THE CANADIAN BUILDER

AND MECHANICS' MAGAZINE.

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THE PRESERVATION OF TIMBER.

Perhaps the solution of no modern engineering problem has been more eagerly sought than a cheap, reliable and universally applicable method of preserving timber. Although methods have been devised which approximately fulfil these conditions there has yet been nothing attained that is suitable for universal adoption in architecture and in other branches of the arts.

It would appear at first sight an easy matter to preserve wood from decay, when it is remembered that the chief causes of decomposition, at least the chief immediate causes, are changes in its hygrometric condition.—Rapid successions of dampness and dryness will speedily destroy most species of timber. There are a few species which are naturally protected by essential oils contained in their texture, but such woods are too rare and valuable for general use.

The physical characters of different kinds of timber afford the clue to the difficulties in solving this problem. Wood is a porous material of great absorbent power upon nearly all kinds of liquids. Many kinds will absorb their own weight of water under favorable circumstances, and part with a large portion of it again when exposed to warm currents of air. To preserve such woods from decay implies the stoppage of the pores, by filling them with some impervious substance, or the saturation of the timber with some antiseptic material.

No process based upon either of these principles has as yet been discovered not attended with some drawbacks. Either the process is expensive, or the texture and grain of the wood suffer change, or its natural beauty is marred so as to render it unfit for ornamental work. The latter consideration may be left out of the account when wood is to be applied to the coarser purposes of engineering, as piles, railroad ties, pavements, &c., but the item of expense tells more heavily in these cases than in ornamental work, where the cost of the material is a small item in the cost of the structure.

But natural decay is not the only destructive agent against which it is desirable to provide. One of the greatest objections to wood for building purposes is its liability to destruction by fire. Many processes have been devised to remedy this evil, and altho' a recent Italian process has been favorably spoken of as being free from the objections pertaining to processes of earlier date, it is quite probable that further news respecting it may not be so favorable.

So far as we are aware, no process has ever been discovered that could be very cheaply applied to the preservation of wood from decay, and also from fire, and which at the same time could be relied upon as certain, The most simple and the cheapest method adopted has been that of the application of fire-proof paints; but paints are liable to crack upon exposure, and from the natural shrinking and springing of timber, and thus give access to moisture. This method has been only partially successful.

It is impossible to give here anything like a detailed notice of the various wood preserving processes. A whole class of them is included in the impregnation method, in which different chemicals possessing antiseptic qualities have been forced by pressure or absorption into the pores of the wood. Sulphate of zinc, sulphate of copper, corrosive sublimate, creosote, carbolic acid, coal tar, &c., have been employed, the three last with the best results yet obtained, so far as preserving from natural decay is concerned. None of these processes have been without failures in some instances, So far as these failures relate to the creosoting of wood, they are doubtless due to the imperfections in the method of performing the work.—Sulphate of copper has also been used quite successfully but is expensive. The use of coal tar products is the cheapest method yet devised, but it is obviously unadapted to use where a finish is to be given to wood. The smell of timber thus preserved is also an objection to the process. We see then that anything like a perfect process for preserving timber under exposure to high temperature and variations in hygrometric condition is yet to be devised. It may be that it is impossible to invent any method that shall cover all the conditions of the problem.—The rich reward, however, which most certainly awaits the fortunate discoverer of such a method, ought to stimulate experiments in this field, and give the world something far ahead of anything yet proposed.—Scientific American.

WORKMEN AND THEIR TOOLS.—A good test of a good workman—one of the best apart from his workmanship—is his care of tools. If he leaves a worn out or dilapidated tool in its imperfect state until he gets time to put it into shape, he lacks in the organ of order, which should be the shop's first law. But if he repairs the tool as soon as it is injured, whether wanted for use at the time or not, he can be depended upon. A carpenter may be known by his chips; but a workman at any business may be known by the state of his tools.

☞ Over ninety per cent. of the rays issuing from most kinds of artificial lights are, according to the German chemist Landsberg, calorific or heat rays, and as such non-luminous. Sunlight has only fifty per cent. of heat rays. He attributes the painful effect of artificial light upon the eyes to this large amount of heat rays. By passing artificial light through alum or mica, the heat rays are intercepted, and the light is rendered much more pleasant and less injurious.

SUCCESSFUL ENGINEERS AND INVENTORS.

GEORGE STEPHENSON.

