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SCIENTIFIC CANADIAN

MECHANICS' MAGAZINE

AND

PATENT OFFICE RECORD

Vol. 7. MAY, 1879. No. 5.

REMARKS ON THE NEW TARIFF.

AS the duties imposed on foreign manufactures by the new Tariff will so much affect the industries of the Dominion, for either weal or woe, and as the advantages, or disadvantages, of protective legislation are still as hotly debated, *pro* and *con*, by the press, as they were on the eve of the last general election, we feel, however much we desire to refrain from touching on political topics, that as the tariff so particularly concerns the welfare of the manufacturing interests of the Dominion, we cannot altogether remain silent. Our duty, however, is not to advocate the political opinions of either party, but simply to offer a few words of advice to those whose interests are most nearly concerned in the change that has been made. In the leading article which appeared in the last November number of this Magazine, the views taken by this journal on the subject were so different to those ultra opinions of strong political partisans, that we have, in several instances, received the approbation of the manufacturers on either side of politics, for the new light in which we reasoned out the question. The reason for this was simply because we discussed the question unbiassed by either political or pecuniary interests. We reviewed the whole question of Protection or Free Trade calmly and unprejudiced; we wish we could say the same of the press in general. We cannot but deeply deprecate the rancour that fills the columns of the leading papers on each side of the political arena, and we deeply regret that all calm reasoning should have been entirely lost sight of, and that the arguments of the press and of members of the House on one side, and the personal aspersions on the character of public men should be answered by a *tu quoque* reply by the other party, and that debate should have resolved itself into a wordy war of political enmity. This should not be. It is the first duty of every representative, when he takes his seat in the House of Commons, to sink all political rancour, when great subjects come before the House that are intended for the public weal, and they should debate the subject free from any disturbing influences contrary to their own rational judgment. Our statesmen should bear in mind the friendly and parting advice given to us all by the Earl of Dufferin; but we fear the admonition of our late esteemed Governor has already been forgotten, when we see the press, on one side of politics, leading the country on to increase their manufactories, by their glowing prophecies of coming prosperity, which as yet are only imaginary, on the supposition that the effect of the tariff is already having a most beneficial effect—which is a premature conclusion—and thereby creating a false impression, which is likely to lead us into still greater trouble; and the press on the Opposition side is doing all that it possibly can to create a want of confidence in this measure of the Government, and to make depression still more depressed. Indeed, it would appear from a review of the past politics of the country, that, no matter what party is in power, it is the creed of the other to oppose and impede, in every possible way, their opponents actions, and to besmear each other's characters with the greatest amount of abuse and calumny, to damage their opponents in the eyes of their constituents—all true patriotism is sunk in these unnatural party conflicts.

The effect of this selfish rivalry must be ever prejudicial to the interests of the country, and it is high time that a more enlightened form of government and useful legislation should be adopted by our representatives and the press.

The country has decided in favour of protection by a very large majority. There is no use, therefore, in the Opposition saying that the people were deluded into voting for protection by false representations. Unfortunately, the people are always deluded; the victory is generally gained by that party which, on the eve of an election, can display the most attractive delusive colours. The fact of the case was simply this: that from the depressed state of our manufactures, and the number of manufactories closed up, and mechanics and labourers thrown out of employment, and, also, from the number of bankruptcies constantly taking place, and seeing no prospect of a change in the future, the people, like drowning men catching at straws, were glad to vote for any policy that advocated a change, and that promised them an improved condition in their affairs. The people, as a mass, never reasoned on the subject, as to whether it were possible that protection for Canada would bring about the desired improvement in their affairs; they, indeed, had neither data nor statistics before them from which they could adduce any warrantry that protection or free trade would be beneficial, or otherwise. They, in fact, knew not, and do not know, even now, the actual requirements of the country, or its actual buying population, and whether it could support new manufactories, if started; but, being guided to some extent by the benefit protection had been to the United States immediately after the war, they had not taken into sufficient consideration whether a country prospering under a protective tariff for a time, under a certain abnormal state of its affairs, would still prosper from too long a continuation of the tariff after it had returned to its normal state again, when, perhaps, protection might prove as prejudicial as it had heretofore been a benefit. The people of Canada, we do not believe, as a body, took these probabilities into consideration, but, considering that matters could not be much worse than they were, voted for a change in the *hope* that it would be beneficial; and the people, as a body, would vote it down to-morrow if the *hoped*-for prosperity does not come to hand.

But the Government have been returned on the ticket for protection, and that protection the people have now got; therefore, let us do our best to prosper under it, and if it is a fallacy, then banish it forever. There is no use in declaiming against a tariff upon certain articles required in our machine shops, for if the Government, when coming into power, found an increased revenue would be required, amounting to $2,400,000, then for the credit of the country that sum must be raised from some source.

Supposing that the Opposition had raised a more attractive political cry than even that of Protection or National Policy—or worked on the feelings of the people on some exciting political question — would not the Opposition have been obliged, also, to raise a revenue to meet these $2,400,000? How, then, would the people have wished the ways and means to have been raised? If it is not their wish that it should be obtained from an increased revenue on importations, it would have to be raised either by an internal revenue on our manufactures, or by an income tax. To raise an increase of revenue by means of a taxation on our own manufactured goods, would be to depress them still more than at present; and to take a revenue from our property, or to impose an income tax, would be a measure not only most obnoxious, but one that is only resorted to in extreme cases, and then only as a temporary measure. As soon as the United States began to revive from the liabilities incurred in their civil war, she withdrew, in a great degree, all taxation upon the industries of the country, and upon incomes and real estate. It must, therefore, be fairly acknowledged by the Opposition that an increase to our revenue had to be met by whatever Government came into power. Then why so much complaint on the part of our manufacturers about what had become a necessity, and towards which they would have had to contribute in any case? It is true that the tariff by no means falls evenly upon all classes of manufactured goods. There are many whose profits will be less, and whose consumption of imported materials will be much more than others, and who have but a moderate protection; and there are others who have large profits and are largely protected, and whose cost for duties on iron and steel does not amount to more than 10 cents in a machine that sells from $12 to $20. The manufacturers of heavy iron work, such as safes, boilers, engines, and agricultural implements, will feel the burthen considerably, as it cannot be expected for some years to come that we in this country can furnish the necessary supply, and of as good a quality as manufactured in England or the United States. Neither of these countries arrived at their present state of perfection in a day, nor can we.

We seriously think that if the political partisans of free trade would calmly consider all the *pros* and *cons*, they would arrive at more satisfactory conclusions with respect to the working of the tariff. There can be no doubt, for the reasons before given in this Magazine, that a certain amount of protection is necessary for the encouragement and growth of certain industries, but no protection to any industry ought to be continued, should it become the means of causing a monopoly.

The question of the new tariff has been discussed in the papers until the public itself is getting heartily tired of the subject, and little good can now result from its further prolongation. The thing is done, and therefore we heartily hope our manufacturers will patiently await the result of this new policy until it has had a fair trial. If, after a time, it is found not to answer, a pressure will be brought upon our representatives to modify it into such a shape as to make it, if possible, work satisfactorily. If our manufacturers, under a protective tariff, can give us as good an article, and at as cheap a rate as similar goods are sold at in the United States, then by all means let the whole country give them the fullest support. But if the tariff is to have the effect of pressing unequally upon certain classes, who are a very numerous body—and who will derive no benefit from it in any way—then it will be desirable that it should be modified, as we cannot oppress the multitude for the benefit of a few. We have no doubt but that a modification of it will take place from time to time, as experience and circumstances will justify.

However, before we rush into forming new industries, or increasing the number of those manufactories at present existing in the country, let us prudently await the revival of trade, and not run blindly forward, only to become more deeply involved than before. The demand must first come, and then the wheels of the factories will begin to move; but to rashly manufacture, ahead, in the expectation of a demand, would be folly, and end in ruin again as it did before. We are suffering at the present time not so much from the importation of foreign goods, as we are from our own imprudence in manufacturing articles beyond the requirements of the country. A moderate competition is a source of healthiness in trade, but over-competition results in over-manufacturing, over credit, and then bankruptcy, and, last of all, ruin. The manufacturer, when, from adverse and unforeseen circumstances, he first becomes a bankrupt, if he is an honest man, he tries to rally under an assignment, but sinks again; a second time, perhaps, he rises to the surface and struggles for existence for a short period, and then finally goes down, never to rise again, and with his fall hundreds to whom he had given the means of living, and their wives and children, are thrown out of employment and without any other means of support. The goods are sold by the assignee frequently far below their actual cost to the manufacturer, thus inflicting upon other manufacturers a greater loss, and greater wrong, than ever they received from American importations into the country. Thus, should we lack judgment and again rush into over-manufacturing because we have protection, we may become the suicides of our own industries and our own fortunes, and that may become a blight to the country, which, with caution and prudence as guides, would become a blessing.

To the mechanics of the Dominion, so many of whom have been looking forward to protection as a boon that would, with the sweep of a magician's wand, bring immediate prosperity to the country, we most sincerely sympathize. Not only have many of them been thrown out of employment, but those who have been fortunate enough to be kept employed have been obliged to work on short time; and now, instead of benefitting by the new policy, as they fondly supposed they would do, their wages are being reduced ten per cent. What room, then, under such circumstances, is there yet for increasing the industries of the country until there is a field in which such goods can be disposed of? Take, for example, our large manufacturing establishments from Montreal to Sarnia, and we know, to our regret, how many of them have been closed, how many working on short time, and how many only working for a part of the year. What room is there, then, for others, until all these are in full operation, and with every probability of their continuing so? It will, however, be their policy to keep their prices sufficiently low, so as not to invite competition from across the border.

In concluding these remarks, we can only say to our mechanics: have patience for a time, and do not despond because no immediate good results follow the adoption of a protective tariff. It will be some months yet before manufacturers will see their way clearly to extend their business. Young and hearty men should not remain here in idleness, awaiting something to turn up: to them we say, who can find means to do so, go before the summer is too far advanced, and take your chance on those rich free lands of the West, where, after a few years of toil, but not of want, you will become independent, and, perhaps, supporters of those very factories in which you were once employed.

Much has been said about the unjustness and ingratitude of Canada in putting a duty upon English manufactures; but it will be a long period yet before Canada will have a population sufficiently numerous to enable her to manufacture with success many classes of goods that we require from England. For years to come we must buy from their markets; but whether the consumer will, or will not, have to pay the extra duty on these lines of goods, is not a matter of so great an account, individually, as to become a burthen or a grievance—provided better times return, and our population, one and all, find employment.

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* For want of space in this number the continuation of the work on "Machine Construction and Drawing" will appear in the June number.

Correspondence.

THE UTILIZATION OF SAWDUST.

To the Editor of THE SCIENTIFIC CANADIAN:

SIR,—Every one acquainted with the sawing of lumber at the numerous mills in this country, worked by both steam and water-power, must have been struck with the immense quantity of sawdust which accumulates around them, or is carried off by the stream, and which in many instances becomes a nuisance, which the mill-owners, generally, would be glad to see abated. In most cases, especially in water-power mills, the sawdust finds its way into the river, where it forms shifting bars detrimental to navigation, is destructive to fish, and for various reasons becomes an objectionable element in the water; but it is generally around steam saw-mills that the sawdust accumulates most, there seldom being any stream to carry it away. There are mills at Ottawa and many other places where whole hills of sawdust are piled around, being the accumulation of years.

Practical economy can in no way be better exemplified than in the utilization of waste material of various kinds.

Taking it for granted that it is possible to utilize this substance, which is the object of this communication to show how it is possible, it will take no elaborate calculation to prove that the loss annually sustained is enormous. For instance, the gang-saw, in common use here, makes a cut of at least ¼ of an inch in width on a 12-inch plank 12 feet long; this would amount to 432 cubic inches, or a board 3 feet long, 1 inch thick —the two outside portions, or slabs, not being used as planks, the cut used to separate them is a balance in the calculation to the one cut separating two planks—so that the actual loss on four planks of the size mentioned is equal to a board of the same length and one inch thick. When the number of feet of lumber produced in a year is estimated, this will give an idea of the amount of sawdust produced and lumber wasted at the same time.

This substance might be utilized in various ways. It might be made into a cheap fuel by adding gas tar, or some substance to give sufficient cohesion, and compressing into blocks of a suitable size. It might be made into paper pulp; I believe that several patents have been granted for this purpose, but the cost of the soda or potash to neutralize the oily matter at the wood has been, as yet, an obstacle in the way. Sawdust, in small quantities, has been used in the process called casting in wood; the sawdust ground fine, or otherwise prepared, is mixed with glue and pressed in moulds of various shapes. The articles produced are made to represent wood carvings, and are used to embellish cheap furniture, &c. It might be adapted to some useful purpose in a dozen different ways yet to be found out.

The object of this article is to point out what, in the opinion of the writer, is the most simple, cheap, and easy way to utilize the sawdust and waste refuse of the mills—that is, to distill it and convert it into pitch tar, pyroligneous acid, creasote, etc., the product of the distillation of wood.

The plant necessary for this purpose would be simple and inexpensive, consisting mainly of the proper retorts and distilling apparatus. They would be heated by the blocks, edgings, and larger *débris* of the mills.

There may not be much of a market demand for pitch tar, creasote, &c., still I think that the difference in value between those products and the raw material, sawdust, would pay. In the matter of creasote, a demand for it might be produced by the adoption more generally of the process for injecting it into wood, lately employed abroad with success, in the matter of railway ties, timber for docks, etc. Recent experiments in this direction have proved, conclusively, that wood so treated was, by a large percentage, much more durable and impervious to rot than wood not so treated.

The retorts and other plant for distilling could be made portable to a great extent, so that when the sawdust at one mill or group of mills was consumed, they could be removed to another locality. I have hills of sawdust in my mind's eye that would keep a batch of retorts going for a surprising length of time.

Whether this idea of distilling the sawdust be a feasible one or not, I leave others to judge. There can be no doubt, however, that the utilizing of sawdust, in one way or another, is a "consummation devoutly to be wished."

WILLIAM H. MUNSON.

Ottawa, Ontario.

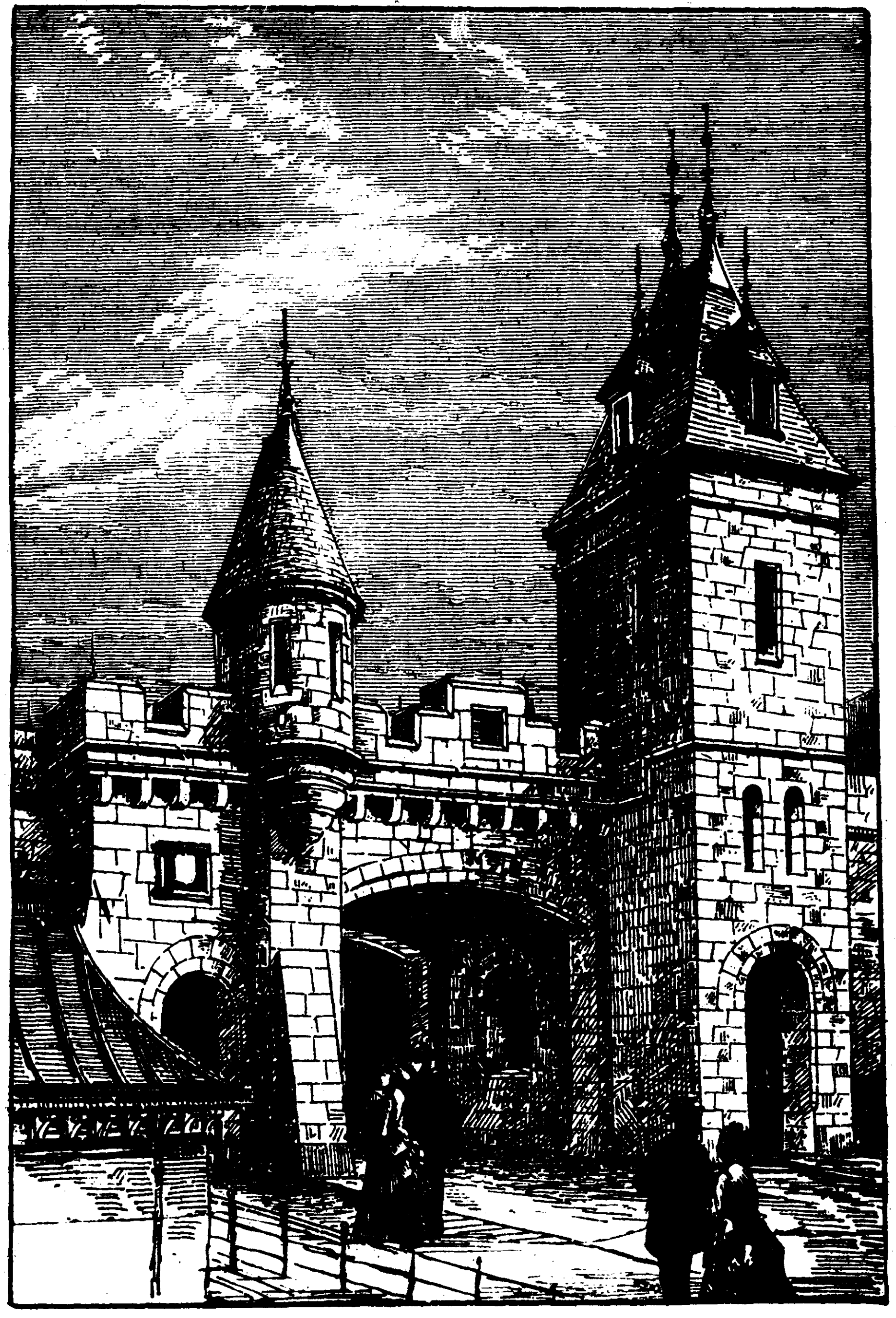
QUEBEC.—ST. LOUIS GATE.—VIEW FROM THE ESPLANADE.

ST. LOUIS GATE, QUEBEC, CANADA.

MR. THOMAS S. SCOTT, CHIEF ARCHITECT TO THE DOMINION GOVERNMENT.

This gate is to be erected on the site of old St. Louis Gate. The style of architecture is adapted to harmonize as far as possible with the existing fortifications. It has a central roadway passage under a segmental arch for general traffic, and a semicircular archway on either side for foot passengers. These roadways and footways form with the fortification wall a continuous promenade. On the front and rear walls are embattled stone parapets corbelled outwards from the face of the walls, and on either end are stone steps leading to the city streets. The stone tower, with pyramidal dormered wooden roof, projects nearly two thirds outwards from the general face of the wall. Opening on the platforms are two corbelled stone turrets of horseshoe plan, one of them being covered with a slate and lead roof. We are indebted to the *American Architect and Building News* for the illustrations.

NEW MODE OF MANUFACTURING WHITE LEAD.—A German paper gives a new process of making white lead, which is described as follows: The molten lead is poured through an iron sieve into a tank filled with water. Hereby it is converted into threads of one-sixth of an inch in thickness, which are now placed in vats each of which holds about 1,000 threads. Vinegar is now poured over the lead, and immediately drawn off again. Under the influence of the air and the vinegar adhering to the metal, the latter is oxidized. The vinegar is now poured into the vat and again drawn off, when it carries away the acetate formed on the surface of the metal in solution. After this process has been repeated a number of times, the vinegar has been transformed into a concentrated solution of basic acetate of lead, from which the carbonate may be prepared by the introduction of a current of heated carbonic acid gas. The supernatant liquid is—mixed with another quantity of vinegar—used again for the same process.



