deceased, being born in 1743, has witnessed the reign of 9 sultans; was born 9 years before the unfortunate Louis XVI, of France; older than Pope Gregory V, by five years; 26 years older than the great Napoleon, and 32 years old before the American Revolution commenced.—*Druggists' Circular.*

AN IDEA IN REFRIGERATION.—Housekeepers who are troubled with moisture in their refrigerators will be glad to learn how it may be prevented. Fresh, unslacked lime, in small quantities, say a quart, placed in a refrigerator, will gradually absorb all the moisture in the provision chamber. The consequence will be a dry cold atmosphere, in which meat and other articles sensitive to the presence of moisture can be kept sweet for a long time. A little experience will soon enable one to know when to renew the lime and how much to use at a time.

EARLY TO BED AND EARLY TO RISE.

The visit of the Emperor of Brazil, and the daily chronicle of his round of work, bring forcibly to the mind the great value of early rising. We (*Lancet*) have been trying to estimate the commercial gain to this metropolis which would accrue if these Imperial habits were imposed upon us. If we rose with the sun, instead of the usual hour of eight o'clock, we should gain, on an average, two hours' additional daylight thoughout the year, and if we sought our beds two hours earlier to compensate for our early rising, we should be saved the expense of artificial light for 730 hours in each year. Now, there are, in round numbers, 450,000 houses in London, each of which we may suppose requires five gas-burners, or their equivalents in lamps or candles, after dark. At present we may reckon that 2,250,000 gas-burners are burnt for 730 needless hours in each year, and if we take the average consumption of gas at three feet per burner per hour, we may say that each burner consumes, in round numbers, 2,200 ft of superfluous gas per annum, which gives a total for the metropolis, in round numbers, of 500,000,000 cubic feet of gas, or its equivalent, which might be saved. Taking the cost of gas at 3s. 9d. per 1,000 cubic feet, we find that the saving to the metropolis of early rising might amount, in the matter of artificial light alone, to no less a sum than £900,000 per annum.

When we consider also that every gas-burner requires to be supplied with nearly 2,000 cubic feet of air per hour, and that after dark the demand for fresh air is nearly doubled in this already stuffy city, because the wants of luminators are added to the wants of man, the gain in health would be scarcely less than the saving in money.

If, too, which is not likely, we were to make as good a use of our time as the Emperor, we should perhaps verify the old saying that "Early to bed, and early to rise, make a man healthy, wealthy, and wise." May we hope some day to see distinguished persons enjoying the pure crisp air in Hyde Park at 6 a. m.? May we ever be allowed to have a daylight theatre that does not reek of humanity? Shall we ever see the abolition of "evening church?" And will the House of Commons, the pioneers of sanitation (!), ever set us a good example in the matter of keeping what Mrs. Grundy speaks of as "decent hours?"

—*English Mechanic.*

NOTES AND MEMORANDA.

A REMEDY FOR BED BUGS.—A correspondent writes to the *British Medical Journal* as follows: "The best remedy for bugs in hospitals is a bug-trap made by boring a series of holes in a piece of wood with a gimlet, and placing this under the mattress of each cot. The piece of wood is to be placed periodically into a basin of boiling water. This is an Indian hospital plan."

VARNISHING FOR WALL PAPER.—The paper must first be prepared with common size, two or three coats, taking care to cover every part with size, or varnish will turn it black; and do the sizing as lightly and quickly as possible; so as not to disturb the colors.

FIXING EMERY.—It can be fixed by mixing with a solution of shellac in spirits of wine, or the patent knotting, or French polish of the oil-shops, until a tolerably stiff paste is formed—then coat the wood with the varnish, and spread it on the wood. This will not stand a high temperature, or of course great friction.

Another.—Use strong glue size, and dust evenly through a fine sieve; if not thick enough add another coat of size and dust as before.

BLACK BOARDS.—Size in your board with size and lampblack; afterwards get some turpentine and a small quantity of japan, gold size, or copal varnish, as a bind for the turpentine. Grind or mix a black with the turpentine, so as to render a flat or dead surface, and apply to board; or use Brunswick black or Berlin black, made thin with turpentine. Apply on the size and lampblack; let dry sufficiently before doing your chalking business, and use soft chalk.

IMITATION PEARLS are manufactured in Paris upon a large scale and with wonderful skill and ingenuity. The sand, upon which the whole art depends, is found in the forests of Fontainebleau. False pearls are lined with wax and scales of the roach and dace, which have to be stripped from the flesh while living in order to retain the peculiar glistening hue. The setting is always of real gold, and the fashion of the newest kind.

THE SLOTH.

(See page 284.)

(*Bradypus tridactylus. Linn.*)

Also known as the Ai, in consequence of its plaintive cry, which resembles *a-i*, is a member of the *Edentata* family, or toothless animals, and is a native of the Brazils, being found generally throughout the length of the forests in the New World from Brazil to Mexico. Probably, a more calumniated and abused creature than the ai never existed. His name is a sarcasm on his habits, and he has been held up by naturalists as the personification of utter helplessness, and as being thoroughly indolent in nature. Naturalists, however, who have gone the length of this abuse, have merely made acquaintance with the animal in captivity, in a state, by the way, for which it was never formed.

A peculiarity about the sloth is its mode of progression, which is just the reverse to that adopted by other animals (with the exception, on certain occasions, of the ape). The sloth must be described while he is in a tree, for amidst the trees he is destined to live and die. But this is not the extraordinary feature of the animal. He does not live *on* the branches, but *under them.*

In fact, he moves, rest, and sleeps suspended from the boughs. Of course, his formation is suitably adapted to this kind of existence; albeit, some naturalists have ventured to describe the work of their Maker as a great bungling.

The ai is about the size of the fox; his head is small and round, not exceeding three inches in length; has a wide, thick mouth, without either canine or incisive teeth. His eyes are dull and heavy, having an expression peculiarly their own. Length, from 12 to 14 inches in body, with a short tail. The fore limbs are just about double the length of the hinder; but in place of soles they are furnished with three toes, which terminate in wonderfully strong hook-like nails, crooked downward and backward, these rendering his movements on the ground as difficult for him as it would be for one of the human species to support himself by the tips of his nails. But the sloth is enabled to cling to the branches with amazing rapidity. His hair is very thick, and, moreover, extremely coarse, particularly so at the extremity. It gradually tapers at the root, where it becomes as fine as the finest spider's web, and it is so much in hue with the moss that covers the boughs to which he clings, that it is a matter of great difficulty to detect the gentleman in the dusk.