George Stephenson began life as a pit-engine boy, receiving for his wages twopence a day. From some cause or other, the engine he had to mind was out of repair, and without seeking instruction from any one, he applied himself with complete success to put it in working order. The ingenuity he displayed on this occasion secured his early promotion to the post of engine man, and his wages were advanced to twelve shillings per week. So elated was he by this change of position that he declared to a companion that he was now made "a man for life." The use of waggon-ways for conveying coals from the place of excavation along the galleries to the shaft, familiarized him with the notion of railroads, and by affording opportunities for the exercise of his talents in repairing and improving them, gradually fitted him for the great undertakings in which he was thereafter to engage. The following extracts from a speech which he delivered many years afterwards, will give the clearest view of the difficulties with which he had to contend in his earlier years, and the perseverance that enabled him to overcome them :—" At the coal pit I had to work early and late, often rising to my labor at one o'clock in the morning. Time rolled on, and I had the happiness to make some improvement in engine work. The first locomotive I made was at Killingworth colliery, and with Lord Ravensworth's money, I then said to my friends there was no limit to the speed of such an engine, provided the works could be made to stand. I betook myself to mend my neighbors' clocks and watches at night, and thus obtained money for educating my son. He got an appointment as overlooker and at night we worked at our engineering. I got leave to go from Killingworth to lay down a railway at Helton, and next to Darlington, and then to Liverpool to plan a line from that place to Manchester. I there pledged myself to attain a speed of ten miles an hour. I said I had no doubt it might be made to go much faster, but we had better be moderate at the beginning.—The directors said I was quite right; for if, when they went to parliament, they talked of going at a greater rate than ten miles an hour a cross would soon be put on the concern." When he gave his evidence before the parliamentary committee, some inquired whether he was a foreigner, others hinted that he was mad; but his intelligence and energy carried him through the ordeal, and the still more severe trial which the actual undertaking presented. The difficulties he had to encounter in constructing the Manchester and Liverpool railroad are well known. The most astounding achievement was the completion of a solid and enduring road over Chat Moss, a bog covering about twelve miles. The moss was of the softest and worst description, and in forming the embankment at the eastern boundary an immense mass of earth was thrown in and totally disappeared before anything like a palpable foundation for the road could be obtained. This part of the undertaking was finished in eighteen months, and the road was opened the whole distance on the 15th of September, 1830, in the presence of not fewer than half a million of spectators.—From this time to his death, in 1848, Mr. Stephenson's history is identical with that of railway extension in this country and on the continent; he became an extensive owner of collieries and iron works, and left behind him a large fortune, incomparably less valuable, however, than the inheritance of his example and his genius. In looking at such men after they have obtained celebrity we are ready to imagine that something of the supernatural assisted them in obtaining it. The early life of Brindley and Stephenson is sufficient to dispel the illusion; the only witchcraft they employed was that of close application and untiring industry. Without any idea of attaining to affluence, much less renown, they diligently improved the advantages of the present moment, always endeavored to make the best use of their faculties, and in this way realized a measure of success beyond their most sanguine dreams. Here is a lesson for the enterprising; in gazing perpetually at the object of their desires, in pondering deep laid schemes of aggrandizement they must surely miss their mark, PRESENT DUTY—a conscientious use of PRESENT MEANS—this is the ladder which Providence places at our feet, and on which we may ascend to distinction.

WELDING COPPER.

Mr. Philip Rust, Bavarian Inspector of Salt Words, writes as follows :—The great obstacle heretofore experienced in welding copper has been that the oxide formed is not fusible. Now, if any fusible compound of this oxide could be found, it would render such a weld possible. We find in mineralogy two copper salts of phosphoric acid—viz., libethenite and pseudo-malachite, each of which melts readily before the blow-pipe. It was therefore natural to suppose that a salt which contained free phosphoric acid, or which would yield the same at a red heat, would make the weld easy by removing the oxide as a fusible slag. The first trial was made with microcosmic salt (phosphate of soda and ammonia) and succeeded perfectly. As this salt was dear, it was found advisable to use a mixture of one part phosphate of soda, and two parts boracic acid, which answered the same purpose as the original compound, with the exception that the slag formed was not quite as fusible as before. This welding powder should be strewn upon the surface of the copper at a red heat; the pieces should then be heated up to a full cherry red or yellow heat, and brought immediately under the hammer, when they may be as readily welded as iron itself.—For instance, it is possible to weld together a small rod of copper which has been broken; the ends should be beveled, laid on one another, seized by a pair of tongs, and placed together wirh the latter in the fire and heated; the welding powder should then be strewn on the ends, which, after a further heating, may be welded so soundly as to bend and stretch as if they had never been broken.