QUEBEC.—ST. LOUIS GATE.—View from the Grande Allée.

WILL THE WORLD GO MAD AGAIN!

It is noteworthy how very similar the present commercial position of Europe is to that of six years ago, after the immediate close of the Franco-German war. Then, as now, two powerful nations had been engaged in a death-struggle. Then, as now, that proclamation of peace released all Europe from its position as on-looker, when each nation, with increased armaments and all preparations fully made, waited to see if evil destiny would drag it into the war then raging. Then, as now, the attention of every people was too much taken with foreign politics to care for the development of trade and peaceful occupation. And then, as now, prices were depressed, confidence was gone, and stocks were low. Peace was declared, and shortly after every branch of mercantile industry began to show vitality; prices rose again and again, confidence came back and developed into recklessness; workmen wanted wages which a few years before would have well paid *three* men of their ability; buyers, apprehensive of still higher rates, ordered three times as much as they wanted,—in a word, the whole commercial world went mad. Is this process to be repeated? We, in the manufacturing part of the world, wait with keen anxiety the issue. The resolution as to the course of events does not rest with us; it rests rather with the prudent buyers. If they recognise the twin-like resemblance of the present position to that of six years ago, and at once,—while prices are low,—make up their stocks, manufacturers will be saved from the "ugly rush" that took us all by storm at the precise period of which we are reminded by precisely similar circumstances. That prices will advance shortly we think there can be no doubt; and the first advance will undoubtedly bring piles of orders from every part or the world. Let the English buyer be advised, and "take time by the forelock."—*Martineau & Smith's Hardware Trade Circular.*

Geographical.

In an address to the British Association recently, Sir C. S. Wayvillle Thompson, F. R. S., its president, after briefly reviewing the efforts made by different countries and individuals, in the work of exploration, deep-sea sounding, and Arctic discovery, and of the researches carried on by the staff of the *Challenger*, he gave an account of the

General Oceanic Circulation.

All recent observations have (he said) shown us that the vast expanse of water which has its centre in the southern hemisphere, is the one great ocean of the world, of which the Atlantic with the Arctic Sea and the North Pacific are merely northward extending gulfs; and that any physical phenomena affecting obviously one portion of its area must be regarded as one of an interdependent system of phenomena affecting the ocean as a whole. Shallow as the stratum of water forming the ocean is, it is very definitely split up into two layers. At a depth varying in different parts of the world, but averaging perhaps 500 fathoms, we arrive at a layer of water at a temperature of 40° Fahr., and this may be regarded as a kind of neutral band separating the two layers. Above this band the temperature varies greatly over different areas, the isothermobathathic lines sometimes tolerably equally distributed, and at other times crowding together towards the surface; while beneath it the temperature almost universally sinks very slowly with increasing slowness to a minimum at the bottom. The causes of natural phenomena, such as the movement of great masses of water, or the existence over large areas of abnormal temperature conditions, are always more or less complex, but in almost all cases one cause appears to be so very much the most efficient that in taking a general view all others may be practically disregarded; and speaking in this sense it may be said that the trade-winds and their modifications and counter-currents are the cause of all movements in the stratum of the ocean above the neutral layer. This system of horizontal circulation, although so enormously important in its influence upon the distribution of climate, is sufficiently simple. One of the most singular results of later investigations is the establishment of the fact, that all the vast mass of water, often upwards of 2,000 fathoms in thickness below the neutral band, is moving slowly to the northward; that in fact the depth of the Atlantic, the Pacific, and the Indian Oceans are occupied by tongues of the Antarctic Sea, preserving in the main its characteristic temperatures. The immediate explanation of this unexpected phenomena seems simple. For some cause or other, as yet not fully understood, evaporation is greatly in excess of precipitation over the northern portion of the land hemisphere, while over the water hemisphere, and particularly over its southern portion, the reverse is the case; thus one part of the general circulation of the ocean is carried on through the atmosphere, the water being raised in vapour in the northern hemisphere, hurried by upper wind currents to the zone of low barometric pressure in the south, where it is precipitated in the form of snow or rain, and welling thence northwards in the deepest channels on account of the high specific gravity dependent on its low temperature, it supplies the place of the water which has been removed. The cold water wells northward, but it meets with some obstructions on its way, and these obstructions, while they prove the northward movement, if further proof was needed, bring out another law by which the distribution of ocean temperature is regulated. The deeper water sinks slowly to a minimum at the bottom, so that if we suppose the temperature at a depth of 2,000 fathoms to be 36° F., the temperature at a depth of 3,000 may be, say, 32°. Now, if in this case the slow current meet on its northward path a continuous barrier in the form of a submarine mountain ridge rising to within 2,000 fathoms of the sea surface, it is clear that all the water below a temperature of 36° will, be arrested, and, however deep the basin beyond the ridge may be, the water will maintain a minimum 36° from a depth of 2,000 fathoms to the bottom. In many parts of the ocean we have most remarkable examples of the effect upon deep-sea temperature of such barriers intersecting cold indraughts, the most marked instance, perhaps, a singular chain of closed seas at different temperatures among the Islands of the Malay Archipelago, ; but we have also a striking instance nearer home. Evaporation is greatly in excess of precipitation over the area of the Mediterranean, and consequently, in order to keep up the supply of water to the Mediterranean, there is a constant inward current through the Straits of Gibraltar from the Atlantic; I need not at present refer to an occasional tidal counter-current. The minimum temperature of the Mediterranean is about 54° F., from a depth of 100 fathoms to the bottom. The temperature of 54° is reached in the Atlantic at the mouth of the Straits of Gibraltar at a depth of about 100 fathoms, so that in all probability future soundings will show that the free waterway through the Straits does not greatly exceed 100 fathoms in depth.

The Depth of the Sea, and the Nature of Modern Deposits.

It seems now to be thoroughly established by lines of trustworthy soundings which have been run in all directions, that the average depth of the ocean is a little over 2,000 fathoms, and that in all probability it nowhere exceeds 5,000 fathoms. Within 300 or 400 miles of the shore, whether in deep or in shallow water, formations are being laid down, whose materials are derived mainly from the disintegration of shore rocks, and which consequently depend for their structure and composition upon the nature and materials. These deposits imbed the hard parts of the animals living on their area of deposition, and they correspond in every way with sedimentary formations with which we are familiar in every age. In water of medium depths down to about 2,000 fathoms, we have in most seas a deposit of the now well-known globigerina-ooze, formed almost entirely of the shells of Foraminifera living on the sea surface, and which after death have sunk to the bottom. In depths beyond 2,500 or 3,000 fathoms no such accumulations are taking place. The shores of continents are usually too distant to supply land detritus, and although the chalk building Foraminifera are as abundant on the surface as they are elsewhere, not a shell reaches the bottom; the carbonate of lime is entirely dissolved by the carbonic acid contained in the water during the long descent of the shells from the surface. It therefore becomes a matter of very great interest to determine what processes are going on, and what kind of formations are being laid down in these abyssal regions, which must at present occupy an area of not less that ten millions of square miles. The tube of the sounding instrument comes up from such abysses filled with an extremely fine reddish clay, in great part amorphous, but containing, when examined under the microscope, a quantity of distinctly recognisable particles, organic and inorganic. The organic particles are chiefly siliceous, and for the most part the shells or spines of radiolarians which are living abundantly on the surface of the sea, and apparently in more or less abundance at all depths. The inorganic particles are minute flakes of disintegrated pumice, and small crystalline fragments of volcanic minerals; the amorphous residue is probably principally due to the decomposition of volcanic products, and partly to the ultimate inorganic residue of decomposed organism. There is ample evidence that this abyssal deposit is taking place with extreme slowness. Over its whole area, and more particularly in the deep water of the Pacific, the dredge or trawl brings up large numbules very irregular in shape, consisting chiefly of iron and peroxide of iron and peroxide of manganese, deposited in concentric layers in a matrix of clay, round a nucleus formed of a shark's tooth, or a piece of bone, or an otolith, or a piece of siliceous sponge, or more frequently a waterlogged fragment of partially decomposed pumice. These nodules are evidently formed in the clay, and the formation of the larger ones and the segregation of their material must have taken them a very long time. Many of the shark's teeth to which I have alluded as forming the nuclei of the nodules, and which are frequently brought up uncoated with foreign matter, belong to species which we have every reason to believe to be extinct. Some teeth of the species of *Charcharodon* are of enormous size, four inches across the size, and are scarcely distinguishable from the huge teeth from the tertiary beds of Malta. It is evident that these semi-fossil teeth, from their being caught up in numbers by the loaded line of the trawl, are covered by only a very thin layer of clay.

Africa Again Crossed.—A Portuguese explorer, named Pinto, has recently arrived at Transvaal in Southeastern Africa, having crossed the continent on an exploring expedition, traveling from west to east. The latitude of his course is not given, nor, as yet, any particulars in regard to his observations and discoveries. His route, however, must have been many degrees south of Stanley's route, and will, no doubt, add much to our rapidly increasing knowledge of the geography of Central Africa.

Cement for Cast Iron.—Five parts of sulphur, two parts of graphite, and two parts of fine iron filings, are melted together, taking care that the sulphur does not catch fire. The parts, previously warmed, are covered with the cement, reduced to a pasty consistence on a fire, and firmly pressed together. This cement, it is said, is very well adapted to fill out leaks in cast iron vessels.

Miscellaneous.

CURE OF SOULS AND OF BODIES.

We may know what we mean, but we can never tell exactly what our typographical friends will allow us to say, and when they do not go the length, as some, in pure pastime, will do, of inserting and taking out negatives, so as to improve the sense of the text, there often still remains in the manipulated copy or form a fine field for the critical faculty of Readers, which it would be quite a pity to trespass upon by "corrections of the press." The press has been the bulwark of civilization; are we now become so free a people in Canada, as to lend to the inference that it has done its work in that line? We will trust not, at any rate. The Doctors present, here, a noticeable contrast; often high minded men, they are yet remarkable for putting forward few medicaments for the mind. While far from averring that they do not understand a good deal of the diseases of the body, one would be pleased sometimes to see the highly benevolent spirit of their walk exercised in the way of advice on points in the conduct of life. They, happily, as a body, have not yet thrown Christianity overboard. Take the broad question of registered or patent medicines. What sort of test is mere popularity of their value? Does immense advertising make a medicine good? Certainly when a medicine is offered so widely, it is to the interest of him who sets it forth to make it as good as he can. The stake he has in its success should be sufficient inducement for him to give a large, if not undivided, attention to its preparation. But here we must call a halt. He is generally exceedingly anxious for a rapid sale, and so, is apt to believe he can extend his market by declaring that his specific can cure everything, and also by prescribing, on the label, great and frequent doses. Nothing could really be more suicidal as to the true interests of his undertaking. Either let proper, that is moderate, doses be prescribed, with a general admission that special cases cannot be met without personal advice, and we believe the dose would sometimes be scarcely more than a tenth of what we are now asked to swallow; or let all such medicine-takers be warned to imbibe only the doses they find by experience to suit their case. But so warned they will not be, we may be well assured, either to-morrow or next month. The ordinary popular history is, that good citizens make themselves uncomfortable by over dosing, and then discontinue the remedy for good. A common interest might, one would think, be established between medicine-man and client. There will be no need to put the thing forward in a diluted form, for all such panaceas are quite dear enough already. Rather let us find the dose that suits our case and determine not to exceed it. Testimonials should be sifted and if possible reported upon by some authority not yet discovered by the pandits of the press.

HOMO.

THE NECESSITY OF PLENTY OF SLEEP.

A writer in *Scribner*, considering "The Relations of Insanity to Modern Civilization," speaks of the loss of sleep as a prominent cause of insanity. He says: "During every moment of consciousness the brain is in activity. The peculiar process of cerebration, whatever that may consist of, is taking place; thought after thought come forth, nor can we help it. It is only when the peculiar connection or chain of connection on one brain-cell with another is broken and consciousness fades away into the dreamless land of perfect sleep, that the brain is at rest. In this state it recuperates its exhausted energy and power, and stores them up for future need. The period of wakefulness is one of constant wear. Every thought is generated at the expense of brain-cells, which can be fully replaced only by periods of properly regulated repose. If, therefore, these are not secured by sleep; if the brain, through over-stimulations, is not left to recuperate, its energy becomes exhausted, debility, disease, and, finally, disintegration supervene. Hence, the story is almost always the same; for weeks and months before the indications of active insanity appear, the patient has been anxious, worried and wakeful, not sleeping more than four or five hours out of the 24. The poor brain, unable to do its constant work, begins to waver, to show signs of weakness or aberration; hallucinations or delusions hover around like floating shadows in the air, until finally disease comes, and

"'plants his siege
Against the mind, the which he pricks and wounds
With many legions of strange fantasies,
Which in their throng and press to that last bounds
Confound themselves.'"

THE SECRET OUT

An American weekly newspaper—*The American Manufacturer*—which calls itself "the leading Iron and Manufacturers' Journal in the United States," has an article why our friends on the other side still protect hardware goods with a prohibitive tariff, while so many American manufacturers are exporting goods to England, and so many American journals are boasting of the lead they have taken from us in the commercial world. But the *American Manufacturer* is careful to explain that "the goods we do export to England are either those which we are enabled to make cheaply by use of improved machinery, those recommended by their fine appearance and workmanship—as our inimitable castings, and those which meet with sale simply on the ground of their superior quality, such as axes and some other tools." And, further, our transatlantic contemporary is good enough to inform us that any one looking through the list of the United States exports will not find "any of those articles made of iron or steel which are but a few removes in the process of manufacture from raw material, such as pig iron, bar iron, scrap iron of various kinds, plate iron, beams, channels, rails, or Bessemer ingots or rails. These articles form the great bulk of our iron manufacture, their total footing up in millions of tons, but not one of them can be profitably exported to England, nor is it probable that they can be for several years to come." Now such a confession as this is doubtless good for the soul of the *American Manufacturer*, but that journal still seems to sail along with the calm conviction that the English manufacturer is fast asleep, and is going to allow the bread to be taken out of his mouth, or else is too much engaged in protecting British interests in Asia Minor, and settling quarrels between Bashi-Bazouks and Greeks, to think of such mundane matters as the quality and price of his goods. Never was a greater mistake. American competition has been the saviour of our manufacturing reputation. No longer do we go along in the old way, but on every hand may be found employers improving their processes of manufacture, putting down new and improved machinery, and spending capital and brain-power to make their goods superior to those of their transatlantic rivals. Nor have they been unsuccessful; and we do not doubt that in a very few years' time American journalists will have to find something else upon which to employ their facile pens than the imaginary way they have taken Great Britain's place as a manufacturing country. Hampered by its silly protective policy, and burthened by the ill-doing of its professional politicians, America is terribly handicapped in commercial rivalry. The writer, a few days ago, mentioned his views to one of the largest hardware manufacturers in the United States, who called upon him in the way of business. Said this gentleman, with evident sincerity, "I guess you are right; if you are a prophet—and I think you are—in ten years' time there will be no hardware goods exported from America to England." This is a fact for the *American Manufacturer* to make a note of.—*Martineau & Smith's Hardware Trade Circular.*

INFLAMMABILITY OF SEWER GAS.

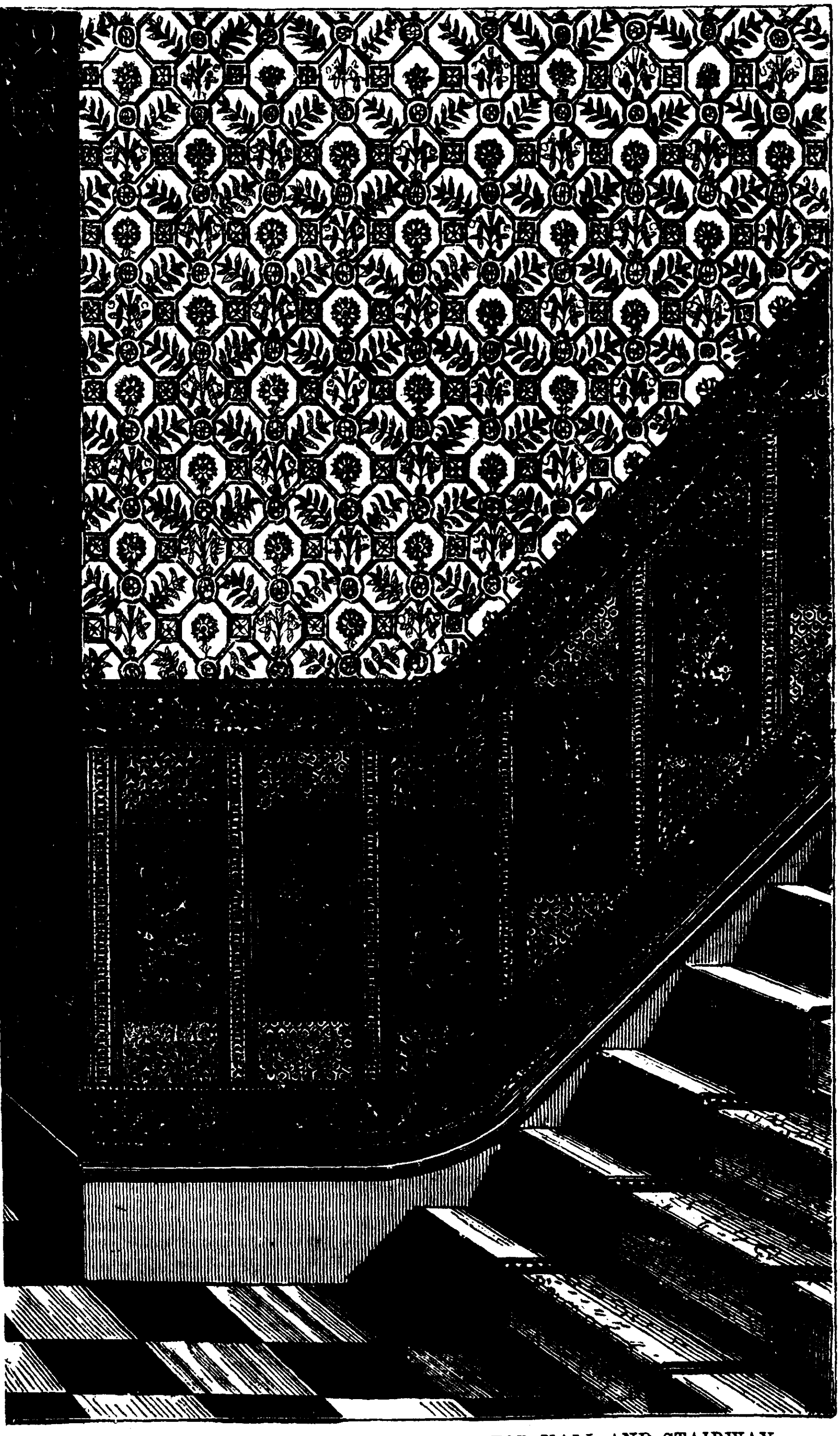
Editor *Scientific Canadian.*

I can corroborate the evidence of your correspondent J. S. that appeared in this month's number of your paper, as to the inflammability of sewer gas. Some years ago, while making repairs to the plumbing of the old stone house corner of Alexander and Dorchester sts., I had removed the sink and broken the connection between waste pipe of sink and drain, and on placing the candle near the mouth of the drain, in order to look into it, I was surprised by the gas in the drain taking fire; it burned for a few seconds with a bluish flame, which gradually receded into the drain until it became extinct. The drain was an old one, and to the best of my recollection, terminated in a cesspit. I never heard of a similar case, until that of your correspondent came under my notice. I think sewer gas as ordinarily met with, is not inflammable, but that old drains, especially when connected with unventilated cesspits, should contain an inflammable gas, is in my opinion not to be wondered at.