In the midst of the deep and gloomy forests of the transatlantic continent on which he resides, the branches of the trees overlap and intersect each other in great profusion, so that the so-called sloth is easily able to pass from one to another of them, and this he does in such an amazingly fast and clever manner, which anything but justifies his cognomen. He is a very timid creature, and perfectly harmless, and the female gives birth to one cub at a time.

The sloth feeds upon buds, leaves, and fruit of all descriptions, and, being a ruminating animal, is provided with four stomachs. His flesh is esteemed a great delicacy by the Indians.

THE UNAU,

or two-toed sloth, is rather larger than the former species, and is found in India as well as in America. In addition to the difference between the toes of the animals, the unau is blessed with no fewer than 46 ribs, whereas the ai has but 28. Their habits are exactly similar, and the two-toed sloth has very much rougher fur.

PATENT-OFFICE.—The Commissioners of patents have determined to continue their publication of official abridgments from the year 1866 onwards. Most of the series referring to different classes of inventions have now been brought down to that date, and it was originally intended that the work should stop here, the place of these abrigments being taken by the abstracts which since 1866, the applicants for letters patent have been required to send in. As it was found that these abstracts were of little real use, they were stopped about a year ago. The new issue of classified abridgments will contain the inventions of the last ten years, 1867 to 1876 inclusive. Several volumes are already in preparation, but it will be some time before any of them can be published. The Patent-office sale-room has been transferred from Southampton-buildings to Cursitor-street, and considerably increased facilities have been given for the purchase of the official publications. In connection with this alteration, the arrangements for storing the specifications, &c., have been revised, and a new system adopted which enables any required specification to be found with less delay than formerly.

—*Journal of the Society of Arts.*

A CAXTON MEMORIAL.

(See page 280.)

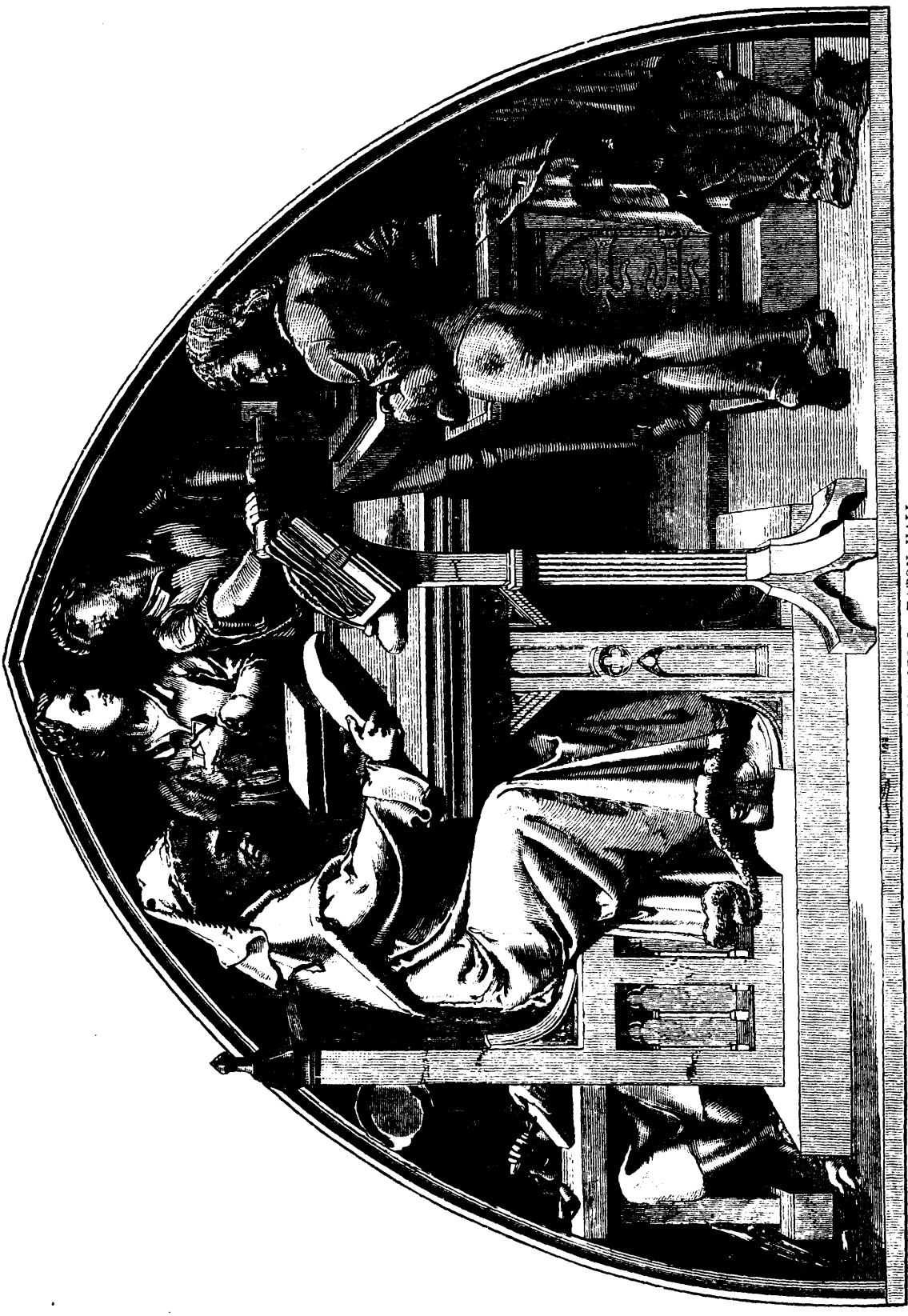
The accompanying engraving represents Caxton s tting at his printing-press, Westminster, in the act of printing "The Game and Playe of the Chesse," an illustrated book published in 1474, with solid type blocks. The details are taken from a cut in Wynkyn de Worde's work. This engraving is from a panel of sculpture executed by Messrs. Farmer & Brindley for his Grace the Duke of Westminster, for the door-head of the new library at Eaton Hall, now being executed from the designs of Mr. Alfred Waterhouse.—*The Builder.*

CURIOUS CARNIVOROUS PLANTS.