Mr. Rust states that as long as 1854 he welded strips of copper plate together and drew them into a rod; he also made a chain the links of which were made with pretty thick wire and welded. It is necessary to carefully observe two things in the course of the operation: 1st. The greatest care must be taken that no charcoal or other solid carbon comes into contact with the points to be welded, as, otherwise, phosphide of copper would be formed, which would cover the surface of the copper and effectually prevent a weld. In this case it is only by careful treatment in an oxidising fire, and plentiful application of the welding powder, that the copper can again be welded. It is therefore advisable to heat the copper in a gas flame. 2nd. As copper is a much softer metal than iron, it is much softer at the required heat than the latter at its welding heat, and the parts welded cannot offer any great resistance to the blows of the hammer. They must, therefore, be so shaped as to be enabled to resist such blows as well as may be, and it is also well to use a wooden hammer, which does not exercise so great a force on account of its lightness.

NARROW GUAGE RAILWAYS.

In the last number of ENGINEERING we find a detailed description of the Broelthal Valley Railway, which has a guage of only 2 feet 7 inches. It appears that the tonnage carried on this small road in 1864 amounted to 32,700 tons, and that the undertaking was successful commercially, although not employed to one-tenth of its capacity. The line appears to be run and managed on an extremely economical basis, while the rate of freight is only one shilling and eight pence sterling per ton for the distance of 12¼ miles. In this country where large manufacturing towns and villages are situated a short distance from trunk railways, such cheap, small railways as the Broelthal should receive attention.

We would especially recommend them to the consideration of the promoters of the many wooden railway schemes now agitated. The rails weigh from 22 to 26 lbs.—The engines are tank locomotives, and weigh in working order 12¼ tons. The freight cars cost L56 to L92. The Engineering says:—

The railway connectiug the valley of Brol with that of Sieg, near Cologne, of which we propose to give some particulars, is of interest to engineers not only on account of the narrowness of its guage, which is 2 ft. 7 in., but also on account of the success with which its working has been attended. The line leaves the Cologne and Giesen railway at Hannef, and with the exception of a short length near that station, it is constructed along the line of the ordinary road, the administrative authorities have permitted a width of about 4 ft. 8 in. to be taken from the latter for the purposes of the railway.

The Broelthal valley line was originally designed exclusively for the accommodation of the mineral traffic, to the works of Friedrich-Wilhelm-hutte, but the inhabitants of the surrounding districts found it to be their interest to employ the line for the conveyance of their goods, as the cost of transportation was found to be about 60 per cent. cheaper than by the ordinary roads, and as a result the line has at the present time a considerable general goods traffic.

After having explained in detail the dimensions of the engines, cars, and other details of construction, it is remarked as follows:—

We must now say something concerning the manner in which the line is worked and its comparative results. The usual load drawn by the engines consists of 28 wagons loaded with 5 tons each, giving 140 tons of paying load. The total weight of the train is thus as follows:—

	tons.
Locomotive,	12½
Wagons	70
Load in wagons	140
	222½

It is found that the engines can easily draw 36 loaded wagons, but the above is the usual load. The speed on the level portions of the line is a little over 9 miles per hour, and in traversing those portions of the road at which there are habitations, this speed is decreased to about 5½ miles per hour.

The Festining Railway in Wales carries about 147,000 tons of freight, and passengers to the number of 135,000 annually, at a speed of 12 to 15 miles an hour on a guage of only two feet. From these data it will be seen thal there is a wide field in the choice of guage, in accordance with the cost and ends to be obtained.

GALVANIZED IRON WATER PIPES.

In the opinion of some the use of galvanized iron for water pipes, conveying water for drinking and culinary purposes, is injurious. Others take opposite ground in regard to this matter, and express themselves strongly in favor of such pipes. Our opinion upon the question has been asked by parties interested.

The use of zinc as a coating for the surface of iron pipes is not merely mechanical. Being more readily oxidizable than iron it produces an electric state in the latter metal which protects parts not covered perfectly as well as other portions of the pipe. The oxide which forms upon zinc is insoluble in pure water. Acids dissolve it readily and when hydrated, as is the case in water pipes, solutions of the caustic fixed alkalies and solutions of ammonia will dissolve it.