Yours,

J. W. HUGHES.

Montreal, April 21, 1879.



SAMPLE OF WALL PAPER TREATMENT FOR HALL AND STAIRWAY.

Temperature of the Head.—Some investigations have recently been made by several physiologists concerning the effect of mental activity upon the temperature of the brain. Several thermometers are placed on different parts of the head and fastened there by means of straps; then the person subjects himself to various intellectual processes, and the result shows a decided increase of temperature in certain parts of the brain. The temperature of the brain of a professor was elevated several degrees while delivering a lecture. Even the slightest intellectual effort raises the temperature of the head above that which it reaches in idle conversation. It is interesting to note that certain parts of the brain show a greater increase of temperature than others. Where the temperature of the head is increased beyond a certain point, intellectual effort takes place with difficulty or with pain. This is very apt to be the case with persons of a very nervous temperament. It would therefore be prudent for such to cease intellectual effort before this temperature is reached, and devote themselves to some physical exercise which shall equalize the circulation and restore the normal temperature to the extremities.

Morning Walks not Healthful.—It is a great mistake, says a medical writer, to suppose that a morning walk or other form of exercise before breakfast is healthful; the malaria which rests on the earth about sunrise in summer, when taken into the lungs or stomach, which are equally debilitated with other portions of the body from the long fast since supper, is very readily absorbed and enters the circulation within an hour or two, poisoning the blood, and laying the foundation for troublesome diseases; while in winter the same debilitated condition of these vital organs readily allows the blood to be chilled, and thus renders the system susceptible of taking cold, with all its varied and often disastrous results. Some will say, Look how healthy the farmer's boy is, and the daily laborers, who go to their work from one year's end to another by "crack of dawn!" My reply is, if they are healthy, they are so in spite of these exposures; their simple fare, their regular lives and their out-door industry, give their bodies a tone, a vigor, a capability of resisting disease, which nullifies the action of malaria to a certain extent.

WALL DECORATIONS.—PAPER HANGINGS.

Until a recent time, the generally accepted idea with reference to wall paper has been that it is a cheap and convenient means of covering a wall which, either from age or from bad workmanship, has become unsightly. The lack of artistic excellence in the wall papers as manufactured rendered them fit for little else, and by long association, and from lack of better means, people came to use plain white walls in all rooms of which the finish cost a reasonable sum. Between frescoing or painting a wall, or decorating it in some way by the hands of an artist, and a white wall devoid of all decoration whatever, there has been no middle ground. Wall papers as produced failed to answer the want of a wall decoration reasonable in cost, and possessing artistic excellence.

Within a very few years, however, the status of wall paper has changed as completely as it is possible for any art to change. From being the last resort for covering a defaced wall, it has come to be recognized as a decorative material of the highest value.

People are realizing that white, although a very clean color, so called, is not altogether pleasing when applied to a wall at which they must look day after day, and in no direction is the growing artistic taste of the people at large more manifest than in the stimulus which the demand for tasteful paper-hangings has given to the manufacture of wall papers. The trade has assumed large proportions, and the patterns which were in common use until a short time since—about the date of the Centennial Exhibition—have been altogether discarded, and in their place there are now sold styles which, in beauty and artistic merit, excel the effect which it is possible to obtain upon a wall painted by artists of ordinary skill. The art of making wall papers has beeen carried to a very high degree of perfection. Improvements in the manufacture of paper, in the processes of engraving and coloring and in the art of printing, have all contributed to the advancement of this industry. It is usual at the present time for manufacturers to purchase designs from the best artists in the world, and, in reproducing them in wall papers, they secure even better effects artistically than it is possible for artists to obtain with a brush upon a wall. This is entirely reasonable, from the fact that an artist may spend months, if necessary, in elaborating a design for a wall paper, while the cost, although a considerable sum, becomes insignificant when distributed over the large surface covered by the reproductions. By the process of printing it is possible to manufacture papers with designs of such character as are practically beyond the ability of an artist to produce satisfactorily at any cost; and designs are readily and cheaply executed in wall papers which, if attempted by handwork of any kind, would consume an almost endless amount of time. When the blocks for a design have been engraved, the production of any quantity of wall paper by means of them, is comparatively a matter of nominal expense only.

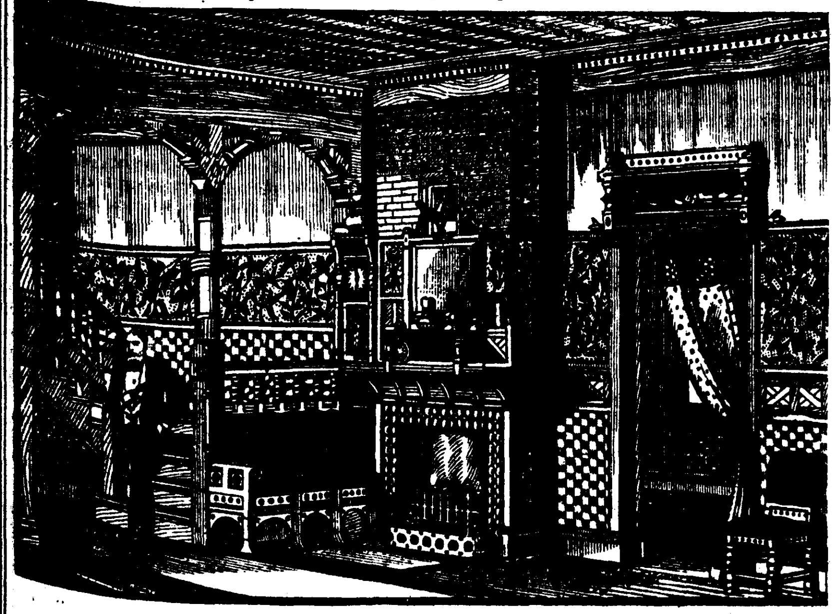
Paper, as a material for wall finish, combines a number of desirable features within itself. It is quite tough. Its surface may be adapted to almost any desired treatment. It can be made almost impervious to air, so that there is practically no absorption of bad odors. In the latter respect it is more healthful than plastered surfaces, which are always porous unless carefully painted. Taken all in all, there is no means of decorating walls which is at all comparable with paper in point of economy and durability, while for beauty and artistic excellence it is capable of producing effects which are equal to anything that is purely decorative, and which does not approach the pictorial in character.

The manufacture of paper hangings was commenced in this country as early as 1837. In no industry, perhaps, has the steady progress of improvement been more marked than in this. At first, the only paper to be had was in small sheets, which were pasted together in order to form a continuous strip or roll. The printing was done altogether by hand, by means of what were known as hand blocks. From this stage of the industry, at its commencement in this country, the course of improvement has been steady, and in some periods of the time quite rapid. It was not long before paper was manufactured in continuous rolls, and this improvement, it is claimed, called forth by the needs of the paper-hanging industry, suggested the use of continuous rolls in newspaper printing. In printing and coloring wall papers from the use of hand blocks, the art has advanced until now perfected machinery is employed for applying the most delicate tints and shades; and to such a degree of excellence has machine work attained, that few, save experts, can distinguish between some printed patterns and the same design hand-painted by a skillful artist. All are familiar with chromos, and understand the relationship which a chromo bears to an oil painting, and how faithful the reproduction may be made. The production of wall papers is in many respects analogous to it, and equal skill, with even greater success, is displayed in producing the finest effects to be found in the artist's original.

At this time we cannot do more than merely mention a few of the interesting features of this branch of art manufacture, each of which might, with profit to our readers, be elaborated into an article. The principles of taste as applied to wall papers, harmony of colors, character of design and other topics are each important, but must be deferred until another time.

The engraving accompanying this article, which was furnished by Messrs. Robert Graves & Co., of 833 Broadway, New York, is a characteristic representation of a wall paper treatment as applied to a hall and stairway. In style, the hangings employed are known as Anglo-Japanese, possessing some of the features of Japanese art, but in composition and treatment conforming to the ideas of English and American artists. The pattern represented—like all others of a similar character—is manufactured of several different grades, and finished in various shades and colors, thus adapting it for use under a variety of circumstances, and making it cost different sums. It is impossible, by means of a description and an engraving which is printed in but one color, to convey an adequate conception of any design appropriate for wall paper. So much depends upon the colors and upon the harmonies and contrasts obtained, that nothing short of inspection of the article itself is at all satisfactory. In the selection of wall papers there is occasion for the best artistic perception. With designs and patterns carefully elaborated by the highest skill, there is need of cultivated taste in the matter of choosing the decorations for the walls of any room. The very best results are possible, and yet, by bad combinations and inappropriateness of design, or from unsuitable colors, the worst results, artistically speaking, may be produced.

In conclusion, therefore, it may be remarked that whereas a very few years since wall papers possessed no artistic merit by the advancement of the art, they have come to possess such excellence that it becomes an artist's work to select and combine them. In the tasteful decoration of a house, almost as much care and thought is to be put upon the selection of the wall papers to be employed as upon the choice of the paintings to be hung on the walls.—*Manufacturer and Builder.*



REMODELLED HALLWAY.

REMODELLED HALLWAY.

We offer the accompanying illustration as an example of remodelling. In the original house the stairway was narrow and enclosed. This has been removed, and a new staircase in hardwood introduced, with fire-place and settle at the foot of the same, and at the end of the settle the old hall clock. The upper portion of this fire-place has the brick-work exposed, the lower portion being encased for mirror, etc., and above the mirror a small sconce mirror. As will be noticed, the doorways into the principal rooms from this hall are without doors; a curtain of heavy material, hung to a rod with rings, forms a means of shutting off the view from the hall when desirable. The end of the main hallway is marked and divided by a newel column bracketed each way.

We are indebted to Bicknell & Comstock, New York, for our illustration and description, from one of their latest publications, entitled "Woollett's Old Homes Made New," containing twenty-two plates of exteriors and interiors.

Painters' Work.

THE DECORATION OF THE STAIRCASE AND CEILING.

BY ROBERT W. EDIS, F.S.A

A London staircase is generally a cold and dreary approach to the real withdrawing or living rooms of the house,—the rooms where we receive our guests and spend our pleasantest hours—often a long vault, walled in with blocks of imitation marble, a cold stone staircase, with cast-iron balustrading of the worst possible design—generally imitative of wrought-iron construction—thin, poor, and often unsafe, with a thin moulded handrail, with what are technically called ramps, wreaths, and curtails of the usual speculative builder's character. Of course all these must remain. We cannot exchange them for the wide oak staircase, with its boldly carved newels, handrails that look like support, and handsomely turned balusters of Elizabethan date; such, indeed, as are still left in numerous old English mansions, and in some few of the older London houses; but we can make them more cheerful, and less cold and dull. A painted and varnished dado, with a wooden moulding raking with the handrail, or plain deal painted panelling, will be at once a help and improvement. The wretched ironwork painted in a plain bright color—not picked out in gold, to show its peculiar eccentricities and faults of design—and the thin moulding which serves as a handrail ebonised as a contrast, will all help the peculiarly unfortunate lines on which you have to work. Above the dado, either distemper or paper in some warm and cheerful color. If you paper, let the paper be one of general tone,—otherwise the great space to be covered will be spotty and disagreeable.

A deep frieze of boldly designed painted or stencil ornament, will assist much in breaking the usual bad proportion of the staircase wall, while panels may be framed in bold lines of paint or distemper, wherein may be framed pictures or other art work. A good neutral tint or warm grey ground, with ornament in green and vermillion, has a good effect, if the colors be carefully treated; or a wide diaper, with patterns interchanged, and charged with shields and legends here and there. Any good photographs, sketches or studies, are useful to hang on the rake of the staircase, on the eye line, to take off the general coldness. Many varieties of tints will suggest themselves, which will help give a bright and cheerful character to the passage way of the whole house, in place of the cold and dreary, rightly called, wall to which we are so accustomed. As a rule, the lower flights of a London staircase are fairly well lighted, and the walls can therefore be hung with drawings. If possible, put here and there a piece of china, or a good figure on brackets, in the angles, to break the ugly appearance of the narrow half landing. A carefully designed lantern light, filled with leaded and jewelled glass, hung from the ceiling, will cost no more than the miserable pointed iron or bronze brackets which are generally affected, and will light the stairs more evenly. A bright drugget, nearly covering the whole of the treadway, is surely better than the narrow three-quarter width carpet, with its edges of cold painted stone; while here and there, on the landings and half spaces, a small Persian or Indian rug or prayer carpet,—which can be bought for almost the price of the carpet usually used—will give color and brightness, and add to the feeling of warmth and comfort; and these, always remember, can be taken up easily, and shaken if requisite every day, and are certainly more cleanly than the closely fastened down carpet, under which the dust accumulates and stays for many months.

If the landing or half space be large, put a comfortable or low couch, with some bright covering, and a stand for flowers or china; for any bit of color, either of nature or art, will add much to the cheerfulness of this part of the house. Nowadays, the art of China and Japan is well known to all of us, and, although I do not for a moment advocate any imitation of Japanese work in the decoration of English houses, yet there are many things we may do well to study Japanese work for. In painting on china and faïence, in every form of decorative art, the Japanese show a keen love and an intimate knowledge of all that is best and beautiful in Nature, and are always at their best in depicting her ever-varied form, whether in flowers, tree or animal life. With a few exquisite touches the loveliest forms are placed before us, with great truth and freedom of drawing; and in all their art there is a desire to set forth beautiful form, and to express lovely combination of color in ever-varying fancy. They always seem to remember that all true decoration is based on construction, that the life and flower, so to speak, of decorative work must spring from the root and framework of construction; just as a good painter will draw his figure first, before clothing it, and the trunk and branches of a tree before covering it with foliage. What can be more exquisite than some of the drawing and coloring of the innumerable paper and silk blinds and fans that have been imported to such a large extent in the last few years? Many of these can be bought for a few shillings, and are admirable pieces of color decoration to hang on the walls of hall or staircase, or framed in small panels round the frieze.

The coloring is generally quiet and refined in treatment, and eminently decorative, and at the same time perfectly true to nature. Where an ordinary workman would conventionalize a flower or bird, and produce whole rows of them, without variation of any kind, in a stiff and unnatural manner, these Japanese artists give us endless variety and coloring, always graceful and effective, and never crude or coarse in color. By a few touches they produce nature in life and movement—a tree bent and shaken by the wind, a blade of grass bent or broken by some passing footstep, a spray of flowers waving with the summer breeze; birds in endless movement, flying or asleep, and all true to the characteristics of their life and form. In the lily, the carnation, convolvulus, fruit, or May blossoms we see numerous examples of our own English flowers, depicted in a way which few artists in England can equal or excel. All such bits of decorative art can be made much of in the dull monotony of a London house, and nowadays can be purchased at a very trifling cost.

If you will only trace, or get traced, some of the outline sketches of wild fowl, cocks and hens, pheasants, or storks, you will find they can be used with good effect as stencil decoration for the upper portion of the staircase walls, or in smaller scale for panels of doors, shutters, and other woodwork, which, as a rule, are left plain and untouched. For instance, suppose you have the usual four-panel doors common to most of our houses, with moldings run around of no particular design, I would suggest that you should paint them in two shades of color, to harmonise or contrast with the paper on the walls, the panels being the lighter shade, and on these stencil some of the designs I have alluded to in the darker shade; and then varnish the whole. By these means you will obtain, at the cost of a few shillings, a real good piece of decoration, which will always be pleasant to look at, instead of the dull monotomy of imitation graining of oak, maple, or satin wood, to which we are so accustomed. In decorative art we have much to learn from the artists of Japan, who for many hundreds of years seem in their humblest articles of daily use to have carried out some impress of their love and knowledge of Nature in her most beautiful forms.

It is a somewhat difficult matter in most London houses, where the ceilings are generally plain, and bordered by cornices of inferior design, to treat them with any amount of color. In houses of the date of Adam the ceilings have generally some very delicate enrichments all over them, either flowing or arranged in patterns very slightly raised. Whenever these occur, it is well to treat them almost like Wedgewood ware, with, say, light tones of pink, green, grey, or buff, in very delicate tinting; but where the ceiling is quite flat it is desirable to tint it a light tone of grey or cream color, to get rid of the extreme glare of pure white. Next the cornice a simple distemper pattern, of a darker shade of the same color, will often be found effective and useful, or one or two simple lines with stencilled corners. The tinting of the cornices must materially depend upon their design and contour; if plain molded cornices, they may be tinted in one or two shades, the lighter tones being always at the top or next the ceiling, and gradually darkening off to the wall decoration. As a general rule, one or two of the tints of the general groundwork of the paper may be used with effect; if, however, the cornices contain the usual ill designed and modelled plaster enrichments, care should be taken to keep them in the background, and to pick them out as little as possible, so as to avoid making their general badness of form and execution too prominent.

It is well to remember a few general rules in decoration of ceilings and cornices, on which to rely when choosing colors or tints. For instance, in using what are called primary colors on molded surfaces, it is well to remember that yellow increases, while blue diminishes in strength; the former should therefore be used on convex, and the latter on concave moldings. All strong colors should be definitely separated from each other by light lines, fillets or small moldings; colors on light grounds appear darker by contrast, while those on dark grounds appear, as a rule, lighter. If the cornice presents any broad flat surfaces, a simple conventional flower or geometrical pattern can often be used to great advantage, care being taken not to make it too prominent; the great aim being to keep the general work subservient, and in no way to form a dark molded frame for the mass of light ceiling. The ordinary system of stencil decoration can be carried out at a very small expense, and with a few good patterns, very good effect can be obtained in ceilings, where generally little or nothing is done; nor is it a very costly matter to lay on to the flat ceiling, small deal moldings formed into panels, and painted, with the panels filled in some very light diaper paper or stencil enrichment.

Michael Angelo, Domenichino, Vasari and other artists, covered their ceilings with paintings and fresco, beautiful in themselves, but trying to those who have to look long at them. Michael Angelo, much against his will, painted in elaborate decoration the ceiling of the Sistine chapel; but Giotto, who knew thoroughly well how to decorate, declined generally to waste his work where it was, at its best, but difficult to see; and in the ceiling of the Arena Chapel we find only a plain light tint of pale blue, contrasting well with his fresco decoration on the walls.