(See page 281)

The *arum Dracunculus* is one of the most curious of that wonderful series of carnivorous plants which at the present time are engaging the closest scrutiny of naturalists. It is a true trap in one sense—inasmuch as it captures the victim which ventures near it; but it relies on little or no mechanical means for securing its prey, but stupefies the living insect by its odor. The flower is horn-shaped, about 11 inches in length, with an opening some 5 inches in diameter. The color within is a dull dark violet, while the interior of the spathe is lined with black, hooked bristles, the whole appearance of the flower being thoroughly repulsive. The illustrations herewith presented, Figs. 1 and 2, represent it at one-third its natural size, Fig. 2 showing a section of the flower. It is not certain what attracts the insects, which are usually of the species known as the meat fly and the common house fly. They do not seem to seek for the small quantity of nectar concealed, and yet they cluster about the fatal opening, as if drawn by some overpowering fascination. Overcome by lethargy, they fall inert upon the flower, are lightly held by the bristles, and finally die asphyxiated by the carbonic acid which the plant disengages in large quantities during its inflorescence. Strange as is the action of the *arum*, the method whereby the *mentzelia* takes its prey is even more wonderful. To illustrate on a magnificent scale, let the reader imagine a surface thickly covered with strong iron posts, on the sides of which are numerous keen barbs pointing downward. Then between these posts, suppose that jars overflowing with honey are placed. An elephant, let it be imagined, attracted by the profusion of sweetness, inserts his trunk between the posts and finds easy access to the honey. But while he can force his proboscis downward past the barbs turned in that direction, when he attempts to withdraw it he finds the keen points catch in the flesh, and render it impossible to do so. A terrible struggle follows, the unfortunate animal twisting and writhing in every direction, until finally by an Herculean effort the head is torn from the body, and the latter becomes digested by some potent gastric juice, exuding from the colossal organism of which the trap forms but a portion. Of course this is vastly exaggerated, and it would puzzle an elephant to pull his own head off; but if for the post-studded trap, we substitute the surface of a flower, and if we replace the elephant by a fly, we shall have conceived an accurate picture of what takes place in the peculiar receptacle with which Nature has provided the *Mentzelia ornata.* This is very beautifully shown in No. 3, and at A in the same figure is represented barbed bristles grasping the highly-magnified proboscis of the fly. Between the barbed bristles are mushroom-shaped projections, from the summit of which viscous nectar exudes. This is the honey bait which induces the insect to insert his trunk between the fatal barbs. There is still another plant, *physeanthus albens*, which captures butterflies by grasping the proboscis. The construction of the flower is quite complicated, so that insects are compelled to insert their trunks through a narrow winding passage in order to reach the nectar. The organ thus necessarily comes in contact with the adhesive substance, which prevents its removal.

The *Grinovia scandens*, Fig. 4, is another trap, which catches no flies nor possesses any such wonderfully adapted devices as the plants already described. It simply has its branches covered with double barbed bristles of great strength, which attach themselves to anything brought in contact with them. The bristles are strong enough to hold lizards, as represented by our engraving, the points inserting themselves in the instertices of the scaly covering of the reptile. Of course, the lizard thus held starves to death, and small birds follow a like fate.—*From La Nature.*



A CAXTON MEMORIAL: EATON HALL.

CURIOUS CARNIVOROUS PLANTS.

FIGS. 1 & 2. ARUM DRACUNCULAS.

FIG. 3. MENTZELIA.

FIG. 4. GRONOVIA SCANDEUS.

THE 17-YEAR LOCUST.

(See page 284.)

The name Locust, being used for the Western scourge and the Eastern Visitors, has led many to suppose that the insect was in both cases the same. Not only are the two insects so unlike as to be placed in distinct sub-orders, but they are strikingly different in their habits. The Western Locust so closely resembles one of our common grass-hoppers, as to require close observation to distinguish them.

The genus *Cicada* is well known to most of our readers in the common harvest-fly, also called Dog-day Cicada and Jar-bug, (*C. canicularis*), a remarkably square-headed insect, about an inch and a half long, which makes its appearance over a wide extent of country near the end of July, and by its shrill note, said to be audible for a mile, announces that the dog-days are at hand. As an account of the 17-year Cicada or Locust, as it is commonly called, will serve to answer numerous questions, and relieve some apprehensions, we give a brief outline of its habits, referring those who would know more about it to Harris' Insects, and to Riley's "First Report on the Insects of Missouri," (1869.) We reproduce here some engravings, made to illustrate an article published in 1866, in which year the insects made their appearance in Western Pennsylvania. The eggs are laid by the parent insect, in grooves in the twigs of trees, as shown in figure 1; they hatch in about six weeks from the time they are deposited, the young larva is about one-eighth of an inch long, white, with long feelers, and six legs, the first pair of which are remarkably large, shaped somewhat like lobster-claws, and well calculated for digging. Soon after it is hatched, the young insect drops to the ground, and at once burrows into the earth; here they live upon the roots of plants, it is supposed they employ their beaks in sucking the juices of the roots; but little is positively known about their manner of feeding. The insect continues this underground life, subsisting upon roots, increasing in size, and occasionally casting its skin, for 17 years. When the time comes for it to end this subterranean existence, it works towards the daylight, making a cylindrical channel five-eighths of an inch in diameter, with cemented sides, which reaches to the surface. The grubs, or more properly, pupæ, remains near the surface for several days, and at a favourable time they crawl out, always in the night. In this condition they are soft, whitish, and bear but little resemblance to the perfect insect; they crawl part way up the trunks of trees, or to some other place, and firmly fasten themselves by their claws. After a while the skin bursts along the back, and the perfect Cicada gradually works its way out, leaving the shell in a perfect state, save the rent in the back, (fig. 2), where it was made fast; it is semi-transparent, and has somewhat the appearance of parchment. When the insect leaves the skin, it is at first very soft and limp, with no conspicuous wings; in a few hours a great change takes place, its body dries and hardens, its wings unfold and take their proper shape, and it appears as in figure 3; it is soon able to fly off in search of a mate, and to add its note to the orchestra already in full blast. The sound is not produced by the mouth, but by a curiously constructed drum, found only in the males; a tightly stretched membrane, made to vibrate by the muscles of the insect, produces the note. When the insects are numerous, their combined drumming sounds like a threshing machine in operation. The 17-year Cicada is distinguished from the common Harvest-fly, by its much narrower head and body, and especially by its red eyes, and the orange-red colour of the edge and larger veins of the wings. Near the tips of the wings there is a darkish line, somewhat like the letter **W**, which, to the superstitious, has long stood for "war," though, as there are two of them, some one has suggested that "warm weather" is the more appropriate interpretation of these "signs and omens." After pairing, the females deposit their eggs. They are provided with powerful piercers, with which they make grooves in the small branches or twigs of trees, in which the eggs are deposited in two rows, in clusters containing 15 or 20 eggs each. Each female lays 400 to 500 eggs, after which she dies. The chief damage done by the insect, is in mutilating the twigs of fruit trees in depositing the eggs; though provided with a beak, it is not known that the perfect insects feed to any extent, and they are unable to eat the foliage. They are much more frequent upon forest trees than in orchards, but when they come upon fruit trees, there seems to be no remedy. The only thing to be done is to cut and destroy the twigs containing the eggs, to prevent the larvæ from entering the ground in that locality. The insects do not appear the same year all over the country, there being a great number of different broods, each appearing at intervals of 17 years, and there is scarcely a year but what they are present in some parts of the country. Mr. Riley, in the report above referred to, gives the statistics of 22 different broods, some of which, mostly confined to the Southern States, complete their career in a shorter time, and appear every 13 years. The present brood is found on both sides of the Hudson River, in a part of Connecticut, in Northern New Jersey, and in parts of Pennsylvania, Indiana, Michigan, North Carolina, Virginia, and Maryland. Its appearance at intervals of 17 years has been recorded ever since 1724. Next year a brood is due in Central Illinois, Southern Iowa, and Northern Missouri.