Whether the oxide which forms upon the surface of galvanized iron pipes will be dissolved, depends therefore entirely upon the character of the water flowing through them. Rain water contains more or less ammonia when first precipitated. The oxide upon a galvanized iron roof would of course be dissolved to a certain extent during a rain storm, a fact that has been noticed not only in connection with this material but with a roof of sheet zinc.

It is probably rare that water does not contain traces of free ammonia or salts, the acid of which has a greater affinity for the oxide of zinc than the base with which it is combined. In such cases we should expect to detect traces of the zinc in water which has remained for any length of time in the pipes.

There are waters, doubtless, which could be passed through such pipes without the slightest danger of being charged with the poisonous oxide, and before their adoption an examination and analysis of the water should be made.

But while we have no doubt that in many cases it would not be proper to employ galvanized iron pipes, we do not think that in a large majority of cases the possible evils which attend their use would be likely to prove serious. A great deal of exaggeration is to be expected upon the part of those who deal in pipes or other materials, and whose interest it is to excite the fears of the publie in regard to any wares that damage their particular trade. People are too apt to become excited by newspaper statements upon such subjects as these, and alarm themselves needlessly. If the fact exists that water flowing through galvanized iron pipes is impregnated with zinc, a simple chemical test by a competent person will readily determine it.

All metallic pipes in use are open to some objections. Much has been said upon the danger of using lead pipes, but the injury that has resulted from their use has undoubtedly been over estimated. Lead poisoning is by far more subtle than zinc poisoning, and as its effects may follow without premonitory symptoms of sufficient extent to excite suspicion, we think them fully as dangerous as galvanized iron pipes under most circumstances.

A material for water pipes, cheap, durable, and capable of resisting the chemical action of all waters fit for household use is a long sought for desideratum. Until it is found we must do the best we can with such materials as we possess. Glass has been proposed and used to a considerable extent, but there are practical difficulties which will probably prevent its ever being generally adopted.

The matter may be summed up by saying that the circumstances of any particular case can only determine whether galvanized iron pipes are safe or otherwise. For most cases we think their use admissable.—Scientific American.

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THOMAS W. DYAS, A., P. L. S., EDITOR.

LONDON, ONT., MAY 1, 1869.

THE Rev. Mr. Punshon, in one of his letters to England, made some remarks on the difference of appearance between Canadian and American cities, which comparison did not altogether redound to the credit of the former. A number of our extra zealous and patriotic Canadians, who can see nothing wrong in anything in their country, immediately sprang to the rescue, and filled the papers with replies to Mr. Punshon's letter, and by their quantity of words completely swamped out the slight impression caused by it. The burthen of the cry was —not that the Canadian city is as beautiful or neat as the American city, this they say is altogether a secondary considcration—but that our cities are so much more substantially built, that we look more to use than appearance, and a lot more of this tirade which extra loyal Canadians always indulge in when comparing their institutions with those over the way. We have so often repeated these pleasant and consoling tales to ourselves that they have become a part of our faith, and to deny their correctness is to display an ignorance and lack of correct judgment quite unbearable, 'Oh,' say these men, 'the Americans are all for show; thay certainly put up fine-looking buildings, this we cannot deny; and their streets appear more beautiful, and their cities neater; bnt then there must be something wrong with them, for you know they are Yankees, and do things in the Yankee style (here they turn up their noses); but as for us we follow the English style, and therefore it must be, and therefore is, a fact that we do it better than they.' Then, when we come to ask these gentlemen in what particular our style is superior to the American, they commence a tirade on America and Americans, stringing together a lot of rubbish about light and unsubstantial buildings, &c., &c., which they always have used as arguments, and which they consider totally unanswerable. Then when we show them how our buildings are quite as unsubstantially put up, and that our construction is quite as flimsy as the American's, they don't know what to answer. But you do not convince them; for to believe that an American can do anything better than a British subject is rank treason.

Do we build more with an eye to comfort and stability than do the Americans? It has been so often stated that we do so, that we now take it for granted without examining to find if it is so; but we think that if we compare without prejudice we will find that no house in the world is built with more regard to convenience than that of the American. The care of the American in this particular has been the theme of many travellers, both English as well as American, and they award them their meed of praise for it. There is no doubt, however, but that they do put up some slight buildings, but in this particular it would be well for us to recollect the saying, 'Those that live in glass houses should not throw stones,'—for we also put up exceedingly slight buildings at times. But we must not consider strength as the only requisite for houses, or comfort as all that is required in a city.—We need in both cases something to strike the eye, something to make an impression on the stranger who passes through; and something of that charm which pervades a neat city, to retain the straggling, and entice others to settle within its limits.