In French ceilings we find many graceful enrichments, especially those designed by La Pôtre, from whom Inigo Jones probably took many of his ideas and thoughts; afterwards Vanbrugh and Gibbs followed with work of similar character, until the perfection of this kind of cast enrichment was attained by Athenian Stewart and the brothers Adam, whose delicate detail, fanciful and flowing treatment of design may yet be seen in some of the old houses of London, and are well worthy of study in all plaster decoration.

TAMPERING WITH THE PATENT LAW.

Most of our readers are aware that there is a movement on foot to induce the United States Congress to make some important changes in the patent law—changes of such a nature that, if passed, they will inflict a most serious blow upon the inventive genius of this country, the progress of which has so greatly been aided by the fostering protection which the law, as it now exists, has extended to it. The proposed changes, while being detrimental to inventors, patentees, and owners of patents, will be highly profitable to such manufacturers, corporations, or any other parties whose interest it is to make use of valuable patents or inventions not patented, at the least possible expense, or without any expense whatever. At the same time it will be a blow against the Patent Office itself, and considerably diminish its income, as many inventors, seeing the increased expense of securing patent rights, and the still more increased uncertainty of maintaining or enforcing the rights when obtained, will not be so ready to apply for patents, being debarred either for want of sufficient means or unwilling to pay more under diminished chances for protection in the ownership of the laborious product of their brains.

The nature of the changes in the patent laws proposed, proves that the proposal comes from: 1st. Parties who thus far have succeeded in secretly infringing various patent rights, and are tired of this secrecy, and at the same time in fear that at any time patentees may prosecute them for damages. 2d. Parties who are dissatisfied because they are prevented from using certain patented inventions, which, if they could use without paying the patentee, would enable them to earn immense profits. We know of several patent rights, which, if they could be annulled or made difficult to enforce by a new law, it could truly be said "there are millions in them."

In order to justify our unfavorable opinion of the proposed changes, we will mention a few of them, with our comments.

"*Section* 1. No damages can be recovered for infringements that have taken place more than four years before beginning the suit."

The result of such a law would be, that if an infringement escapes the notice of the patentee for four years, the infringer goes free and the patentee gets—*nil*, minus his costs, as a remuneration for the value of his invention.

"*Section* 2. Any one will have a right to use any invention upon paying the patentee a price, the amount of which is to be settled by the courts."

This is downright robbery, as by such a law a patentee would no longer be master over his own invention, and would have to accept a price not agreed to by himself, but fixed by his antagonists. His patent would fall to the level of a description of an invention, which anybody could use without even asking him.

"*Section* 3. If an inventor proves an infringement and the judgment allows him less than $20, he must pay all the costs of the court, his own as well as those of the defendant—the infringer."

This is practically a threatened heavy fine upon an inventor who dares to sue an infringer, as by sharp law practice the latter may often succeed in obtaining a judgment against himself for less than $20.

"*Section* 4. Infringers have the right to continue their infringement, during any procedure by the patentee, until a verdict is rendered against them."

"*Section* 5. Infringers have the right to remove any injunctions against them, in order to have the privilege to continue infringing."

"*Section* 6. No re-issues shall be granted, unless applied for within seven years from date of patent."

These sections are evidently for the direct benefit of infringers.

"*Section* 7. Inventors cannot base any prosecution for infringement upon a re-issued patent, but only upon the original."

This shuts off the benefit of any correction of a deficient claim by a re-issue, so that in the future re-issues would become worthless, and no inventor would hereafter apply for one.

"*Section* 8. A patent taken out jointly, when only one was the inventor, is void."

"*Section* 10. Infringers may commence suits against patentees to declare their patents void."

This is simply intended to assist infringers to break down patents that stand in their way, and to do it quite easily if the patentee is poor, absent, or dead.

"*Section* 11. If patentees do not commence suits against infringers whom they have warned, within a reasonable time, the infringer may continue the infringement during the entire term of the patent without paying the patentee anything."

"*Section* 12. Besides the $35 to be paid at the issue of the patent, the patentee must pay $50 more in four years, and $100 more in nine years; total, $185 for the price of a patent, as failure to pay any of these sums annuls the claim."

The increased liability of poor patentees would be another cause of diminished applications, and the result would be the same as experienced by a merchant who doubles and trebles his prices while he deteriorates the quality of his goods—namely, a decrease in business. In this case the old advice may be given: "Let well enough alone."

In saying this, we do not mean to convey the idea that we consider our patent laws of the highest perfection, but certainly if the proposed laws were adopted things would be a great deal worse than they are now. The principal evil to be corrected is of a very different nature from that reached by any of the provisions above detailed. It is this:

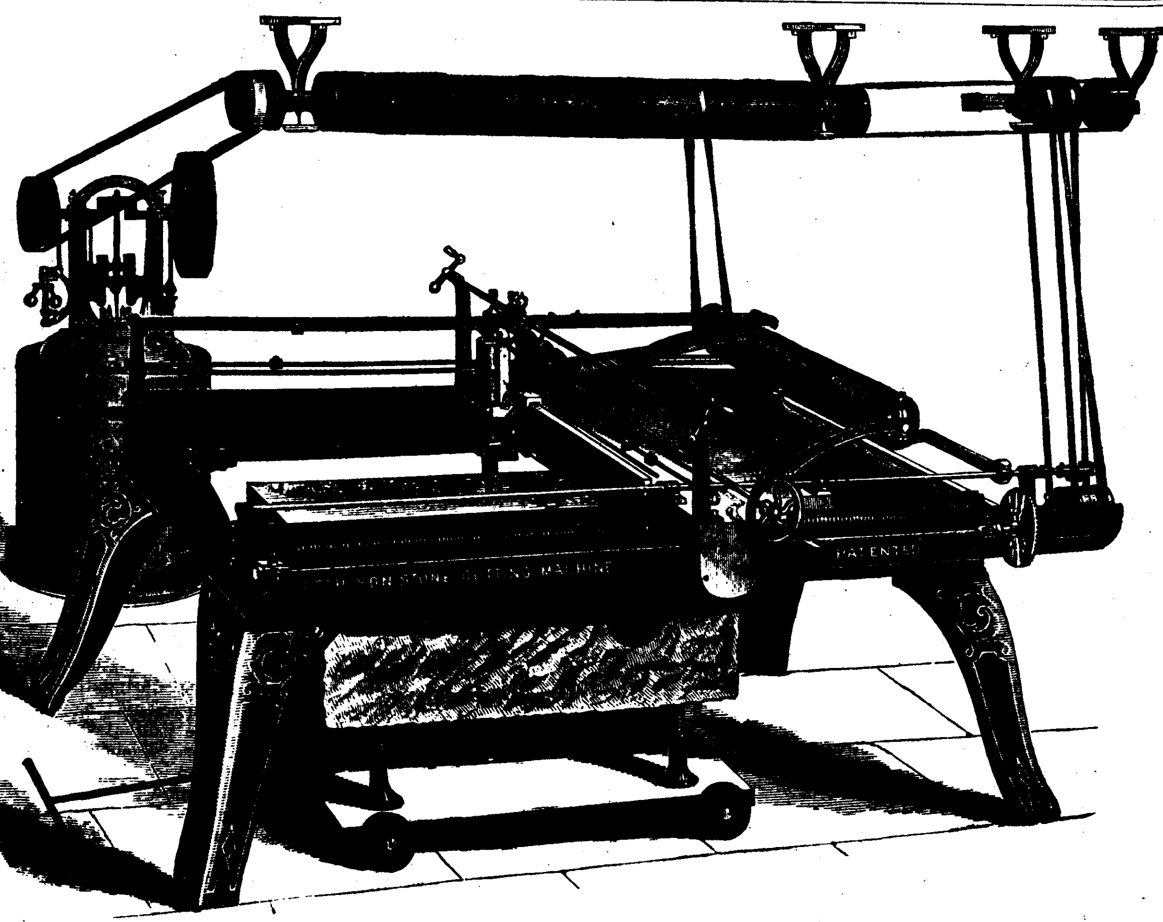
Frequently a party takes out a patent for an invention, with which he does nothing whatever, debarring others from using it; and if, in ignorance of his claim, some manufacturer uses a process similar to his, and the patentee discovers it and thinks he can prove an infringement, he comes down on the poor manufacturer, bleeds, and often ruins him.

Another evil is that some patentees have such exaggerated ideas of the value of their inventions that they ask exorbitant prices or royalties that no one feels justified in introducing the invention, however good it may be in itself, fearing that it will not pay. For this reason many otherwise valuable inventions have been kept out of use. These cases have been reached better by the patent laws in France. There, when an inventor does not prove that he has not neglected to introduce his invention within a certain period, in such a way that the public could reap the benefit of it, his invention becomes public property.

We hope and trust that the good sense of our legislators will prevent them from making changes for the worse in the patent laws, which certainly would be the case if the law at present proposed were adopted, which, while it does not reach the evil, is a glaring injustice to all inventors and patentees.

Since putting this article in type, we understand that the movement to induce the United States Congress to make the above changes, has, from the strong representations made against such alteration, been abandoned.

IMITATION MARBLE.—A German glass company near Freden, Hanover, make imitations of marble from glass, which, on account of its superior hardness, is preferable for some purposes. They imitate marble table and floor slabs.



ATCHISON STONE CUTTING MACHINE.

REVOLUTION IN STONE CUTTING.

The introduction of machinery for cutting and dressing stone will effect a total revolution in that business. In place of the tedious and unreliable dressing by hand labor, which can only give satisfactory results when an expert hand executes it with great care, machines can now be procured which will perform the same labor with reliable accuracy, and at the same time great dispatch.

Among the machines of this class, we hold that the one to which we referred on page 36 of our late February number, which is known as the Atchison stone cutting machine, and of which we now give a representation on this page, stands foremost. It is adapted for cutting and planing granite, or any other kind of stone, to dress and finish the surfaces more satisfactorily either for building purposes or polished work, and it does this work in considerably less than half the time that it can be accomplished by the most expert hand labor.

The cutting tools are two in number, and are arranged in a strong head piece attached to a moving platen, similar to the iron planing machine. This platen, with the head piece, is made to move forward and backward over the stone, and the tools having a perpendicular, reciprocal, rotating motion, cut the surface at the rate of not less than 6,000 blows per minute. The rapidity of this motion is of great value in the use of the tools—the wear is less than one-half compared with hand work. The tools are semi-circular in shape at the edge, made of Jessop steel, and can be used constantly for at least forty-five minutes without changing, thus one set of tools will cut not less than 270,000 blows without re-sharpening.

The advantages of this machine are: 1st. That it is of simple construction, and therefore not liable to get out of order. 2d. It is very easily managed and requires but little care—so little indeed, that, 3d, one man can operate three machines and sharpen his own tools, which is easily done by the use of a die, a new and valuable method. 4th. They require little power to run them, one horse-power for each machine being amply sufficient. 5th. The tedious process of sighting or measuring is dispensed with, as the machine cannot possibly work the surface irregularly or out of wind. 6th. The edges of the stone are always evenly and perfectly cut without "chipping." 7th. The slight cutting blows of the tools, produced by a peculiar motion, leaves the surface absolutely solid and free from "stunning," which is important for polished work. 8th. The principle upon which it operates is eminently adapted for ornamental work. 9th. The rapidity and accuracy with which such machines cut moldings, cornices, ornaments, letters, etc., on all kinds of stone, place them far above all other attempts thus far made in this direction, overcoming the supposed insurmountable obstacles in the way of making ornamental stone-work by machinery. 10th. Last, but not least, the great saving of time and the diminished wear of tools.

We are informed that the machine here represented is the result of four years' steady work, to improve the plan of planing granite by machinery, and the inventor, Mr. Atchison, of Boston, can look back with satisfaction on the labor spent in this direction, as it has resulted in enabling contractors and builders to accomplish in hours what heretofore it has taken days to do.

UTILIZING THE WASTE HEAT OF EXHAUST STEAM.—Mr. James Atkinson recently described before the American Society of Engineers a new apparatus for utilizing the waste heat of exhaust steam. This apparatus consists of a number of straight tubes screwed into a tube plate, which forms the base of an inclosed cylindrical vessel containing the tubes and the water to be heated. These heating tubes are closed at their upper ends, but are open at the bottom to the exhaust steam, for which a short direct passage is provided. Small circulating tubes draw any air out of the heating tubes which would prevent them being filled with steam. The latent heat of a portion of the exhaust steam is transmitted through the heating tubes to the feed-water which is forced through the heater, and passes into the boiler at a temperature of from 210° to 212°. It is claimed that this heater is perfectly free from back pressure in the engine.

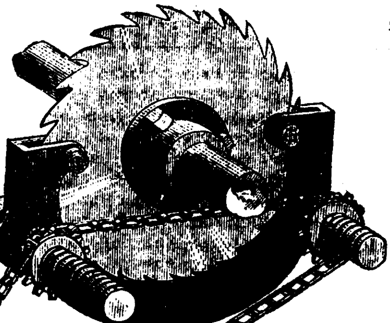


Fig. 2.

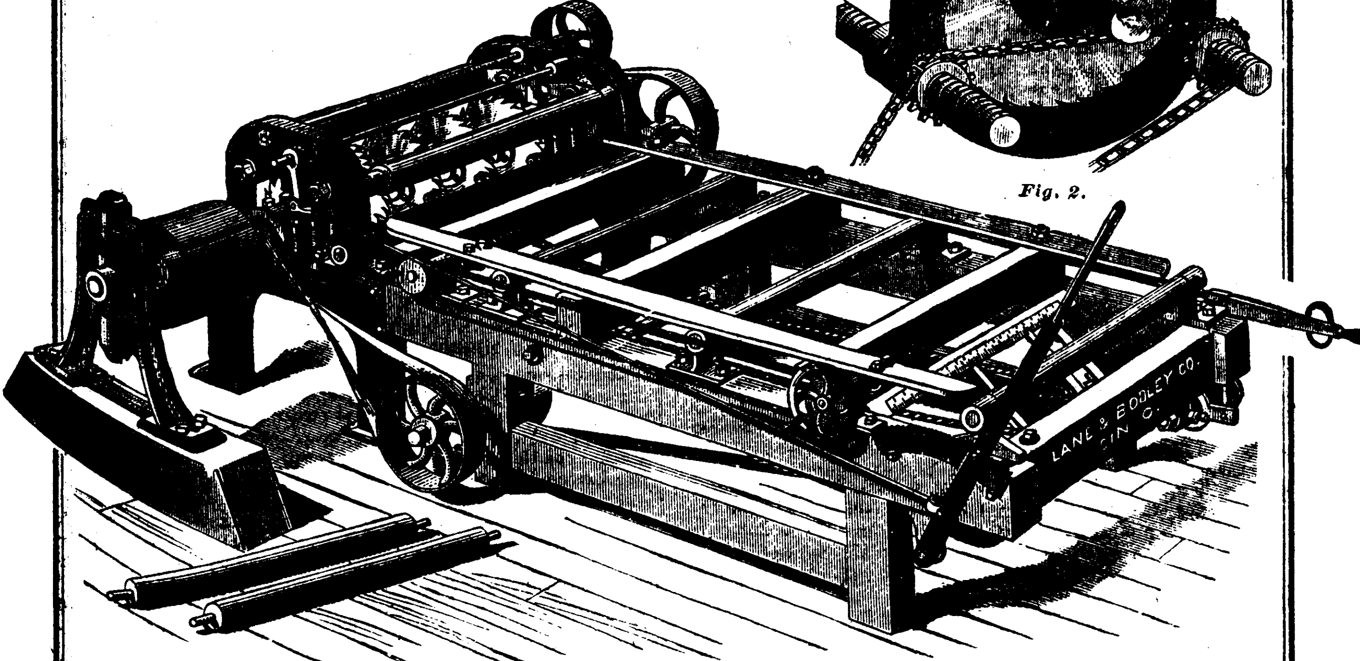


Fig. 1.—GANG-EDGER.

IMPROVED GANG-EDGERS.

Among the machines which have been evolved by modern progress in the production of contrivances for special purposes, are what are called "gang-edgers." They are intended to split wide boards, square their edges, rip scantling, car sills, and other framing timber from cants, and this with great economy of power and time, in comparison with the ordinary methods, as done with large mills. They consist of a power-feed with a movable bed carrying the stuff under a revolving shaft, provided with a number of adjustable revolving saws, and adjustable fences. The machines of this kind thus far made had defects, which have been overcome in the one represented in our engraving, and which is giving great satisfaction, judging from the very flattering testimonials which have fallen under our notice.

The main frame is of cast-iron, of simple design, and of great strength. The mandrel is 2 15-16 inches in diameter, and has three patent self-lubricating bearings, one of which is on a pedestal at the outside of the main pulley. A feather is secured to the mandrel for the pulley and the saw collars. The saws are from three to six in number, and fitted with means for adjusting their position when in motion.

The radical improvement is in the method of holding and moving the saws. All other devices thus far invented take hold of the saw collars in a groove. The result is much wear, while the unguided saw follows the grain of the timber as it may lead, to the extent at least of the last motion of this collar, and all links and joints to the confining notch, so that the products of such machines are very irregular in thickness, and no carpenter expects to get his framing timber within one-fourth of an inch of a uniform size—so universal has become the admission of the imperfection of gang-edger sawed stuff. This slack control of the saw makes a very heavy saw-plate a necessity, and it frequently happens that the mandrel is sprung, the saw spoiled, or the machine stopped, by the "running" of the saw from a true line. It has been the aim of the inventors to remedy this difficulty and also to supply a machine to run with a thinner saw and less power, and to make accurate lumber, so that the machine will be satisfactory to box makers.

Fig. 2 illustrates how this has been accomplished. The grooved collar and forks are abandoned, while the saw is held between two pairs of fingers, or guides, at opposite sides of the saw, just as a man would take hold of the plate to slide it, were the saw not in motion. Thus the rim is guided, and the saw restricted at its cutting edge to the *set* line, and opportunity is given the center to right itself, if by heat it should expand and buckle.

The two guides have adjusting screws, and are at opposite ends of a yoke. Each end of the yoke carries a nut with sprocket teeth on the end flange. These nuts are supported at each end by coarse pitch screws, lying parallel with mandrel across the frame. A chain passes over the sprocket wheels on the nuts, to similar nuts and screws at the front of the receiving table, where a constantly rotating shaft, driven by a belt from the feed counter-shaft, communicates motion through the chain and nuts to either saw, and moves them in either direction, as either pulley of a friction reversing gear is engaged with the rotating-shaft. Clutches are provided for throwing into gear either one of the chain-nuts, so that adjustment of one saw may take place without disturbing another.

The lower feed-rolls are driven by a pulley on end of each, and a single belt. A tightener is provided, under the control of the sawyer, for putting additional strain on the belt, as may be needed.

The upper rolls are carried in the ends of four short levers, pivoted near their center, and are raised by a link fastened to the free end of each pair, and connected by a rocking-shaft, cranks and rods, to the sawyer's stand.