THE SURINAM TOAD.

(See page 284.)

The history of our common toad is a strange one; the eggs are laid in the water, and hatch out, not as toads, but as tadpoles, or "pollywogs," as boys often call them. In the early part of their life, they live in the water, just like a fish; at length the tadpoles get legs, lose their tails, and come out as regular toads. Frogs do the same, and it is difficult to tell a frog tadpole from one that will turn out to be a toad. All this is strange enough, but there is a toad in Surinam that manages in a different, and still more singular manner. After the eggs are laid in the water—and most of you have seen the eggs of our toads and frogs, which the boys call "frog's-spittle," in which the eggs are all surrounded by a clear, jelly-like substance—the male-toad heaps the eggs on the back of the female, where they are vivified under the skin in little cells, or cysts, as shown in the illustration, and these remain until they are able to leave the maternal cradle and take care of themselves.

ANDERSON'S EQUILIBRIO COUCH.

(See page 285.)

This couch is designed for use in passenger ships, to counteract the rolling motion, and so provide for its occupant a means of exemption from the principal cause of sea-sickness. Its dimensions are similar in all respects to those of an ordinary couch. Any number may be placed together, end to end, when they will act in unison, and occupy very little more space than is required for ordinary couches.

The couch is provided with two pairs of flanged wheels, with india-rubber tires running upon concave rails attached to any suitable frame, and forming arcs of a circle, of which the length of the couch may be the radius, and consisting of as many degrees on either side of the centre as it is desired to counteract; it is thus caused to maintain its own level by the influence of gravity, and when placed transversely across the ship, remains horizontal while the latter is rolling.

The extent to which the motion of the ship may be thus neutralized, is only limited by the length given to the concave rails, a very slight extension of which—in the ratio of about an inch to a degree—will considerably increase the counteracting action. The rails in our illustration do not exceed the length of the couch itself, but the couch will nevertheless counteract 15 deg. of rolling each way, or 30 deg. in all, and will therefore allow of its free action in either direction while the ship may be rolling to that extent. The india-rubber tires on the wheels render the motion and checking of the couch easy und noiseless.

The object of the designer is to substitute a horizontal movement for the upward and downward motion produced by the rolling of the ship, and which is the principal cause of sea-sickness. The couch is about to be tried in the Channel, and if the results of such trial are as satisfactory as is anticipated, it will prove a valuable addition to the means available for lessening the discomforts of a sea voyage. It is also susceptible of being used, with the necessary modifications of form, as sleeping births, or cots for the sick.

Mr. Anderson has several plans for application of the principle to larger structures for carrying a number of passengers, and to other purposes of a like nature. These plans comprehend a ship's cabin to counteract both the rolling and pitching motions; a structure for use in ships' saloons, to counteract either the rolling or pitching motion, or both, in which any number of persons may find a refuge from the effects of bad weather; and horse or cattle stalls for conveying valuable animals in safety across the Channel or on longer voyages. It is at all events so inexpensive that its value can be easily tested.

HOME TOPICS.

BY FAITH ROCHESTER.

These are indeed hard times. None but those upon whom the woe has fallen, can appreciate the words "out of work." The sight of it is enough to set any one who believes in "cause and effect," to thinking about the cause and the cure for misery of this kind. But a dissertation upon that theme lies outside the province of the Household columns. It has, however, occurred to me many times, that men who are out of work, are by no means justified in sitting idly about their premises, or lounging in adjacent stores and groceries, when their wives are overburdened with the cares and labors of the family. Every household needs two heads, the father and the mother, a "united head." But when a father is so situated that he is unable to contribute to the family support, he must reflect that he becomes a positive burden to the family, unless he can make himself useful to it. The class of men likely to get out of work, usually have hard-working wives, who need holidays quite as much as their husbands do. Sometimes these women not only do the family housework and washing and child-training, but also add to the family finances by sewing, washing, writing, or other means. And there are husbands of such hard-working women, who feel (or seem to feel) that it is only right and proper that they should lounge about reading the paper, playing with the children, chatting with the neighbors, while their wives have one unceasing round of household labor. The fact is, they dislike "menial" tasks, and they forget the feelings they professed as lovers, toward the women now their wives, and allow those whom they once aspired to protect and cherish, to perform for their ablebodied husbands the most "menial" services. They don't think a word about it; but they ought to think. They fall in with the ordinary drift of things, and only attempt to meet the requirements of public opinion in the locality where they dwell. I remember that, when I was teaching in Pennsylvania, Mr. Smith was laughed about because he wheeled the baby carriage when he went out walking with his wife and child, instead of allowing his wife to do that part, besides taking care of her skirts. It would have been considered quite enough for him to swing his cane beside her, prepared most chivalrously to defend her in case of attack—"sword arm free," you know. Like the savages, who cannot stoop to "menial" offices, because they must keep always alert and vigorous for the chase, some of these noble men and brethren must be saved from all the distracting cares and petty concerns of the family, that their superior powers may be in readiness for doing big things when the time for doing big things arrives.