BUFFALOES VS. TELEGRAAH POLES.—Here is a good story from the west. The buffaloes found in the telegraph poles of the overland line a new source of delight on the treeless prairie—the novelty of having something to scratch against. But it was expensive scratching for the telegraph company; and there, indeed, was the rub, for the bison shook down miles of wire daily. A bright idea struck somebody to send to St. Louis and Chicago for all the brad-awls that could be purchased, and these were driven into the poles with a view to wound the animals and check their rubbing propensity. Never was a greater mistake.—The buffaloes were delighted. For the first time they came to the scratch sure of a sensation in their thick hides that thrilled them from horn to tail. They would go fifteen miles to find a brad-awl, They fought huge battles around the poles containing them, and the victor would proudly climb the mountainous heap of rump and hump of the fallen, and scratch himself into bliss, until the brad-awl broke or pole went down. There has been no demand for brad-awls from the Kansas region since the first invoice,

WHO SHALL BUILD OUR HOUSE.

The question is a very disturbing one to a great many people. The more because they have so many wants in the matter.

They want it, first, very cheaply built—that is to say they want to make a good bargain of it.

Next, they want it tastefully built.

Nextf they want a great deal of room in a house not very large,—which is always an awkward want.

Next, they are not quite sure of material, but want the best, and that it should not cost too much, and are open to conviction in respect to any material which shall be economical and beautiful and durable.

Next, they want a good architect, who shall be experienced and manageable, and listen to their views, and modify plans as the work goes on, and keep cost within hailing distance of the estimates.

Next, they want, virtually, to plan it themselves.

The wants may be reasonable enough, individually, but when they are massed together in the mind of a talkative man or woman, they make an awkward congerie of wants.

In old times nobody thought of consulting an architect about house-building, but matured his own plans, so far as able, and then compared notes with the master carpenter who carried the matter through. But it has come to be understood that he who devotes himself to the planning of houses every week in the year, should know more about it than he who plans only once in a lifetime —and yet there are very few architects who are left untrammelled.

We had occasion to ask, not long since, one of the most accomplished architects in this city what country house of his construction he felt most pride in?

"I feel pride in none," said he; "I have never yet been my own master."

The same thing is doubtless true to a considerable extent of architects of churches and other public buildings, who are subject to the rulings of committees, who have always a lively idea of their judgment in the premises.

But is it a reasonable request that a man should give up wholly the modelling of the house which is to make his home for years to the judgment of the architect?

By no means; and that architect is the best who can so interpret and meet the spe

cial wants of the home-seeker as to clothe them with a form of grace which shall at the same time be in keeping with all the demands of the site and of the climate.

What the house-holder has a right to insist upon is his own notions of convenience in interior arrangement (of which a good housewife is the best planner in the world); he has a right to insist further upon such economies as to material or method as his means may demand; but beyond this he should venture his opinions sparingly, and with a doubt of their own weight. What may be effective or tasteful, or agree best with the site, involves consideration which are best left to the judgment of the architect. And the chances are that he will do better by yielding all these points.

To insist upon special treatment is like insisting upon special treatment for your sick child, in whose behalf you have summoned the best professional skill.

But we do not advise any one to employ one of those surly and brow-beating architects who are quite sure that they know everything much better than we can possibly know it ourselves.

We sum up our short talk upon this subject thus,—Choose an architect in whose skill you have confidence, and having chosen, give some reasonable range to your confidence.

Insist mainly upon the interior arrangements which you have at heart, and upon your own limitations of cost. But always reckon on paying fifteen per cent. more than estimates; always count on miscalculations; always allow an extra month for the drying of the walls; and don't let little delays in the progress of the building worry you.

EDGE TOOLS.

All cutting and piercing edge tools operate on the prineiple of the wedge. A brad-awl furnishes an example which all can understand. The cutting edge of the awl severs the fibres of wood as the instrument enters, and the particles are compressed into a smaller compass, in the same manner as when a piece of wood is separated by a wedge. A chisel is a wedge in one sense; and an axe, drawing-knife or jack-knife is also a wedge. When a keen-edged razor is made to clip a hair or to remove a man's beard, it operates on the principle of the wedge.