The sawyer raises the rolls to receive stuff of greater thickness than the preceding piece, but the weight of the rolls gives sufficient resistance to the feed of the lower rolls, to carry through rapidly four-inch stuff, with all the saws cutting. The shaft of the stationary binding pulley on the feed-belt forms a brace for the top of the frame, and also a return-roller for assisting the return of boards, requiring a second passage through the machine. The front table is furnished with the machine. It has iron rollers, one stationary fence, and on the opposite side of table an adjustable one. This has a parallel movement by a screw at each end, connected by a chain, so that the sawyer can adjust it without leaving his place. These machines are manufactured by the Lane & Bodley Company, Cincinnati, Ohio, to whom we refer for details, prices, etc.—*Manufacturer and Builder.*

Scientific Items.

Spectroscopic Test of Blood While in the Human Body.—The compound which oxygen makes with the coloring matter of blood—namely, oxyhæmoglobin — gives a well-marked spectrum having two absorption bands. Herr Vierordt, a German physiologist, has pointed out that this may be simply observed by putting the fourth and fifth fingers one over the other, and bringing their line of union before the slit of a spectroscope, the light used being sunlight transmitted. If now a caoutchouc ring be passed around the fingers so as to stop the access of arterial blood, the two absorption bands in the spectrum disappear in a few minutes, the spectrum giving place to that of reduced hæmoglobin. Take the ring off, and the former spectrum recurs. These phenomena evidently give information in regard to the rate at which oxygen is being used up in the human body, and might, Herr Vierordt thinks, be advantageously utilized by physicians. To this end, he goes on to show that even reflected light will give the indications, and they can be conveniently observed from a finger, the red part of the lips, the tongue, red cheeks of young persons, &c., with a Browning spectroscope. The observer notes exactly the moment at which, say, a caoutchouc ring is applied to the finger and the moment of disappearance of the bands. The latter may seem vague, but with practice a sufficiently exact judgment may be formed. Vierordt gives a detailed account of the changes that occur. Without here following him in this, we note the results of a large number of experiments made on himself between the 7th of May and the 3rd of July. The amount of consumption of oxygen then in normal, quiet life, is found to show considerable variations (as much as nearly threefold). Immediately on rising out of bed, the process is slowest—about 4 minutes 5 seconds on an average. The muscular exertion in dressing and washing increases it somewhat (it was 4 minutes 42 seconds), and it becomes much quicker in the next half hour (2 minutes 35 seconds), doubtless partly due to breakfast. The values then are pretty constant till after the mid-day meal. Immediately after this it rose (2 minutes 10 seconds), and one hour later—at 2 o'clock— reached a maximum (1 minute 24 seconds). Then comes a gradual decrease, till, between 6 and 8 o'clock, something like the value in the forenoon is reached again. Supper gave, in the only two cases observed, a considerable rise (1 minute 36 seconds). Various occupations had a marked influence on the phenomenon ; thus, continuous speaking always increased the consumption of oxygen ; so did sundry other bodily movements, such as walking, &c. Specially interesting was the increase in consumption observed during a temporary indisposition of the experimenter. Shortly before and during the ailment low values were had ; but as he grew better the values rose again. By intensifying his breathing he could considerably increase the time in which the absorption bands disappeared. It is notable that the dissociation of oxyhæmoglobin occurs in about two minutes—that is, about the time in which suppression of breathing is found to cause the greatest phenomena in the system.

Coating Metals with Platinum.—Mr. Dode, a Frenchman, has recently invented a process for covering iron with platinum. The iron is first coated with a preparation of lead and copper. It is then ready for the platinum composition, which is thus made : Ten parts of platinum are converted into chloride, mixed with five parts of ether, and permitted to evaporate in the open air. The residue is incorporated with a compound of 20 parts borate of lead, 11 parts of red lead, some oil of lavender, and 50 parts of amyle alcohol. Into this mixture the article to be coated is dipped, then allowed to dry in the air, and finally heated to a moderate temperature, in a muffle furnace. A practical demonstration of the *modus operandi* was recently given at the laboratory connected with the Mint and Bank of England, at which the ease and simplicity of the operation were fully seen and acknowledged ; but as the invention is a recent one, the important element of time and wear to test his work is as yet wanting. The invention relates more particularly to the coating of articles of cast-iron, but is also applicable to the covering of other metals in order to preserve them from oxidation under the action of air, fire, or acid gases. The same process is applicable to glass. The processes hitherto known for the coating of metals have only imperfectly attained the object in view, inasmuch as the coverings of copper, nickel, silver, or tin, applied by immersion or with the aid of galvanism, are not adapted to prevent oxidation. Mr. Dode's invention consists in the application of platinum in such a state of division as to enable it to be employed as a preservative against the oxidation of metals, whereby a considerable saving is effected, as compared with the systems at present in use, and much greater efficiency is obtained.

Coating Metals with Tin.—The process of coating metals with tin promises to extend its use for culinary and other uses. Its electro-deposition is proposed by means of a zinc and carbon battery. The inner cell containing the zinc is filled with dilute sulphuric acid. The articles to be coated with tin are put into a bath composed of 8 parts of proto-chloride of tin, 16 of cream of tartar, and 2 of the chloride if the latter is used. When it is present the tin coating is effected more rapidly, whereas, when the bath is composed of proto-chloride of tin and cream of tartar only, the tin coating is very white, but is not produced so rapidly as when the chloride is used. These ingredients should be dissolved in about 100 gallons of distilled water. The black plates are first "pickled" in any suitable manner, and then immersed in the above described bath or solution, and are allowed to remain in the same for a longer or shorter time, according to the thickness of the deposit or coating of tin required on the plates. While in this bath the plates or other pieces to be coated are connected by a wire with the positive end of the battery, while the negative end of the battery is connected with a piece of tin hung in the same bath. When the plates or other pieces or articles have been sufficiently coated with tin, they are held over a fire in order to give the tin a lustrous appearance.

Transmitting Power by Electricity.—Profs. Elihu Thomson and Edwin J. Houston have an important article in the journal of the Franklin Institute for January, concerning the practicability of the transmission of power to long distances by means of electricity. It has been stated by an eminent electrician that the thickness of the cable required to convey the current that could be produced by the power of Niagara would require more copper than exists in the enormous deposits in the Lake Superior region. Another statement estimates the cost of the cable at about $60 per lineal foot. Profs. Thomson and Houston on the contrary assert that it is possible, should it be deemed desirable, to convey the total power of Niagara a distance of 500 miles or more by copper cable not exceeding one-half of an inch in thickness. Stripped of its theoretical considerations, they say the important fact still remains, that with a cable of very limited size, an enormous quantity of power may be transferred to considerable distances. The burning of coal in the mines, and the conveyance of the power generated by the flow of rivers, may therefore be regarded as practicable, always, however, remembering that a loss of about 50 per cent. will be almost unavoidable.

Triumph of Electrical Science.—In the cable news of a few days since, it was stated that the French Atlantic cable was " broken 161 miles from St. Pierre Miquelon, in 500 fathoms of water." These few words show one of the many triumphs of modern electrical science. Here is a wire cord buried under three-fifths of a mile of the water of the ocean, and 180 miles from land—and yet the people on shore can exactly locate the points at which it is broken. Strange as that seems, it is actually done, and has been time and again. The repairing vessels will go out to the indicated point, throw over their grappling hooks, and within a few hundred yards will find the broken ends and splice them. This wonder is accomplished, first, by exact knowledge of the laws of electricity, which make known what amount of currents a wire of a given dimension will carry, and the resistance it must overcome in going to a given distance, and next, by the instruments made by the mechanicians of our day, which will make the operation of both laws visible to the experienced observer, even if the break in the cable is a thousand miles away and two miles under the sea.—*Philadelphia Ledger.*

Pig-Lead from Smoke.—The following explanation is given as to how pig-lead may be produced from smoke : In the process of smelting the ore a great deal of it escapes in the form of lead fumes, and the White Lead Company was organized for the purpose of catching this smoke, and, by passing it through an almost endless line of pipes of sheet-iron and woollen bags, condense it. The result was that after an outlay of many thousand dollars and a year's experimenting, they have succeeded in condensing the smoke or lead fumes, into metallic lead, the same as steam is converted into water. The product of the fumes is a bluish, impalpable powder, which makes a splendid blue paint, pronounced equal to the corroded article. For the purpose of making it white several furnaces were built, and the blue product, with the aid of an intense heat, is again changed into lead fumes, which are again condensed, and come out pure white lead. In the transforming of the blue lead into fumes, the object is to sublimize it all, but the heat is not powerful enough to do so.

A NEW LIGHT.

The English papers are largely discussing "a new light," which is new, however, only in the fact that it is an intensified gaslight. It is by some called "the albo-carbon light." This light consists in the use, as an auxiliary to common gas, of some properties of pure white carbon in the solid form of small cylinders; not much unlike in appearance to a stick of pure white candy.

The machinery required to adapt the feeder and enricher to an ordinary gas burner is extremely simple, and can easily be adjusted by any one skillful enough to fill and trim an ordinary table lamp. Albo-carbon thus stands in favorable contrast with the elaborate machinery at present required for the production of the electric light. While it economizes the consumption and improves the quality of the gas, it involves no change in mains, meters or piping, or the general apparatus of gas service. In the case of single lights, the apparatus consists of a metallic chamber of spheroidal form, fixed at a slight distance from the burner. In this vessel the albo-carbon is placed, and the substance, becoming liquefied by heat, gives off an inodorous vapor, which mingles with the gas made to pass through the vessel, and produces a combination of illuminating power vastly superior to that of common gas. The enriching material is a form of naphthaline, and is clean, portable, and inexplosive.

The proprietors of the patent claim that albo-carbon causes no obstruction and leaves no residuum; and that the vessels in which it is placed may be replenished without the slightest fear of accumulating deposits, so perfectly exhaustive is the evaporation of the substance under heat. At a recent exhibition of the light near London, a variety of interesting photometric tests were applied to the light, and its power was gauged and measured under a variety of aspects, one of the most pleasant of which is its hue, which, while intensely brilliant, is cheerful and sunny, while the shadows cast by objects illumined by it are not of that dense darkness which contrasts so strongly with the moonlight brightness of the electric light. Gaslight, enriched by albo-carbon, is a warm, sustained, and steady light, not, however, calculated to fatigue the eye; but its value was made known most readily and most convincingly when the spectators passed from the brilliantly-lit eastern section to the main body of the building illumined by common gas, under which it presented an appearance of well-nigh murky dimness.

The Stings for Rheumatism. — The *Peager Wachenblatt* contains the following in regard to the cure of rheumatism by the means of bee stings. The correspondent say that his wife having suffered so much as to be unable to enjoy any rest or sleep for the space of six months, the right arm being almost lame, preventing the sufferer from doing any household work, making her even unable to dress or undress herself, and having heard that a farmer, quite incapacitated by rheumatism, had been accidentally stung by bees, and thereby got entirely cured, he persuaded his wife to try this remedy, as the pain from the sting of the bees would not be greater than that already suffered. Three bees were therefore laid and pressed upon the right arm for a considerable time, in order that the poison bladder of the insects should entirely empty itself. The effect produced was astonishing, as the lady, even on the first night, was enabled to enjoy a long good sleep, the first time for at least six months, the pain being entirely gone. The arm was, of course, swollen greatly in consequence of the sting, but the swelling gradually disappeared upon the application of some cooling lotion. All pain was gone, the lame arm recovered its previous vigor, and not the least sign of rheumatism has since showed itself.

Old and New Objects of Invention.—The inventions of the last hundred years sometimes appear more grand and far reaching than any now being developed or demanded. But it must be remembered that the old inventors had a clear field. Everything was demanded and nothing was done. The steam engine, the cotton gin, the telegraph, smelting with pit coal, the hot blast, the rifled cannon, and all the other great inventions which have changed the whole aspect of life, were then unknown; and even the most imperfect development of them was more striking and revolutionary than the later and really more valuable refinements of the same inventions. And it does not follow that less useful work is wanted or likely to be done now. On the contrary, the improvements in steam power, for instance, likely to be developed during the next hundred years, will have a greater money value than all that has preceded—perfect as the steam engine is to-day. The old inventors were called upon to discover and open the doors of Nature's storehouse; the later inventors are called upon to bring out and set in order her wonderful secrets.

PECULIAR BEHAVIOR OF CAST IRON.

A peculiar phenomenon has been repeatedly noticed with cast iron long submerged in the sea. A grey, spongy, light mass is formed, which in several cases, when brought to the surface, ignited spontaneously. Thus, for instance, cast-iron cannon raised after 50 years from a man-of-war sunk near Cariscrona, were reduced one-third to the mass described above. After being exposed to the air for about 15 minutes the cannon became so hot that they could not be touched, and the water with which they were moistened was converted into steam. During a naval battle between the French and the English in the year 1545, an English vessel was sunk off Portsmouth. Three hundred years afterward the bronze ordnance of the man-of-war were raised by divers. In one of them there was a cast iron-ball, which, as soon as it came into contact with the air, was heated almost to redness, and then fell to pieces, which weighed together only 19 pounds, while to judge from its diameter the ball must have weighed originally about 30 pounds. Modern chemical science would find it easy to trace the causes of this phenomenon, while a 100 years ago somewhat violent assumptions were deemed necessary to account for it. Thus a ship's physician has placed the following explanation on record: "It is probable that the cannon were sunk in the heat of battle, and therefore had not sufficient time to cool off." Thus the heat must have remained in suspense for a long time, which may account for its promptness in making itself manifest upon return to the outer world.

TO PREVENT EXPLOSION.

Mr. John Napier, of Edinburg, Scotland, proposes the following mechanical device for the prevention of boiler explosions: The device consists in the attachment to the boiler of a plate of copper or other metal of similar qualities and ductility, which plate is firmly secured between two perforated plates of iron or other metal, and is covered by them on its upper and lower sides, except at the places of perforation, these places corresponding to each other in the upper and lower plates. The perforations are greater or less in diameter, according to the size of the boiler. Direct communication is established between the apparatus and the interior of the boiler, and according as the thickness of the intermediate plate is varied with reference to the strength of the boiler, it resists a greater or less pressure. When this pressure is exceeded, the steam causes the intermediate plate to give way at one or more points between the corresponding perforations of the upper and under plates, and by the steam thus escaping from the boiler an explosion is prevented. The apparatus, which is intended to be accessory to the ordinary safety valve, may be either attached to the boiler or fitted to a tube or neck secured to the boiler. In order to give additional security, the apparatus may be fitted in two or more places on the boiler subjected to pressure. The plates are so attached to the boiler and to each other that the intermediate plate may be readily removed and replaced by a fresh one.

Wire Belts.—We made some allusion a week or two since to the manufacture of wire belts. We now find the following additional, and more in detail, in the *Iron Age*: "Machine straps of wire, as a substitute for leather, are being made by a German firm. The belts are made of the best crucible steel wire, in transverse network of one to ten wires, in any desirable length or width. The two ends of the strap are joined like the middle, so that there is no beginning and no ending, the belt forming an endless band. All the wires run parallel only across the width, in such a manner that one wire catches into the other like a spiral, a continuous, densely-woven chain being thus produced, the movability of which is so great as to enable it to go round the smallest pulley. The straps are also made with leather or elastic lining, or bordered with leather, elastic hemp, hair-tape, or any other material, also its interstices filled with gutta-percha, to supply elastic bands with cotton web, and to prevent their stretching. The tightening of the strap—s ortening of the chain —which is only necessary once, viz., when put on by means of a strap key, may be effected very easily and very quickly by taking out any desirable number of wires, and again joining the two ends in the same manner by twisting in the required number of wires."

A BAD JOB OF PLUMBING—THE METHOD OF CORRECTION.

We are indebted to the *Metal Worker* for the illustration and article on the above subject.

Not long since the writer was asked by letter from a friend in Europe to examine the plumbing work of his house, and if alterations or repairs were needed, to have it put in order before his return. During the two years he had owned and occupied this house, he had suffered more or less serious annoyance from bad smells and from sicknesses in his family of a kind clearly indicating the existing of unwholesome conditions. The previous owner had lost some members of his family by typhoid fever, and had left the house in bad health.

The house in question is a type of its class. It is a high-stoop, three-story brown-stone house of good appearance, one of the kind to be found by the thousand in the upper wards of New York. It was built, like most houses of this class, on speculation, and had probably been sold at a satisfactory profit. Generally speaking, it is pretty well built, and is as good as almost any other of the houses in the fashionable neighborhood in which it stands. My friend had bought it for occupancy, and having sufficient means to live comfortably, he wanted to have so necessary a feature of the house as its plumbing work so arranged as to be convenient and safe. No instructions were given as to the nature, extent and cost of the repairs.

In compliance with his request I visited the premises, and found one of the most remarkable examples of the shoddy plumbing work of the time I have ever seen. The accompanying sketch (Fig. 1) gives an idea of how the waste and soil pipes were arranged with reference to the several fixtures. The details of the work were worse than the plan. Not a joint in the whole line of iron soil pipe was tight. Some were made with putty, some with cement and some with lead. Those made with lead were a very poor pretence of good work. The lead had been poured into the hub from the front, and chilling as it flowed, had barely met behind. The calking tool had been in front only, and the insufficient character of the part of the joint not calked had been covered up by the friendly plasterer, who had carefully hidden whatever the plumber might not care to have seen. The connections between the lead and iron were fearfully and wonderfully made. The branch waste from the butler's sink on the parlor floor was made by boring a hole in the iron pipe, inserting the end of the lead pipe without an attempt to expand it, and actually wiping a solder joint against the iron. When examined, this joint was loose and could be easily pulled apart with the fingers, and from the first it had afforded an outlet for the foul air of the soil pipe. Under the closet on the second floor, the lead branch was slipped into the top of the 4-inch iron waste, and a joint made with the commonest painter's putty. The 2-inch air pipe from the top of the closet trap had been put in by the present owner, but as always happens when an attempt is made to ventilate a 4-inch pipe through a 2-inch extension, the ventilating was inadequate. In this case the 2-inch pipe, which was of iron, was slipped into the bend of the lead trap and connected with putty.

As shown in Fig. 1, all the wash basin waste ran through 1½-inch lead pipes, carried under the floors for a long distance, without fall enough to keep them free from obstruction. Their S-traps rarely held any water, and when removed were badly corroded at the top of the bend. The long horizontal waste pipes were exceedingly foul, and were a constant source of annoyance on account of the rapidity with which they filled up and the bad odor which constantly came from the traps with which they were connected. In a word, the entire plumbing system of the house was utterly bad in design, material and workmanship.

To correct it involved a much larger job than had been contemplated; but as the question of cost was a consideration of minor importance, it was deemed best to make it thorough. Work began by breaking through plastering from the basement to the third floor, and exposing the lines of pipe. The soil and waste pipes were then removed and new ones substituted, on the plan shown in Fig. 2.