I believe in a division of labor; and I do not subscribe to a rather common notion among some reformers, that husbands and wives would always be happier if they worked side by side in the same field; and I sympathize somewhat with women who say that they shouldn't want a husband "always round under foot!" But I do say that a hard-working woman never admires her husband more, than when having no work to do in his own field, he comes cheerfully over into her field, and bends his stronger shoulders to help her bear her burdens, that she may share in his leisure.

Don't I know? Didn't I see a stalwart laddie, "rising of" forty, working in his shirt sleeves and an apron, over my kneading board, soon after sunrise yesterday? I can testify without any mental reservation, that the bread on our table to-day is of excellent quality. It is enough for one woman to get breakfast, skim and strain milk, put up the dinners for school, and dress the baby, without having also to knead bread, all before breakfast; and so it is lucky for her if the "gude mon," off work for a few days, stands ready to "lend a hand."

Men, generally, have no idea how much they can do to help, if they set about it. They have an uneasy feeling sometimes, that they ought to take hold somewhere, but they don't know how to begin. I said to a man with no particular work to do, who sorrowfully told me of his wife's ill-health and hard work, "Of course you help her do the washing."—"Oh yes!" he answered, "I bring in the wood, and get all the water for her."—And it never occurred to him that Justice could ask more of him, that noble creature, a man! He to bend over the wash-tub, applying his superior mind to the discovery of grease spots, and his manly strength to the rectification of soiled garments? No doubt the kind-hearted fellow did sometimes go farther, and graciously dandle his own babe on his knee, when it was sufficiently amiable to please him, in the idea that by thus tending a baby, he was helping his wife. He, the strong, thus choosing the easier work, in order to give her, the weak, a chance to do the harder task unhindered. This sort of thing is extremely common in families, and women who are of the angelic type, never feel themselves defrauded of their rights, but continue to smile as the law directs. Others "fret inwardly," or take refuge in sarcasms. Frankness is better.

Say to this reasonable but thoughtless husband of yours, something like this: "Now, just look at it, you and I are the heads of this family. I certainly am no more responsible than you are for the number of mouths to feed and bodies to be clothed, or for the daily and yearly round of work that must be done here. I am willing to work as hard as you do for the prosperity of the family, but I think it altogether fair that you should work as hard as I do. Now, while you can not work at your proper business (and sometimes this sort of thing goes on for weeks and months at a time), or get any paying work to do, suppose we make a division of labor right here in the family. You can do all the sweepings, you can knead the bread,"—and so on, consulting his tastes and the amount of "faculty" or "knack" which he is likely to bring into the partnership. If your sleep is broken by care of children, and if your nerves are overstrained by constant and conflicting cares and anxieties, your husband ought to know it, and give sympathy if he can not give help, but it is a pity if you have to tell him the facts and beg for aid.

While I write, I remember that there are selfish wives, who would shirk all care and toil, preferring to live like the lilies of the field, whatever burdens may fall upon their husbands, and I wish to give no countenance to such. I do not like to think of marriage as a "partnership," but it should not fall behind a business union in the essentials of justice.

BREAD MAKING.

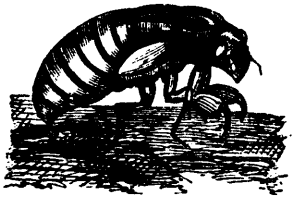
For a long time nothing has been said in the Household columns upon this all-important subject. Yet recruits are all the time coming forward, who wish to be told minutely just how to make bread, what yeast to use, how, and when, and where to set the "sponge," or

THE SLOTH, OR AI.

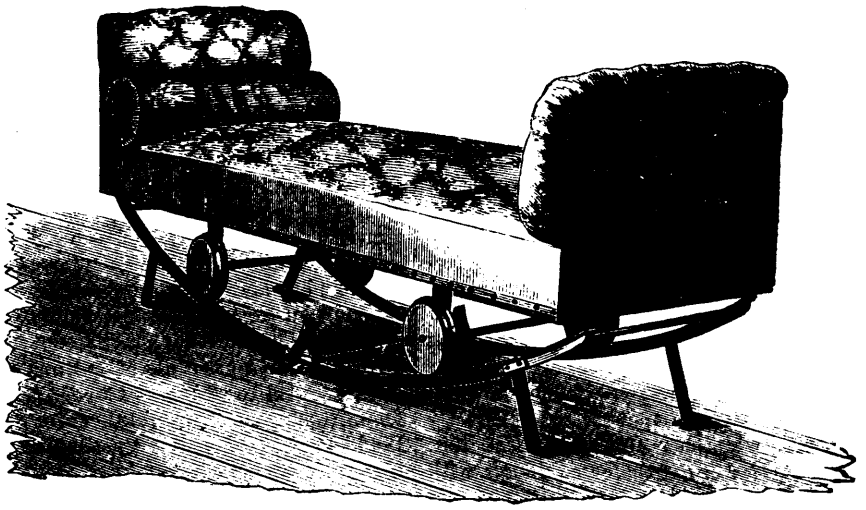
THE SURINAM FROG.

Fig. 1.

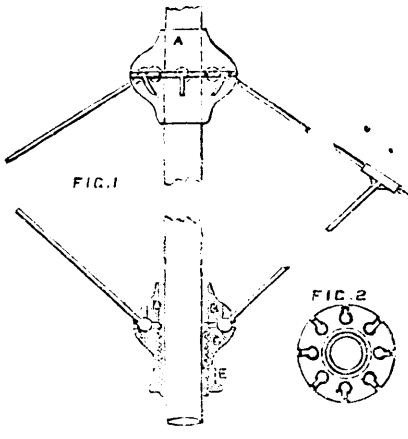
THE 17-YEAR LOCUST, OR CICADA.



THE EMPTY PUPA CASE.



ANDERSON'S EQUILIBRIO COUCH.



IMPROVEMENTS IN UMBRELLAS.

FIG. 1. ELEVATION.

DESIGN FOR A SUBURBAN RESIDENCE.