Every intelligent mechanic understands that when a wedge is dressed out smoothly it may be driven in with much less force than if its surfaces were left just as rough. The same idea holds good with respect to edge-tools. If the cutting edge be ground and whet to as fine an edge as may be practicable with a fine-gritted whetstone, and if the surface back of the cutting edge be ground smooth and true, and polished neatly, so that one can discern the color of his eyes by means of the polished surface, the tool will enter whatever is to be cut by the application of much less force than if the surfaces were left as rough as they usually are when the tool leaves the grindstone. All edge-tools, such as axes, chisels and planes, that are operated with a crushing instead of a drawing stroke, should be polished neatly clear to the cutting edge, to facilitate their entrance into the substance to be cut.

STRAW HOUSES.—An English inventor has built some houses on a novel principle at New Hampton. The houses are of a cheap order designed for laborers. He compresses straw into slabs, soaks them in a solution of flint to render them fireproof, coats the two sides with a kind of cement or concrete, and of these slabs the cottages are built, By ingenious contrivances the quantity of joiners' work is much reduced, and the chimney is so constructed as to secure warmth with the smallest consumption of fuel, and at the same time to heat a drying closet. The cost of a single cottage of this description, combining all the requirements of health, decency and comfort is eighty-five pounds. The commissioners on the employment of children, young persons and women in agriculture, report favorably of those cottages.

THE VELOCIPEDE OUTDONE.—A spring wagon has been invented by a gentleman in Kentucky, which is proposed to run without either animal or steam power. He has already constructed a small model which runs up and down hill very rapidly. The power is received from an immense coiled steel spring, which will run for half an hour without being wound up. In going up hill the spring exhausts itself, but in going down hill it winds itself up. The inventor claims that he can carry heavy loads ever an ordinary road.

☞ It has lately been discovered in Germany that if the refuse iron ore from foundries is pounded up and mixed with pulverised lime, the composition makes the most substantial building material ever invented.

CONCERNING NAILS.

A wrought iron nail, 73 to the pound and 2½ inches long, driven into dry elm to the depth of one inch across the grain, required a pressure of 327 lbs to extract it; and the same nail driven endwise or longitudinally into the same wood was extracted with a force of 257 lbs.

The same nail driven two inches endwise into hard pine was drawn by a force of 257 lbs; and to draw out one inch under like circumstances took 87 lbs only,

The relative adhesion, therefore, in the same wood, when driven transversely or longitudinally, is 100 to 78, or about 4 to 3 in dry elm; and 100 to 46, or about 2 to 1 in deal; and in like circumstances the relative adhesion to elm and deal is as 2 or 3 to 1.

The progressive depths of the same nail driven into hard pine by simple pressure were as follows:—

¼	inch, by a	pressure of	24	pounds:
½	"	"	76	"
1	"	"	235	"
1½	"	"	400	"
2	"	"	610	"

To extract the same nail from a depth of one inch out of

Dry oak required.....	507	ponnds.
Dry beech required.....	667	"
Green Sycamore required	312	"

From these experiments we may infer that an inch nail driven two inches into dry oak would require a force of more than half a ton to extract it by a steady force. A common screw of one-fifth of an inch was found to have an adhesive force of about three times that of an inch nail.

The force necessary to break or tear out an iron pin, applied in the manner of a pin to a tenon in the mortice, the thickness of the board being 0.87 inch, and the distance of the centre of the hole from the end of the board 1.05 inch, was 976 pounds.

As the strength of the tenon from the pin-hole may be considered as in proportion to the distance from the end, and also to the thickness, we may for this species of wood —dry oak—obtain the breaking force in pounds by multiplying together one thousand times the distance of the hole from the end by the thickness of the tenon in inches.

The terms, threepenny, sixpenny, &c., as applied to nails, arose from the fact that before cut nails were invented all the nails in use were made by hand and sold by count. One hundred sixpenny nails were sold for sixpence, (12½ cents.) As soon as the cut nails were brought out the price fell materially, and the nails were sold by weight, but the old designations were still retained.

London, March 25th, 1869.

Mr. T. W. Dyas,

Sir,—I have used your 'Imperial Boiler Purger' in a 20 horse power boiler in my factory, and find it a good preparation for cleaning the boiler of scale; and it produces no foaming.

Thomas Green.