In this arrangement the main line of 4-inch soil pipe has about three times the weight per foot of the old one, is put together with well-calked lead-joints, and extends of one size from the cellar to and through the roof. A second vertical line of 2-inch

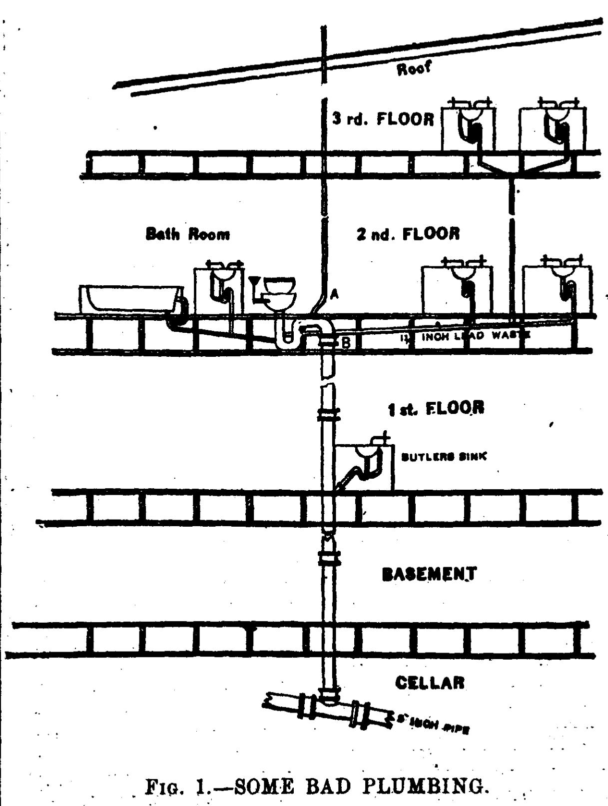


FIG. 1.—SOME BAD PLUMBING.

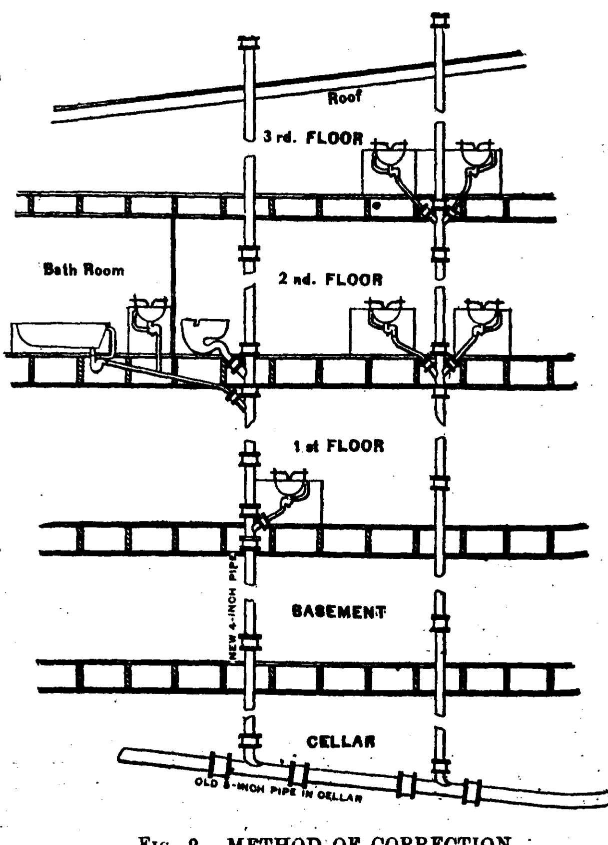


FIG. 2.—METHOD OF CORRECTION.

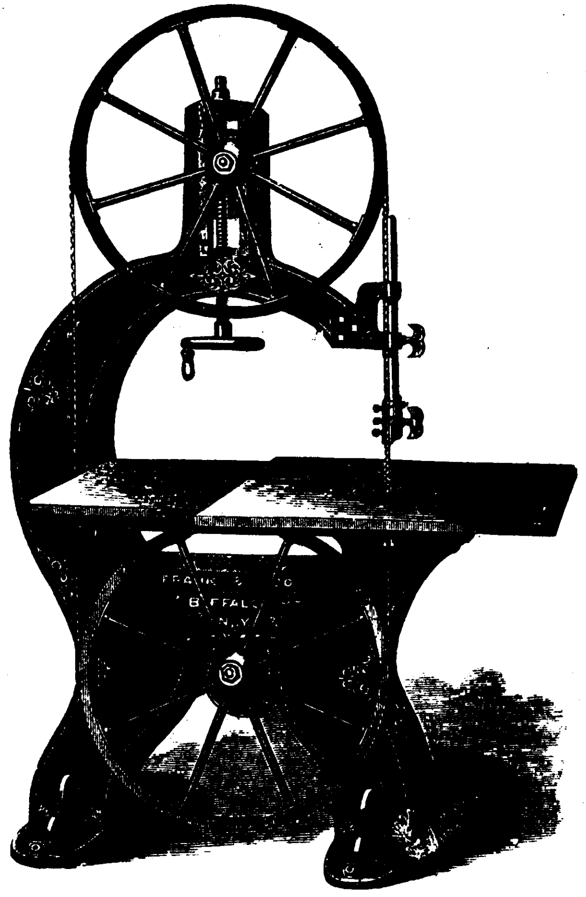
iron waste, for the basin fixtures on the second and third floors, was put in, extending from the line of 5-inch pipe in the cellar to and through the roof. This, of course, obviates all the difficulties before experienced in wasting through long lines of lead pipe laid under the floor, and connecting with the water-closet waste. It also obviates the danger of unsealing all the basin traps when any one basin was emptied, or the closet flushed sufficiently to displace the plug of soil held in the trap. Another improvement was made by giving the bath and wash basin adjoining it a connection with the soil pipe, independent of the water-closet. It is always the meanest kind of bad practice to waste another fixture into a water-closet trap, when a direct connection with the soil pipe is possible.

This example is not given because it involves any interesting or novel problems in plumbing practice, but because it shows how work is commonly done in contract buildings, and how it should be done. The plan shown in Fig. 2 is simply a correct and common-sense arrangement of the waste pipes. The plan shown in Fig. 1 combines all errors which could well be combined, and, considering the materials and workmanship, was nearly as bad as it could be. To change the system and correct it cost nearly $500, including masons', carpenters' and painter's work. To have made it right in the first place would have increased the cost of the plumbing work less than a hundred dollars, which amount the owners paid many times over in funeral expenses and doctors' bills. I do not expect these considerations to have much weight with speculative builders or "bottom figure" contractors, but they should have weight with owners who build for occupancy, and with honest men generally. J. C. B.

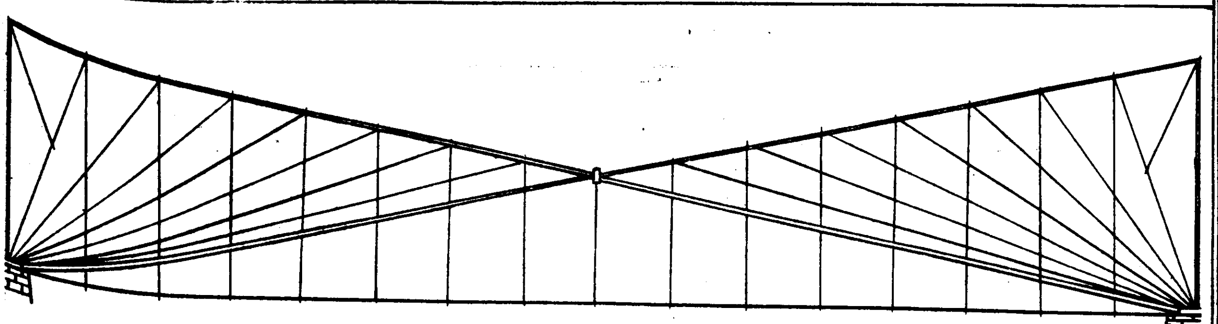
Sanitary.

A WRITER in the *Lancet* condemns the planting of trees in the streets of towns as unsanitary. He takes the ground that the circulation of fresh air is checked by the foliage of the trees, and in the narrow lanes, where the poorer part of the population are packed together, anything that interferes with the freest possible circulation of air is injurious to health.

Trees are excellent things in their place, but there can often be "too much of a good thing." In our climate it is doubtless not well to have trees so near a house as to cast shade upon it at noon. The sunshine is too valuable. Every one appreciates it for at least nine months of the year, and if thoroughly informed as to its beneficent qualities would appreciate it for the other three. In towns trees may be harmless in wide streets or squares, but where towns are built in continuous blocks the presence of shade trees cannot be recommended, except in places where they would not interfere with sunshine and free circulation of air in our houses.



EUREKA BAND-SAW.



ROBINSON'S PATENT BRIDGE.

ROBINSON'S PATENT BRIDGE.

We give a design of an iron-bridge which was patented a few years since by Mr. Orpheus Robinson, C.E. and P.L.S. of Brantford, Ont., but which has never been brought properly to the notice of the public.

The principle claimed in this patent is that the weight of the structure itself is so disposed that no portion of the fabric bears the weight of any other part.

In the accompanying sketch the panels are calculated for a space of 12½ feet each, and each panel is sustained entirely by the piers by means of suspension rods depending from braces extending from the suspending rod or rods to the piers.

It is claimed that the strength of the centre is quite sufficient to sustain all that is required of it, which would be one half of the two middle panels and the load placed upon them.

A load placed upon any point of the bridge will not produce a strain upon any point beyond the nearest suspension rod on either side of it.

A load resting upon any point between the two middle panels and either end, is sustained by one of the shorter braces; the one reaching from the nearest pier to the suspension rod nearest the weight on either side of it and such portion of the opposite main brace as extends from the opposite pier to such shorter brace.

A NEW JOINT AND MITRE PLANER.

We give a front and rear view of the tool, and diagrams illustrating the kind of work it is capable of doing. The work is placed upon a table, which may be inclined to any required angle with the face of the plane. It is caused also to abut against a pivoted head or stop, which also is adjustable to any required angle. The plane proper runs upon ways formed upon the upper part of an adjustable bed, and by the proper adjustment of these three elements any required angular form is quickly and accurately produced, without measurement of the work, and of the precise size required. The rear view of the planer, shown in Fig. 2, shows the pivoted head or stop, with its graduated scale for forming the different angles desired to 45 degrees. It also shows the attachment of the plane-iron to the plane by the use of a lever and screw which easily regulate or set, attach or detach the iron. The thumb-screw above the plane regulates and squares the plate of iron with the face of the plane. The ways, of dovetailed grooves, which guide the movements of the plane on the bed-plate are also shown. By the use of the thumb-screw, shown at the end of the bed-plate, the latter is lowered so as to use the full width of the cutting plate in planing thin pieces, thus giving to the plane an oblique or shear cut that saves the plane-iron from becoming dull at the bottom, while the portion not in use still remains sharp. This bed-plate is provided with a compensating gib, by which any or all of the running or sliding part of the plane is taken up.

In Fig. 1, the front view, the adjustable table upon which the piece to be worked rests, is shown directly in front of the plane. This table or plate may be elevated to any required angle by the passage of the slide links or bars pivoted to the table over the iron rod in front, and when adjusted to the proper angle may be securely held by tightening the thumb screw at the end of the rod. The long flat piece in front of the pivoted head is a slide-bar or rest used in finishing long pieces of work and making sections of a circle for the rims of wheels or pulleys. It is held by the use of a thumb-screw, and when not in use is folded back out of the way.

The small adjustable piece working in the front circular slot serves as a support for lengthy pieces while mitreing the end, and, when reversed, steadies or securely holds any shaped moulding, either side up, in its position for mitreing, while it rests on the face-plate or table below; when not in use, it is slipped down to the end of the slot out of the way. The long bolt at the end of the table is used in fastening the planer to the bench, that it may be instantly changed to any position desired to suit the convenience of the workman.

It is claimed by the inventor that a saving of 50 per cent. in pattern work may be made by the use of this planer, is at all exaggerated. The tool is receiving the highest commendation from pattern and model makers, builders, cabinet makers, and joiners, and we are informed that orders have been received for it from a large number of the most prominent, enterprising, and solid manufacturers in the country—men who are themselves skilled machinists, pattern-makers, builders, and joiners, as well as men of other trades in which the planer can be used to advantage. The wonderful capacity of this tool may be inferred from the specimens of work performed by it, shown in Fig. 3.

The following remarks on appropriate picture frames and judicious hanging will not be out of place here at the close of our article on mitreing.

" If a frame is required to a picture it should serve its purpose in isolating the painting or engraving from immediate surrounding objects, but it should neither be so attractive as to divert the eye from the work of art to which it owes its existence, nor should it in colour or glitter prove injurious to the effect the artist or engraver desired his picture to have. A few hints may

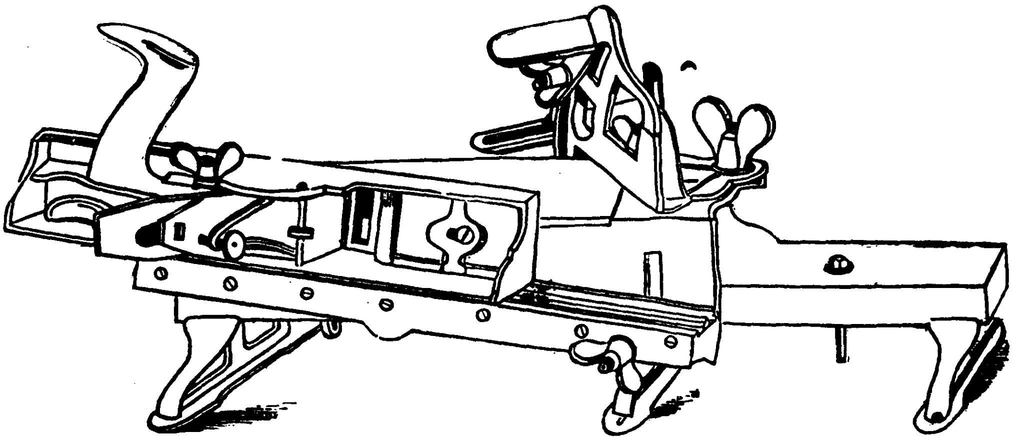


Fig. 1.

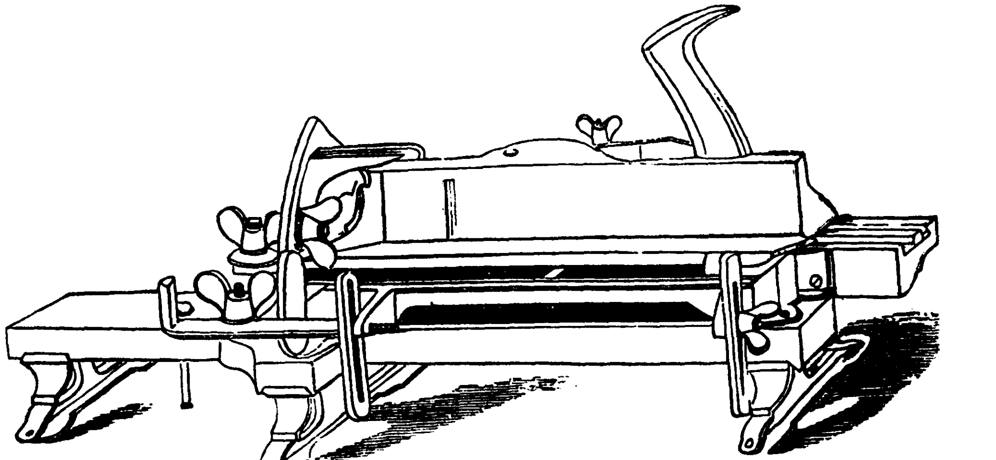


Fig. 2.

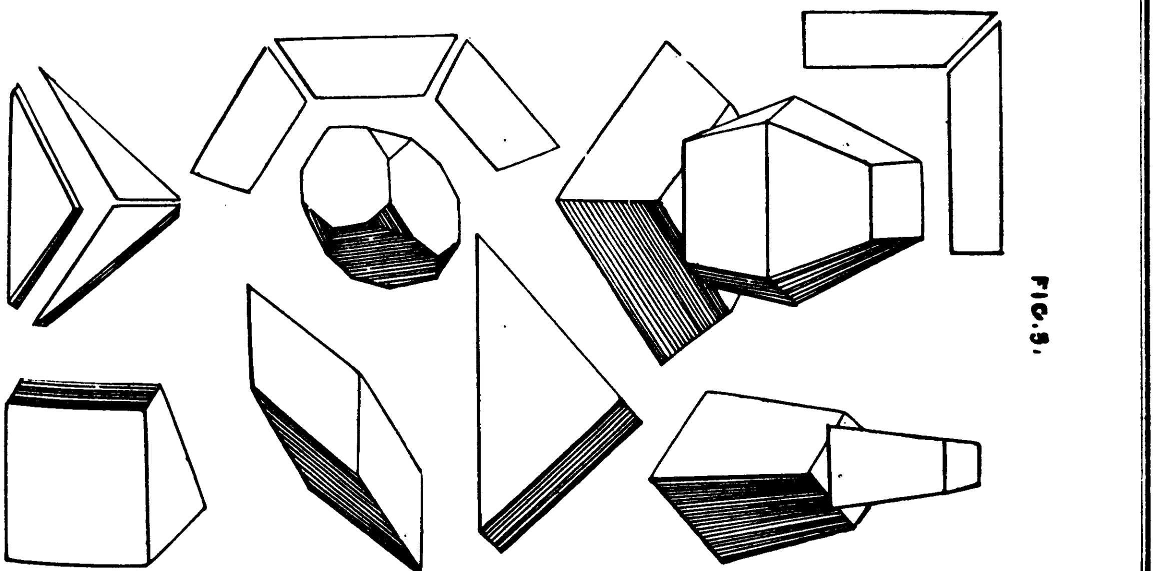


FIG. 5.

be useful. Where the painting itself represents golden objets, the real gold of the frame is apt to prove injurious to its effect if brought into too close contact with it, and bronze having less yellow may often be advantageously substituted for the gold. Frames of this kind are also of value for paintings representing effects of fire or artificial light. Ebony frames are apt to injure the brown and deeper tones of a painting from which it should consequently be well separated either by the mount or by an inner flat of gold. Engravings in gilt frames should always have a certain margin of white mount. Grey is a good colour to associate with most landscape subjects, and it is a good plan where the picture has a dominent tone, or one colour to which all the others are analogous, to let the complementary tone or colour lightly tint the mount."

Pictures properly belong to the furnishing of a house, though they are often regarded as ornaments of secondary importance.

Pausing for a moment to consider the subject, it will strike one, that no matter how rich the ordinary furniture of a room may be, if the walls lack pictures, there is a dreariness about the place that is anything but pleasant. Frescoes and elegant wall-paper cannot take the place of pictures. Even draperies, the most elegant adornment that can be used, will not fill the blank. Only pictures will suffice. The selection is more important than that of the sofas and chairs, and should not be made in haste. It may take years to obtain the right kind, and even then it is not supposed that every one can have the best Raphael, Turner, or Millais. These are not to be had for the asking. Many good pictures, however, can be had at a moderate cost, which will serve for the principal rooms until better ones can be obtained.