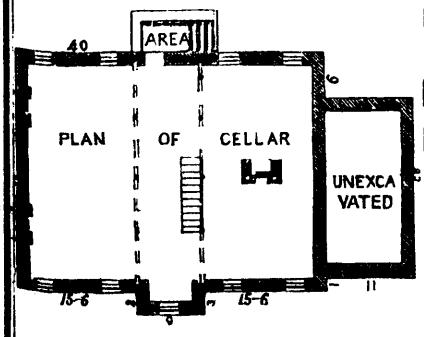


FIG. 2. PLAN OF CELLAR.

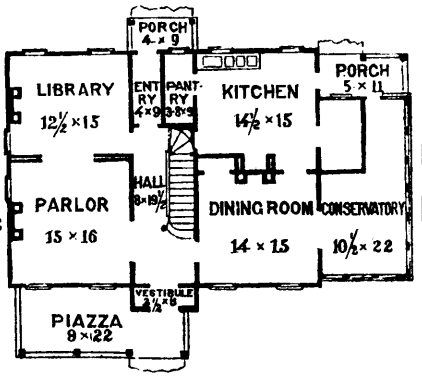


FIG. 3. PLAN OF FIRST FLOOR.

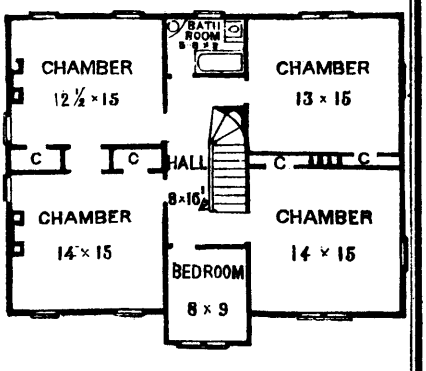


FIG. 4. PLAN OF SECOND FLOOR.

bread batter, for its first rising, when, and how long to knead the dough, when, and how to make and bake the loaves.

It seems to the uninitiated a very formidable undertaking, requiring peculiar judgment and discretion; yet it cannot be very difficult to learn, else how does it happen that this little girl near me, just past her eighth birth-day, has made ten or a dozen goodly batches of bread within a half year, and never a sour, or heavy, or tough loaf in all that she has made. The manipulation was all her own, but mother's "judgment" was always at hand and freely used. The first sponge was set in a pint basin, but every one since has been sufficient for at least three common bread-tin loaves. No Kindergartening at our house has proved more entertaining, and perhaps none more profitable than bread-making. At least one boy has learned the art as a pastime, and whatever may be his future lot, need never starve for good, light bread, when proper materials can be obtained. It is really help, too, for a mother, when her children, with clean hands and cheerful hearts, work at the bread dough, with a wholesome ambition to produce the sweetest and lightest, and finest possible loaves of bread.

There are many ways of making good yeast bread. The very best, in my opinion, is mixed with fresh, sweet milk. Many consider sweet skimmed milk with a little butter melted in it, just about as good, but if you add the butter, there is no economy in substituting skimmed milk for fresh. The far-famed Parker House bread is made, I am told, of simply yeast, flour, and water, and I am very certain that delicious bread, sweet, light, and tender, can be made from these three things alone, when they are of good quality, and carefully and skilfully used. This care and skill any well-disposed child can learn, so no housekeeper must consider it beyond her attainments.

Many good recipes for yeast are given in books and papers, and every neighborhood has house-keepers who make excellent yeast. I always use, of late, some form of dry yeast, such as my grocery store will furnish. It costs no more than home-made yeast, and saves a deal of care in either hot or freezing weather, requiring only a dry place for storage. It is quite as good as jug yeast.

It is usually most convenient to begin the bread-making, or "set the sponge," at night, and so get the baking done early the next day, but it can all be done in the same day, if desired, by beginning before breakfast. This brings the baking late in the day, and most of us do not like it. At night, or in the evening, we make a soft batter of warm water and flour and yeast, the quantity of each depending upon the number of loaves desired. The proportions are generally the same, though no precise rule can be given, as flour and yeast differ in their properties.

Miss Beecher says that it takes about a quart of flour to make each loaf, and for four loaves a quart of wetting. But loaves vary in size. For a baking of this size, you need about three-fourths of a cake of good dry yeast in summer, in winter a whole cake. This yeast must be soaked in warm water half an hour or less before using. The yeast will not work if scalded. A gill of lively, soft, or baker's yeast, answers for the same sized baking. Take a portion of your flour (say two quarts), and (if you do as I do) pour half of your wetting into it boiling hot, only scalding about half of the flour you use in the sponge. Use the other half of the wetting luke warm, and see that the batter is below the scalding point when you add the yeast. In summer you may make the sponge at a lower temperature than in winter, but should never be cold. Make it of such thickness that it will not separate or become watery over the top, but thin enough to stir and pour easily. Set in a warm place, covered loosely—wrapped up warm in winter.

In a warm kitchen this sponge rises in from three to five hours; if the materials are good, it seldom sours during the night, but must be looked after very early, and if light, must be kneaded without delay. Some housekeepers stir dissolved soda into it, always at this point, whether it is sour or not, but this is sheer folly. If the flour and yeast are good, it is very seldom that a good housekeeper has occasion to put any soda into her bread. If the bread smells sour (not simply yeasty), or tastes sour, put in dissolved soda in the proportion of a teaspoonful to a quart of wetting used in the sponge. Dissolve the soda in warm water or sweet milk (and I add to it two heaping teaspoonfuls of sugar), and stir it into the sponge before kneading. Stir in flour until your batter is too stiff for your strong spoon, then begin to work with your hands, keeping flour between your hands and the soft dough, and always between the dough and board. As soon as the bread is stiff enough to knead without sticking, cease to work in flour, but knead with as little flour as possible upon the board, and work it hard with the hands for at least half an hour. The "Parker House" baker says he kneads two hours, but of course he makes larger "patches." Put the dough back into the pan or tray, and keep it warm.