SMOKY CHIMNEYS.

The Architect, a London weekly, gives the following summary of the causes of smoky chimneys, condensed from a new work on the subject, published by Longmans, which seems certainly very comprehensive as well as concise.

Want of sufficient height in the flue.—The outlet of the chimney being placed in an exposed and cold situation, while the air with which the fire is supplied is drawn from a warmer and more sheltered region. Excessive width in the flue, by which a large volume of cold air is drawn in and allowed to lower the temperature of the ascending column. Low temperature of the interior of the flue in comparison with that of the external air. Humidity of the air. Too accurate fitting of the windows and doors, and joints of the flooring. The draft of one fire injuring that of others in the same house. A current caused by the heat of the fire circulating in the room. A flue of insufficient size. A foul flue. Displacement of masonry, or accumulation of mortar within the flue. The sudden obstruction of the draft by gusts of wind entering the chimney top. Increase of density of the air at the chimney top, due to the effect of wind in chimneys rising from the eaves of roofs. Drafts within the room which throw the smoke out of the influence of the ascending chimney current.

Of course the remedies consist in the removal of these causes, but the suggestion given that the kitchen flue should be at the north or east end of a stack is sagacious; also, the recommendation to supply fire with air for its own consumption, drawn from the coldest side of the house. The arrangement proposed with this aim is ingenious, and no doubt capable of easy and effective application in a large proportion of cases but the question of the exact position, size and adjustment of the air inlet near the hearth appears to us yet open to further investigation; and it must not be forgotten that any such arrangement diminishes the efficiency of the open fire as a ventilator of the room.

WELDING POWDER.

A powder of the following composition, recently patented in Belgium, is said to be very useful for welding iron and steel together. It consists of one thousand parts of iron filings, five hundred part of borax, fifty parts of balsam of copaiva or other resinous oils, with seventy-five parts of sal-ammoniac. These ingredients are well mixed together, heated and pulverized. The process of welding is much the same as usual. The surfaces to be welded are powdered with the composition, and then brought to a cherry red heat, at which the powder melts, when the portions to be united are then taken from the fire and joined. If the pieces to be welded are too large to be both introduced at the same time into the forge, one can be first heated with the welding powder to a cherry red heat, and the others afterwards to a white heat, after which the welding may be effected. Another composition for the same object consists of fifteen parts of borax, two parts of sal ammoniac, and two parts of cyanide of potassium,—These constituents are dissolved in water, and the water itself afterwards evaporated at a low temperature.

CHEAP BRICK WALLS.

A considerable saving may be effected in brick walls, and at the same time the much desired hollow be acquired, by a very simple arrangement of the work. In walls of small one-story cottages this would indeed be a most desirable mode of building: for it would be at once cheap, healthy, and sufficiently strong for the purpose. It only requires a little care in the jointing, taking care to flush up with mortar. The method of procedure is as follows. Commence on the foundation's top at the corner, and lay the first course thus; Place two bricks side by side, flat; over these lay two others, likewise flat, carefully filling the joints. Now do the same at the other corners, and proceed to lay the courses all around complete with headers. Next commencing at the corners, lay on a course all around of stretchers, flat. And over this set another course of headers, flat. Be cautious to break joint regularly on the rear as well as on the front of the work; and especially to bind the corners to the rest of the walling; since, if these corners are not so bonded to the other part of the wall, there must of necessity be weakness where the greatest amount of strength is required. These three solid courses carry the work up to the flooring joists. And now begins the mode of economizing the brick. The next course is composed of stretchers set on edge, leaving two inches and two-thirds open space. The course over this will be headers laid on flat. Above this comes the stretcher course on edge again, and then the headers on flat; and so on to the top which must close with headers laid flat. There can not be a doubt but this is a strong as well as an economical mode of laying up bricks for cottage walls, and one that ought to receive the attention of our builders. Wooden blocks might take the place of bricks on the inside of the building for the purpose of receiving the trimmings, &c. If brick manufacturers would only conform to the progress of the time, and make bricks of varied sizes, a great many ways could be very readily devised by means of which strong work, having every advantage of economy, sanitary effectiveness. and the saving of space, could be most thoroughly secured. The Romans and the Greeks had their different sizes of bricks, and why are we to be restricted in this matter? In the above method of laying alternate courses on edge we find a saving, and if we had heading bricks four inches thick as well as broad a double economy would be the result.—Manufacturer and Builder.