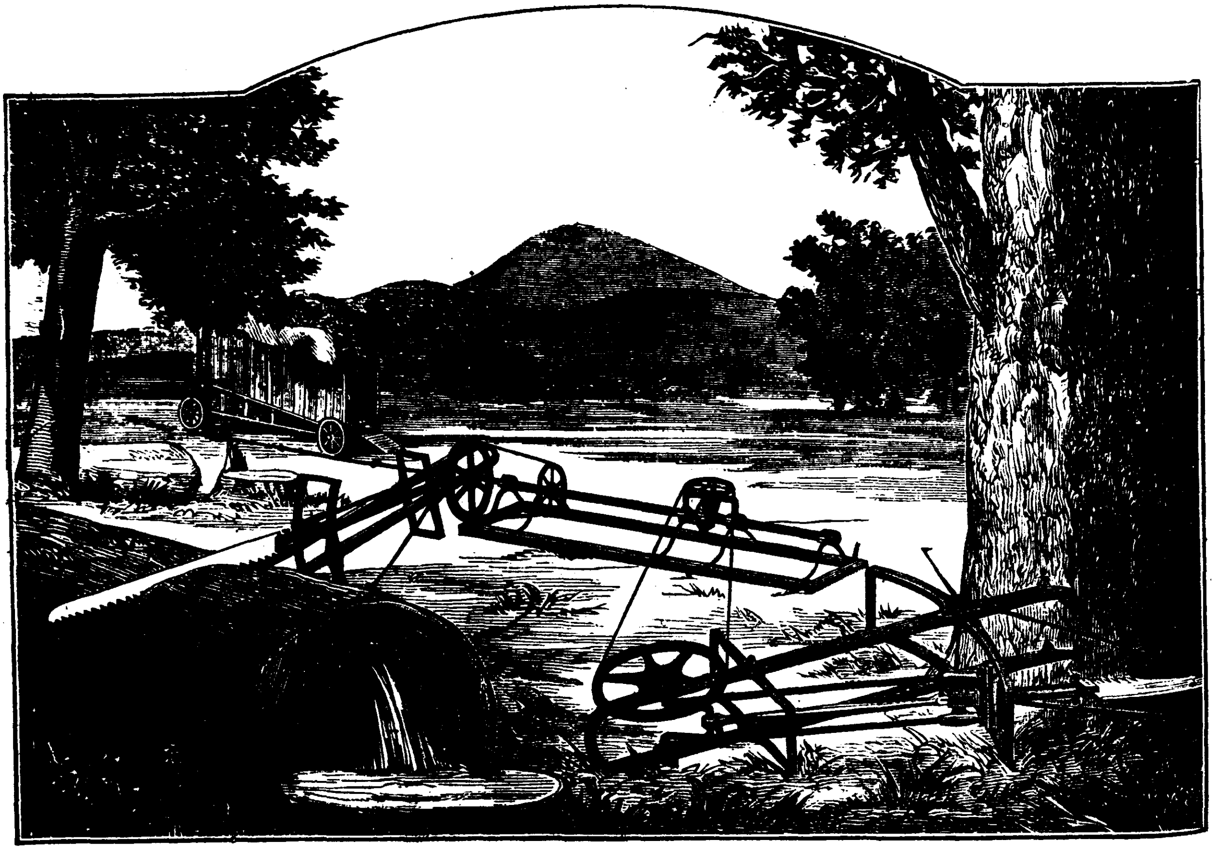
Some people overdo the thing, and crowd the walls, mingling together all sizes, shapes, and subjects and effects indiscriminately. Few people think of having a room set apart for the especial display of pictures, but many make each room a gallery. The effect generally is bad, particularly in city houses, for the light is not always of the best, and different pictures require different lights. The effect is that many a work of real merit is totally destroyed by this one circumstance, and he who buys a work of art without considering whether he has a suitable place to put it in, makes a foolish purchase.

PAPER VS. IRON CAR WHEELS.—According to the Chicago *Railway Review*, the average running capacity of an ordinary iron car wheel is about 75,000 miles; while that of a paper wheel, with a steel tire, is from 450,000 to 550,000 miles. In order to get this wear, it is necessary to give the tire from three to four turnings. The first cost of the paper wheel is $65, and of the best quality of cast iron wheel $14. The mileage of the latter is usually guaranteed at 50,000 miles. The cost of turning the steed tire is $35, which may safely be estimated as equal to the cost of the more frequent renewals of cast iron wheels with the attendant expenses of transportation in each case. The paper wheel costs $65, and runs 350,000 miles in 28 years. For convenience in reckoning, and at a disadvantage to the paper wheel, on account of the interest money, call this period three years. At the end of this time the original cost, with 7% compound interest, amounts to not quite $80. But during this period nine cast iron wheels have been used, costing $24 each. Allowing a rebate of $5 each for the worn out wheels, and calculating on simple interest at 7%, the cost of the wheels for this service amounts to $91.50, showing a saving in the case of paper wheels of $11.50, and were compound interest computed, as in the case of the paper wheels, the saving indicated would be a much larger amount. In computing the cost for the second period of three years a much greater saving would be shown, since a renewal of the tire only, at a cost of $35, is necessary, instead of a first cost of $65 for a new paper wheel. The data from which this conclusion is reached are vouched for by the Pullman Company. The *Review* adds that the experience of the railway companies which have used the paper steel tired weels bears out the records of the Pullman Company. As engine truck wheels, the paper wheels seem to be especially successful, the experience on some roads warranting the conclusion that they will make 800,000 miles before the tire requires renewal.

NEW THEORY CONCERNING FEVER.—A series of experiments have been made by Dr. Horatio C. Wood, Jr., of Philadelphia. The expense of the investigation is borne by the Smithsonian Institution. The experiments indicate that the rapid fall of animal temperature which takes place after section of the spinal cord, is due to paralysis of the coats of the arteries, causing their expansion; whence results an increased flow of blood to the surface of the body, and a consequent reduction of the interior heat. Fever, under this theory, is a disturbance of equilibrium between the heat producing and the heat cooling powers of the body. The difference of medical practice that may result from adopting the theory, can be exemplified by the treatment it suggests for sun-stroke. If the patient is in collapse, the hot bath should be applied; if thermic fever has supervened, the cold bath is required. In the first case, enveloping with a higher external temperature may save life; in the second case, cold surroundings may be similarly effective.—*N. Y. Tribune.*

OIL PAINT.—A writer to the English Mechanic says: The cheapest and best solution I know of I accidentally discovered, and it may be worth while to tell how, though very likely some may know of it. In trying experiments for press-copying some old letters, amongst others I used successfully a solution of one tablespoonful of vinegar and 1 oz. of washing soda to a half pint of water. A little of this was spilt on the painted window-sill and in wiping it up the paint came entirely off, leaving the bare board quite clean. Try it; a gallon will not cost 50 cents.

A NEW THEORY OF THE NATURE OF WATER.—M. Maiche, in *Les Mondes*, propounds the theory reached after numerous experiments that water is simply hydrogen *plus* electricity, or oxygen *minus* electricity; or in other words, that normal electrified hydrogen constitutes water, and that normal diselectrified oxygen produces the same; or that hydrogen, oxygen and water are precisely the same, differing only in degree of electrification.—*Scientific American.*



SMYTH'S TREE FELLER.

SMYTH'S TREE FELLER.

Wm. H. Smyth, of San Francisco, has just patented, through the *Mining and Scientific Press* Patent Agency, an improved portable sawing machine and tree feller, the application of which is shown in the engravings on this page. The machine is intended not only to cut down trees, but also to reduce the felled logs to convenient lengths for any purpose desired.

The reciprocating saw has a connecting rod uniting it with a cross-head moving upon or between suitable guides. These guides are loosely united at the rear end with the driving axle, so that they move about it as a center as the saw makes its cut. The driving crank is formed on this axle between the guides and is connected with the cross-head by a connecting rod or pitman. In connection with the device a simple but novel feeding apparatus is used which operates to feed the saw forward into the cut at each revolution of the crank and reciprocation of the saw. The whole is mounted on a frame and provided with holding clamps or dogs so that it may easily be attached to the tree or log in desired position to cut either horizontally or vertically. The mechanism is adjustably connected with the driving power, so as to be moved from one tree or point to another without disturbing the power.

The dogs hold the carriage firmly to the tree or log, when they are driven into the wood, so there is no motion to the carriage or frame. When the apparatus is used on fallen logs the short arms or dogs are secured below and the larger ones on top.

The power is applied to this machine preferably by a chain or rope passing over a pulley from the power wheel. The power may be derived from an engine, horse, or other convenient source, and may be connected over uneven ground by tumbling rods, thereby enabling the machine to cut all the trees or logs inside of a circle of say 150 feet, without moving the power. The application of the power is plainly shown in the engraving.

The saw is only fed on the back stroke, and the feed is variable, suitable arrangements being made for regulating it at will.

The feeding of the saw is accomplished by two inclined bars or plates on the saw bar, which are raised or lowered by means of thumb screws. These inclined bars operate two rack bars, which in turn move two worm gears which engage with the teeth on the segment, causing the guide bars and saw to move the required distance for proper feed. By bringing the inclined bars closer together or farther apart the amount of feed is regulated with great nicety ; and once set, the feed will remain the same and be automatic.

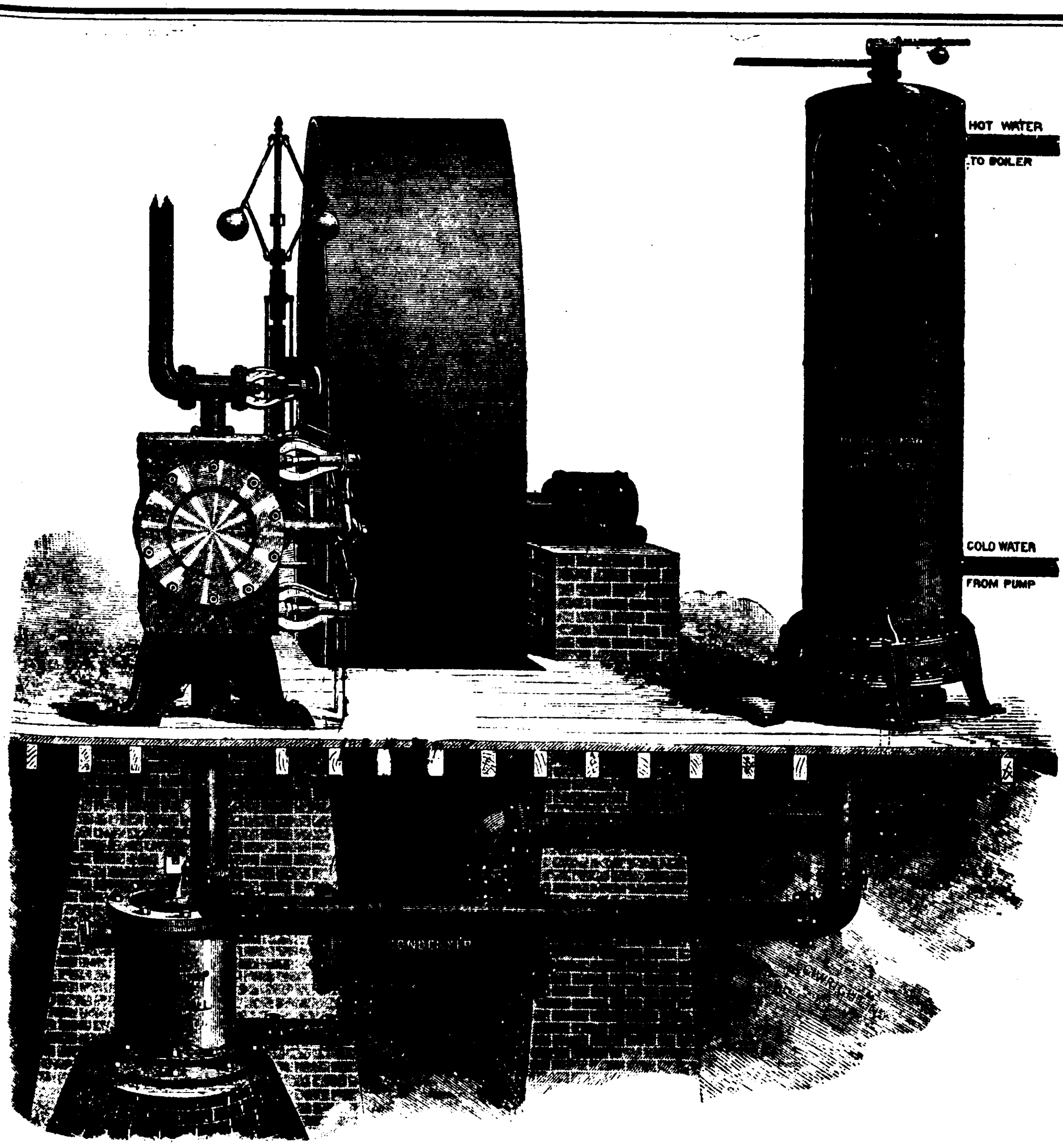
This device is able to cut the trees so close to the ground that a header can pass over the stumps. In fact, it can cut even with the surface, or below it, if desired. Half a dozen or more saws can be run from the same central power, provided there is power enough.

It will be seen that when it is necessary to cut a long fallen tree into sections or short logs, the driving wheel can be slid along the shaft to the extent of the frame, where a blank tumbling rod may be inserted, thereby moving the frame the length of the rod. By adding other lengths the carriage may be carried the whole length of a large tree without having to change or move the power.

This whole machine only weighs 150 pounds, and two men can move it about with ease. One of the machines can be easily run with a single horse-power, and the labor of felling and sawing trees performed by horse instead of man-power. The saw runs at a speed of about 125 strokes per minute, and can therefore do great execution. Trees eight feet in diameter have been sawed with the machine without difficulty.

In pine and redwood timber this will do very good work, and men furnishing logs to mills on contract will find it of the greatest ability. In cutting logs for mines, and getting out railroad fuel, its use will be a great saving.

The inventor, is Mr. William H. Smyth, San Francisco, Box 1,308, for further information.



AN IMPROVED FEED-WATER HEATER.

No engineer who has thoroughly studied his profession, can any longer doubt the advantage of resorting to means to utilize the heat of exhaust steam for heating the feed-water, even in condensing engines. The only question is how to utilize this heat in the latter case, as it has of course to be done in its passage from the engine to the condenser. The practical difficulty connected with this great problem has been solved in the ingenious Berryman system of ∩ shaped tubes, which are placed in a cylinder through which the feed-water passes, and also through which the exhaust freely circulates in its passage from the engine to the condenser, without giving rise to any back pressure. The complete arrangement is represented in the adjoined engraving, where the feed-water heater is seen at the right side, receiving the cold water below and discharging it in a heated condition at the top, while the exhaust steam enters at one side below, passes first upward and then downward through the system of ∩ shaped tubing, and escapes again below at the other side, the bottom part of the heater being divided by a partition. The steam then escapes to the condenser, and from there to the air-pump and hot well, from which the feed-pump can take the water, and send it through the heater described, to be further heated.

It is evident that while for a high-pressure engine the water may thus be heated to nearly the boiling point, say 210° Fah., for a low-pressure engine it cannot be heated to such a degree; but this will be gained, that while in the hot well the temperature of the water will not exceed say 100°, this water, when pumped into the boiler, will arrive there at say 85° or 90°, while when passing through this heater, after leaving the pump, it will enter the boiler at a temperature of 150°, or more, a gain of 60°, or 60 units of heat for every pound of water passed; so that on the basis of evaporating 50 pounds of water per horse-power per hour, for every horse-power 3,000 units of heat are economized per hour, a saving of at least ½ pound of coal per horse-power an hour.

Now, this may appear a trifle at first sight, but if we consider an engine of 60 horse-power, it is 15 pounds of coal per hour, or 150 for a day of 10 hours—an amount by no means to be despised at a time when the economy of coal for the generation of steam-power has become one of the most important problems of the age.

Another great advantage is that this arrangement is an actual surface condenser, but of such a nature that for the condensing water salt water may be used, and the boiler fed with cold water, which will be heated by the steam on the same principle as the surface condension.

An incidental advantage must not be overlooked, namely, that it acts as a purifier, as it is well known that if water is heated before entering the boiler it will form deposits, and greatly diminish the tendency to incrustation in the boiler.—*Manufacturer and Builder, Vol.* 11, *p.* 57.

HOW TO COLOR AND FINISH BRASS GOODS.

To prevent the every-day tarnishing of brass goods, the trade has long resorted to means for protecting the surface from the action of the atmosphere, the first plan of which is to force a change to take place. Thus, if brass is left in damp sand, it acquires a beautiful brown color, which, when polished with a dry brush, remains permanent and requires no cleaning. It is also possible to impart a green and light coating of verdigris on the surface of the brass by means of dilute acids, allowed to dry spontaneously. The antique appearance thus given is very pleasing, and more or less permanent. But it is not always possible to wait for goods so long as such processes require, and hence more speedy methods became necessary, many of which had to be further protected by a coating of varnish. Before bronzing, however, all the requisite fitting is finished, and the brass annealed, pickled in old or dilute nitric acid till the scales can be removed from the surface, scoured with sand and water, and dried. Bronzing is then performed according to the color desired; for although the word means a brown color, being taken from the Italian "*bronzino*," signifying burnt down, yet in commercial language it includes all colors.

Browns of all shades are obtained by immersion in solutions of nitrate or the perchloride of iron, the strength of the solutions determining the depth of color. Violets are produced by dipping in a solution of chloride of antimony, or of perchloride of iron. Chocolate is obtained by burning on the surface of the brass moist red oxide of iron, and polishing with a very small quantity of black lead. Olive green results from making the surface black by means of a solution of iron and arsenic in muriatic acid, polishing with a black-lead brush, and coating it, when warm, with a lacquer composed of one part lac-varnish, four of turmeric, and one of gamboge. A steel-gray color is deposited on brass from a dilute boiling solution of chloride of arsenic; and a blue by careful treatment with strong hydrosulphite of soda. Black is much used for optical brass-work and is obtained by coating the brass with a solution of platinum, or with chloride of gold mixed with nitrate of tin. The Japanese bronze their brass by boiling it in a solution of sulphate of copper, alum and verdigris.

Success in the art of bronzing greatly depends on circumstances, such as the temperature of the alloy or of the solutions, the proportions of the metals used in forming the alloy, and the quality of the materials. The moment at which to withdraw the goods, the drying of them, and a hundred little items of care and manipulation, require attention which experience alone can impart.

To avoid giving any artificial color to brass, and yet to preserve it from becoming tarnished, it is usual to cover properly cleaned brass with a varnish called "lacquer." To prepare the brass for this, the goods, after being annealed, pickled, scoured and washed, are either dipped for an instant in pure commercial nitric acid, washed in clean water and dried in sawdust, or immersed in a mixture of one part of nitric acid with four of water, till a white curd covers the surface, at which moment the goods are withdrawn, washed in clean water and dried in sawdust. In the first case, the brass will be bright; in the latter, a dead flat, which is usually relieved by burnishing the prominent parts. Then the goods are dipped for an instant in commercial nitric acid, and well washed in water containing some argol (to preserve the color till lacquered), and dried in warm sawdust. So prepared, the goods are conveyed to the lacquer room, where they are heated on a hot plate and varnished.