The dough now rise until it doubles in size. It must rise enough, or it will not be light and elastic in texture. It must not rise too much, or it will lose the natural sweetness of the wheat, and about all that one can say here is "cultivate judgment." If, at this stage, the bread turns sour in any degree, it is still possible to neutralize the acidity by the use of soda, and this is the best way to do it: mix soda and dry flour together, and knead them into your loaves very thoroughly. The dough requires a very thorough kneading, without more flour, when made into loaves, in order to secure a uniform texture. If you plan four loaves, you may knead half of it for a few minutes, then work the other half as long, and then divide into separate loaves, and knead each one well before putting it into the well-buttered tins. If the dough is sour, half a teaspoonful of soda for each loaf should be mixed with a little flour and kneaded in. Though the bread may be nice, I never feel that I have been very successful when I have had to use soda. The loaves should be set in a warm place, and allowed to rise light, or double in size, before they go into the oven—not too light, as they are pretty sure to rise a little more after they go into the oven, unless the oven is too hot for bread. Prick the loaves on the top with a fork or knife, when light, before baking, to prevent a loose upper crust. Bake steadily for an hour or a little longer, according to the size of the loaves.

REPAIRING BED COMFORTERS.

Complaint is made of our "heavy" cotton comforters. Wherefore "heavy"? They are not so when new, but the cotton becomes packed by pressure, and especially by washing. Comforters, which are used as coverings in winter, should not be used as mattresses over straw-

beds in summer. This, of course, makes them hard and heavy. Before putting them away for the summer, they need some cleansing, but, unless the covering is really soiled, the sunshine and fresh air will freshen and sweeten them properly. Hang them out the whole of at least one sunny day, then put them away, not packing them too closely. If they must be washed, untack them and wash only the covering, laying the cotton out in the hot sunshine for a day or more, then tacking the whole together as before.

OLD BED QUILTS.

These must be washed when much soiled, and a washing machine and wringer seem almost indispensable. Plenty of suds should be used, and a thorough rinsing be given. If they happen to hang through a good pouring rain, it will do no harm. They can be patched up, when very badly worn out, more easily than some imagine. If placed in large blocks, they can be patched with dark or light, according to the shade of the worn portions, so as to look almost as good as new. Of course they need not be ironed.

TO WASH BLANKETS NICELY.

I have seen various directions for this work, but a few things seem essential in every case: to avoid hard water and resinous soaps, to wring without twisting (i.e., with a wringer), or not to wring at all, to use water of the same temperature all through, or to increase in heat during the changes, not to rub the soap upon the flannel, but mix it with the water. Flannel is of so porous texture, that it is cleansed in good suds without much rubbing. Hard rubbing tends to "full" the cloth, and to rinse in cold water flannel that has been washed in warm water, is a sure way to shrink and harden it. From cold to warm, but never from warm to cold. I have seen the direction to rinse flannels in soapy water, but I am sure there is no value in this. The clean, warm rinsing water is sure to be soapy enough, if good suds have been used in the washing. One suds or two may be used, according to the degree to which the flannels have been soiled. When they have been rinsed, twoshould take them, one at each end, and shake and snap them well, to make them more soft and fuzzy.

An American paper writes:—"We learn from an East Indian exchange that one of the railways of that somewhat sultry climate is being supplied with "punkahs." This article, which we are told "is not only necessary for the comfort of passengers, but, one may say, for their safety, during a long journey in the scorching heat of an Indian summer," is thus described: The punkah is attached to an iron rod which extends from one end of the carriage to the other. This rod, worked by a coolie who sits outside the carriage, is caused to make rapid semi-revolutions, thus causing the punkah to move, not only quickly but noiselessly, and to produce a strong breeze. For the coolie a small platform is provided at the end of the train, protected by a canvass awning. The idea of a colored gentleman sitting outside of a railway car and moving back and forth an iron rod to which a big fan in each car is attached is a novelty in India, as well as elsewhere, this being its first introduction. It occurs to us, however, that a Yankee would doubtless have invented a plan to utilise the revolutions of the wheel, or axles so as to cause the fan to move automatically, thus dispensing with sweltering the coolie. If the close English compartment cars are used on these roads in summer, it would also be in order to suggest that the abolition of the smothering partition between the seats, and the adoption of the American plan of cars, open from end to end, would render the punkah less a necessity and the traveller's life less of a burden."

IMPROVEMENTS IN UMBRELLAS.

(See page 285.)

The present method of attaching the ribs of umbrellas by means of a wire to the notch-ring at the top is, as most people are aware, not the best means that a mechanic would suggest, for when placed on one side after a shower of rain, the water finds its way to this vital part of an umbrella's frame, and speedily rusts the eyes of the ribs, which accordingly soon break, especially when any strain is brought on them, through twisting. Mr. W. Martin, of Friday-street, has recently obtained letters patent for a method of adapting the principle of the ball and socket joint to umbrellas, which will be clearly understood on referring to the illustration.

Instead of the top notched ring now used firmly fixed to the stick of the umbrella, parasol, or sunshade, is an annular ring of metal, round the outside of which are as many receptacles, cups, or sockets as there are ribs; to the end of each rib and stretcher is a ball made so as to fit in the receptacles or sockets. The top ring is made in two pieces, and when the balls at the ends of the stretchers are inserted into the cups or sockets, the two parts are joined together, the balls or ends of the stretchers having free play in the receptacles by means of slots cut in the lower piece or portion of the ring. The lower ring is somewhat differently constructed, being made in two pieces, the upper piece firmly secured to the runner, while the other part is screwed in its place and held there by a screw collar, so as to hold the balls on the ends of the ribs in place; thus the ends of the stretchers or ribs are firmly secured in position without the aid of wire or other fastenings. Another part of the invention consists in a novel mode of joining the ribs to the stretchers. The end of the rib is made **T**-shape, and on the stretcher at the point of junction is brazed or cast a small piece of metal, just sufficient to make a double flange, into which the **T**-piece is inserted, and pinched or pressed together, thus making a strong and secure fastening. Fig. 1 represents an elevation partly in section, and Fig. 2 a plan of the lower ring. A is the upper ring; B, the upper part of lower ring; D, the lower part of this ring; C is the runner on which B is fixed; it is screwed at the lower end to receive D and a screwed collar E; the **T**-joint is shown at F.

HOW TO SUCCEED.

If your seat is hard to sit upon, stand up. If a rock rises up before you, roll it away or climb over it. If you want money, earn it. It takes longer to skin an elephant than a mouse, but the skin is worth someting. If you want confidence, prove yourself worthy of it. Do not be content with doing what another has done—surpass it. Deserve success and it will come. The boy was not born a man. The sun does not rise like a rocket, or go down like a bullet fired from a gun; slowly and surely it makes its round and never tires. It is as easy to be a leader as a wheel-horse. If the job be long the pay will be greater; if the task be hard the more competent you must be to do it. Follow these instructions, and all will be well.

GIVE THEM A LIFT.

If you know of a poor fellow in distress, give him a lift. "Don't kneel in prayer, nor moralize with his despair; the man is down, and his geeat need is ready help—not prayer nor creed. 'Tis time when the wounds are washed and healed that the Christly motives be revealed; but now, whatever the spirit may be, mere words are but mockery. One grain of aid just now is more to him than tones of saintly lore. Pray, if you will, in your full heart; but give him a lift—give him a start. The world is full of good advice, of prayer, and praise, and preaching nice; but the generous souls who aid mankind are scarce as gold and hard to find. Give like a man, and speak in deeds; a noble life is the best of creeds; and he shall wear a royal crown, who helps a man when he is down."

Fried Cucumbers.—Cucumbers that are too large to use in the ordinary way, even when they begin to turn yellow, may be sliced, and treated in the same way as egg plant. Slice the fruit crosswise, about half an inch thick, peel and stack up; put a plate with flat-iron on top, or lay the slices in strong salt and water to remove a slight bitterness. At the end of two hours dry the slices on a cloth, and dip in a thin batter of egg and flour, and fry to a light brown, or instead of the batter, dip first in beaten eggs and then in cracker powder. Serve hot.

THE CIVET.

THE CIVET—(*Viverra Civetta.*)

The locality of this animal is in the north of Africa. The length of the elongated body is from two to three feet; the tail is about half as long as the body; the height, from ten inches to a foot. The hair of the body is long, brownish grey, with numerous interrupted transverse black bands, or spots of the same colour. The hairs on the ridge or middle of the back, from between the shoulders, are longer, and can be raised or depressed, at the pleasure of the animal. The legs and the greater part of the tail are black; the upper lip and sides of the neck are almost white. Each of the eyes is surrounded by a black patch. Two or three black bands pass from the base of the ears, obliquely, towards the shoulder and neck, which last has a broad black patch.

The civet is very voracious. One that Barbot had at Guadaloupe was, from the carelessness of the servant, kept without food for a whole day; on the following morning the animal gnawed its way through the cage in which it was confined, came into the room where M. Barbot was writing, and staring about with sparkling eyes for a few seconds, made a leap of five or six feet at an American parrot that was perched on a piece of wood inserted in the wall for the purpose. Before his master could run to the relief of the bird, the civet had torn off its head, and begun to feast on his prey.

The Dutch used to keep numbers of civets alive at Amsterdam, for the purpose of collecting the perfume when secreted. When a sufficient time had been allowed for the process, the animal was put into a long wooden cage, so narrow that it could not turn itself round. The cage being opened by a door behind, a small spatula, or spoon, was introduced through the orifice of the pouch, which was carefully scraped, and its contents put into a vessel. This operation was performed twice or thrice a week; and the animal was said to produce most civet when irritated. The quantity depended chiefly on the quality of the nourishment it took, and the appetite with which it ate. In confinement its favourite food was boiled meat, eggs, birds, and small animals, and particularly fish.

Civet, as a perfume, was formerly in high repute in Europe. Massinger makes one of his characters say—

> Lady, I would descend to kiss thy hand,
> But that 'tis gloved, and civet makes me sick.

Cowper, in whose time not only ladies but gentlemen were highly scented, avows a similar feeling:—

> I cannot talk with civet in the room.
> A fine-puss gentleman, that's all perfume,
> The sight's enough—no need to smell a beau—
> Who thrusts his nose into a raree-show?
> His odoriferous attempts to please
> Perhaps might prosper with a swarm of bees,
> But we that make no honey, though we sting
> Poets are sometimes apt to maul the thing.
> 'Tis wrong to bring into a mixed resort
> What makes some sick, and others *à la mort*,
> An argument of cogence, we may say,
> Why such a one should keep himself away

On this subject, Mr. Piesse observes: "In its pure state, civet has to nearly all persons a most disgusting odour; but when diluted to an infinitesimal portion, its perfume is agreeable," except in certain cases. "It is," he adds, "difficult to ascertain the reason why the same substance—modified only by the quantity of matter presented to the nose—should produce an opposite effect on the olfactory nerve; but such is the case with nearly all odorous bodies, especially with ottos, which, if smelled at, are far from agreeable, and, in some cases, positively nasty—such as otto of neroly, otto of thyme, otto of patchouly; but if diluted with a thousand times its volume of oil, spirit, &c., then their fragance is delightful."

MISCELLANEA.

A TOOTH of a mastodon has been dug up near the Ashley river in South Carolina. It is 11½ inches long, 6 inches in diameter and weighs more than 5 lbs.

A VIOLET ink for rubber stamps in made by mixing and dissolving aniline violet 2 to 4 drachms, alcohol 25 ounces. The solution is poured on the cushion and rubbed in with a brush.

THE TELEPHONE.—The proprietors of the speaking telephone are putting instruments into use in Providence, Rhode Island, to a limited extent, selecting a few specimen cases to insure the instrument a full test for practical purposes. Some small telephones which have been introduced are not over 5 in. in length, and they weigh less than ½ lb.; but they do all the work for practical purposes of larger instruments.

TYPHOID FEVER IN THE PRINCE OF WALES' HOUSEHOLD.—Prince Albert Victor of Wales, the heir presumptive, is now, as our readers are aware, suffering from typhoid fever,—the third of his line who has been thus afflicted within a period of sixteen years. The fever was, it is believed, contracted at Sandringham: and this is a circumstance which will, of course, require careful local sanitaty investigation. Typhoid fever being essential a preventable fever, due to causes which, by perfect sanitary arrangements, may be held at bay, it is, we believe (says the *British Medical Journal*), proposed that Dr. Seaton, the head of the medical department of the Local Government Board, shall make a searching examination of the water supply and other sanitary arrangements at Sandringham. Since the serious illness from typhoid fever of His Royal Highness the Prince of Wales, she water supply of Sandringham has been remodelled at considerable cost and trouble. It is stated, however, that at the time of the recent visit of the Prince and his family for some days to Norfolk, the works connected with the newly-arranged water supply were out of order, and recourse was had for a while to the source from whence the water was drawn prior to the Prince's purchase of the estate.