The varnish used is one of spirit, consisting, in its simple form, of one ounce of shellac dissolved in one pint (imperial) of methylated spirits of wine. To this simple varnish are added such coloring substances as red sanders, dragon's blood and annatto, for imparting richness of color. To lower the tone of color, turmeric, gamboge, saffron, Cape aloes and sandarac are used. The first group reddens, the second yellows the varnish, while the mixture of the two gives a pleasing orange.

A good pale lacquer consists of three parts of Cape aloes and one of turmeric to one of simple lac-varnish. A full yellow contains four of turmeric and one of annatto to one of lac-varnish. A gold lacquer, four of dragon's blood and one of turmeric to one of lac-varnish. A red, thirty-two parts of annatto and eight of dragon's blood to one of lac-varnish.

Lacquers suffer a chemical change by heat and light, and must, therefore, be kept in a cool place and in dark vessels. The pans in use are either of glass or earthenware, and the brushes of camel's hair, with no metal fittings.

Dr. H. Briem proves that plants grow luxuriantly when their earliest stages are accelerated by heat.

HEIGHT OF WORK FOR FILING.

Various ideas very naturally exist among mechanics as to the height at which the jaws of a vice should be set from the floor for use in filing, arising, no doubt, from the varied nature of the work upon which the advocates of the diffierent ideas have been accustomed to operate. In the "Treatise on Files," issued by the Nicholson File Company, of Providence, R. I., the following points are laid down:

For general work, the top of the vise jaws should be placed so as to be level with the elbow of the workman, which will be found to range from 40 to 44 inches from the floor, therefore 42 inches may be considered as an average height best suited for all heights of workmen, when the vise is to be permanently fixed. If the article to be filed is small and delicate, requiring simply a movement of the arms, or the right hand and arm alone, the vise should be higher, not only in order that the workman may more closely scrutinize the work, but that he may be able to stand more erect. If the work to be filed is heavy and massive, requiring great muscular effort, its surface should be below the elbow-joint, as the operator stands further from his work, with his feet separated from 10 to 30 inches, and his knees somewhat bent, thus lowering his stature; besides, in this class of work, it is desirable to throw the weight of the body upon the file, to make it penetrate, and thus, with a comparative fixedness of the arms, depend largely upon the momentum of the body to shove the file.

It will be seen, therefore, that in fixing the height of the vise, the nature of the work and the stature of the operator should be considered.

WORKING UP IRON AND STEEL SHEARINGS.

Thin shearings or pieces of iron or steel—such, for example, as the scrap from cutting iron sheets for tin-plate making, and from other operations in which thin sheet iron or steel is employed—are frequently reworked with other metal either in the puddling furnace or in the refining furnace. In some cases the scrap has been placed loose in the puddling or refinery furnace, but more commonly it is made into bundles. In any case the binding only serves to keep the material together whilst heating up, for the bundle then falls apart, allowing the metal to mix with the remainder of the charge upon the bed or hearth of the furnace. There is much less in this process of reworking, 30 cwt. of this scrap not producing more than a ton of manufactured metal. According to the invention of Mr. J. H. Rogers, of Llanelly, the shearings or waste pieces of thin iron or steel are compacted together into masses or blocks, and these, either alone or together with other pieces of iron or steel, are placed in a reheating furnace, and, when heated to a proper temperature, are consolidated under a steam hammer or in other convenient way. In this manner he can obtain a ton of manufactured metal from 23 cwt. of shearings. In order to form the shearings or pieces of iron or steel into masses or blocks ready for heating, he places them in a box or mold, and by a steam press or other suitable machine he presses the contents of the box or mold until a compact block is obtained. The mass thus compacted is withdrawn from the box or mold by an opening provided for the purpose, and which is closed by a door whilst the material is being molded. The compacting of the scraps is performed in a cylinder or mold, wherein they can be compressed by a kind of steam hammer. To discharge the molded mass or block, the box or mold is opened, and by means of a bar inserted at a suitable hole it is forced eut in a condition to go into the reheating furnace. In the furnace, and in the subsequent hammering, the blocks or masses are treated in the same way as piles or blooms.

THE PULSE IN HEALTH AND DISEASE.—Every person should know how to ascertain the state of the pulse in health; then, by comparing it with what it is when he is ailing, he may have some idea of the urgency of his case. Parents should know the healthy pulse of each child, since now and then a person is born with a peculiarly slow or fast pulse, and the very case in hand may be of such peculiarity. An infant's pulse is 140, a child of seven about 80, and from twenty to sixty years it is 70 beats a minute, declining to 60 at fourscore. A healthful grown person beats 70 times in a minute, declining to 60 at fourscore. At sixty, if the pulse always exceeds 70, there is a disease; the machine working itself out, there is a fever or inflammation somewhere, and the body is feeding on itself, as in consumption, when the pulse is quick.

HOW TO PAINT IN OILS ON UNGLAZED POTTERY.

BY J. H. GARRATT.

(Concluded from pages 6 and 101.)

We have seen it done many times by those who ought to know better; for instance, a straight-lined ancient pattern, side by side with a curved, flowing, classic one. Such incongruities may please at first glance, but they will soon weary a cultivated taste.

Then another absurdity is the painting of *flowers* in the usual way on *flower* vases; the painted can never approach in delicacy the real, and if they did, there is something incongruous in putting them together thus. If the flowers are so conventionalized as to become a thoroughly set figure, that is a different thing, and many such make very appropriate ornaments. Flower-vases should generally be painted in dull though rich colors, and rather heavy, solid designs, to contrast with the delicate, light flowers that will be placed above and in them.

There are many patterns on wall-papers, carpets, and calicoes that, with a little adaptation, make pleasing decorations for this kind of pottery. And, just on account of the little study required, it becomes a fascinating and not altogether useless recreation; for whatever requires the manipulation of color and form, gets one into the spirit of designing, so that they soon see what goes together and what does not, and so appreciate all designing more, through seeing the reasons for such and such combinations.

It is noticeable that the generality of people are getting tired of the excessively graceful in shape, and delicate in color; and are desiring instead the more angular shapes, and heavy or rich coloring of the ancients, in all articles of household furniture and decoration. The pink and gold age is passing away (and in fact this style would be very inappropriate to pottery decoration), and is replaced by designs of conventionalized birds, fruits, and flowers, in decided tertiary colors and tints. The mild, soft effects of such combinations are very restful, and therefore "wear well," a consideration of first importance in decoration.

The afore-mentioned potteries are making a very great variety in the most pleasing of the ancient forms of Egypt, Assyria, Troy, Persia, Peru, and Central America, and, if appropriately decorated, make beautifully unique ornaments.

This is a line of manufacture in which the ancient forms and decorations can be kept in the modern copies with a considerable fidelity to the original, that is, needing less adaptation than in other lines of manufacture, for there are many very ancient articles of pottery that, being accurately copied, with appropriate surroundings, make a good effect in the modern vestibule, hall, or drawing-room.

We are not speaking now of the Grecian, Roman, Pompeian, and Etruscan styles; they not being truly ancient when compared with Egyptian, Assyrian, Persian, Peruvian, and Central American. The terra-cottas of these countries are of very curious shape and ornamentation, and very interesting not only to the ordinary viewer, but to the scholar who is able to read them; for, as has been said, "Pottery tells an older story of the human race than parchments."

Although the pottery used by the ancients was not highly ornamented as a general thing, that is, no really fine work, and especially no high colors, yet the mural decorations of Egypt and Assyria, and even the Aztec countries, were rich, and, adapted to the modern reproductions of their pottery, have a very unique and pleasing effect. It is a wonder that it has not been done more. The sacred lotus of Egyptian decoration, for example, is a most pleasing figure, and, at the same time, an interesting and perfect example of conventionalized ornament. As we see it on their walls and mummy-cases, it is dull, though decided in color, and altogether fascinating; but it is usually spoiled whenever used by modern designers, by being modernized in shape and color; the beauty being in the original mode of coloring. This can be done to better effect in copying on pottery, than on any other material.

Then there are other figures, as the winged-asp and puffed cobra, sacred winged globe, the hawk and ibis-headed deities, and a multitude of others that are capable of being used with a great effect.

Also the Assyrian figures with curled beards, their winged bulls, sacred free, and eagle headed Nisrosh, and a variety of set figures, combinations of the cone and looped ribbon, the colors also being peculiar, as golden yellow, Indian red, and apple green, with black and white, also the picturesque hieroglyphics of these nations (which are especially appropriate for putting on pottery.)

The ornaments of the Aztec and Scandinavian nations, which were quite similar to the Phœnician (the oldest nation), were *purely geometrical* designs. The Saracenic or Moorish, though hardly to be classed with the ancient styles, nevertheless, with its rich colors and elaborate filigree work, is especially pleasing.

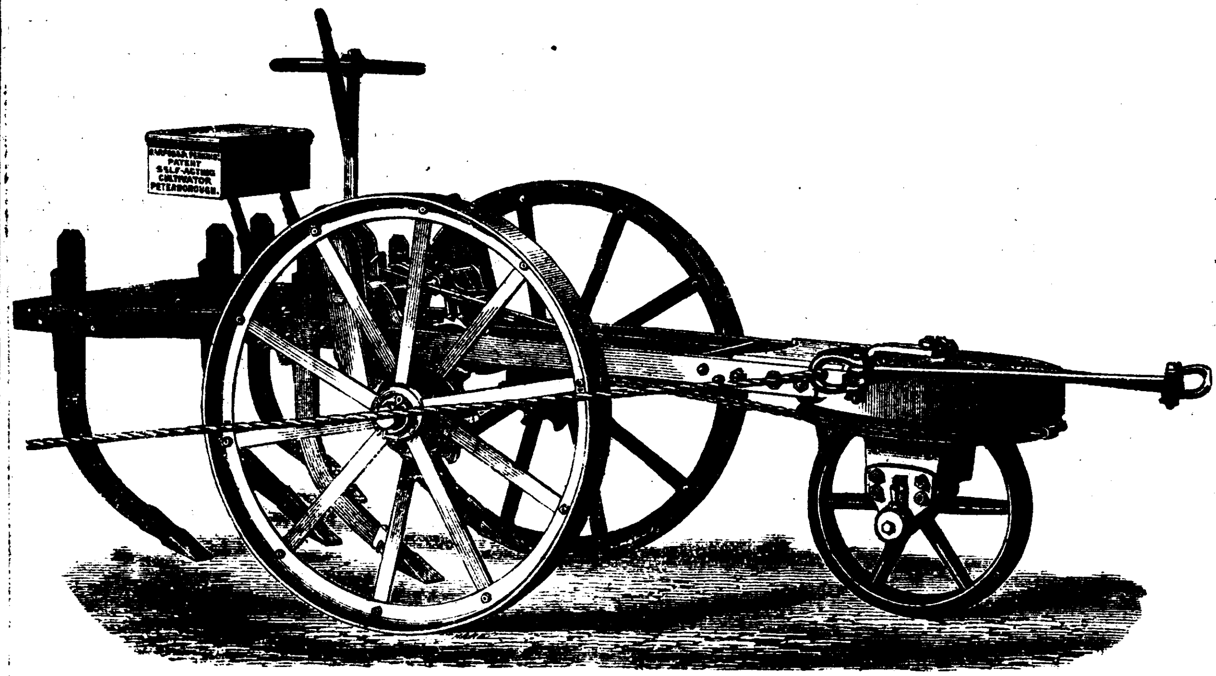
These, and the distinctively characteristic ornaments of other ancient nations, applied to the appropriate pottery shapes, make ornamental vases of more than usual interest and beauty.

The cuts we illustrate on pages 6 and 101, only give a hint at some of these styles we have spoken of. It is impossible to give any idea of the coloring in an engraving—but only a few shapes, with the corresponding style of design. For further material for Egyptian designs, see Leptius's *Denkmale*, in any large library; and for the coloring, Belzoni's *Egyptian Antiquities*, illustrated; also, Owen Jones's *Grammar of Ornament*. The latter will also give the other styles of ornament herein mentioned.

We have hoped, in these few remarks, to have made the mode of decorating this pottery in oils as clear as can be in writing, although it must be evident to every one that there remain many details and suggestions, which can not be made clear in written directions, and can only be learned from a teacher, or by carefully following the above suggestions, and of course at the possibility of some failures. But, with the belief that "practice makes perfect," any one can produce more beautiful and elaborate work than he thought possible before he began to try.

THE ABUSE OF PAIN.—The little nerves of feeling which run through all parts of the human body carry to the brain intelligence of disaster and of pleasure. The evil messages they bring are called pains. A pain admonishes us that some injury is done to a part of the body—a finger jammed, a toe cut, an arm burned—or that some part is overworked or is wearied out, and must have rest. The nerves but do their duty, when they report faithfully these things, and our duty is to do the best we can to repair the mischief which caused the nerves to report in the way of pain. But many persons are annoyed by these evil messages, and only seek to silence the messenger. The immediate call is for something to "still the pain." Fortunately, the means employed are sometimes such as correct the evil at once, and so put an end to the trouble reported by the nerves. Especially is this the case when cool water is applied to cuts and burns—the relief and the cure begin and go on simultaneously. The same result is usually attained when hot water applications (or fomentations) are made to bruises and sharp pains of various kinds. Pain, which results from overdoing of any kind, is most reasonably 'stilled" by rest—general rest of the whole body, and especial rest of the overworked part. Anything that tends to equalize the circulation of the blood, or to make all parts of the body comfortably warm, and no warmer, helps to set the nerves at rest, or to stop pain and disease. Not long ago I saw a man who was suffering with a violent headache (a neuralgic general toothache) furiously kicking, first with one foot, and then with the other, working to get the blood from his head to his heels, because he had found that the most effectual way to cure his headache. Cool applications to the head, and hot ones about the feet and legs might serve the same purpose.

TEST OF WOODY FIBER.—According to the *Journal of the Franklin Institute*, Dr. Wiesner recommends phloroglucin as an extraordinary delicate reagent for woody fiber. Place a drop of a half per cent solution of phloroglucin upon a bit of pine, and moisten the spot with a drop of hydrochloric acid, and there immediately appears a beautiful lively red stain, verging upon violet. On drying, the violet tinge becomes still more marked. Even if the solution contains only one-hundredth of 1% of phloroglucin the red color is very decided; and if there is not more than one-thousandth of 1% the reaction can be recognized under proper precautions. If a strip of pine is allowed to remain in such a solution for 24 hours, hydrochloric acid gradually draws out a perceptibly reddish stain. The slightest traces of woody substance in vegetable tissues can be readily detected in this manner. The tenderest germs, by means of this reaction, show a woodiness in the cells. Every trace of woody substance in hemp and flax can be detected by the phloroglucin. Dr. Wiesner suggests that it may be used to distinguish hemp from flax, and also as a means of dyeing fabrics woven from vegetable fibers.



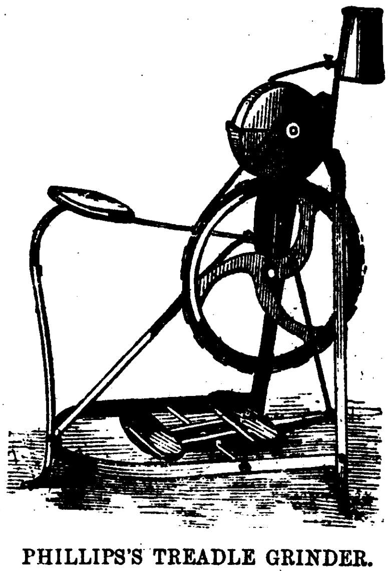
BURFORD AND PERKINS'S NEW STEAM CULTIVATOR.

ENGLISH AGRICULTURAL IMPLEMENTS.

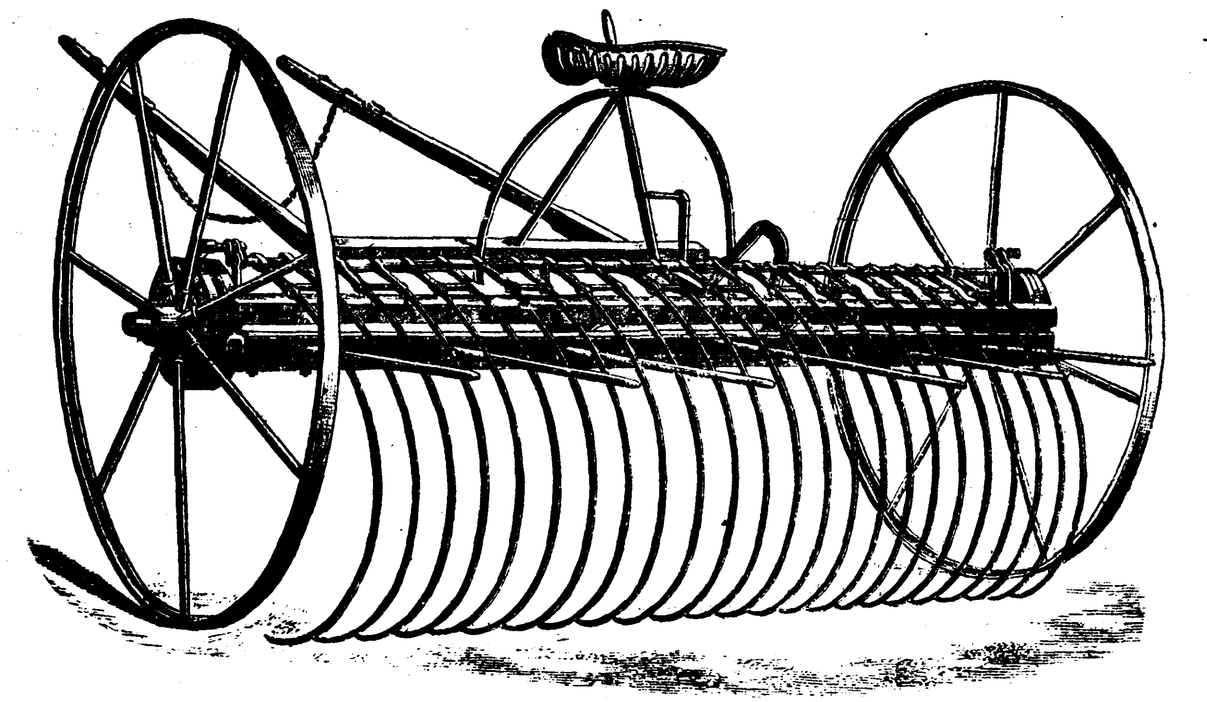
We shall furnish the manufacturers of agricultural implements in Canada, from time to time, with cuts of improvements in this class of machinery, in the hope that should there appear therein any improvements worthy of being adopted in this country, our manufacturers will profit thereby. We should be happy to notice improvements in agricultural machines made in the Dominion, but we cannot feel ourselves justified in giving the advantage of such a notice to one party, to the prejudice of another. The object of this Magazine is to convey information which will be of benefit to all concerned, but when any new invention is patented, our columns are open for its publication therein.

HOWARD'S ANGLO-AMERICAN RAKE.—We have no description given with this rake, but presume the machinery connected therewith will be readily understood.

BURFORD & PERKIN'S NEW STEAM CULTIVATOR.—We give an illustration and detailed description of this new patent improved self-lifting steam cultivator, with patent compensating draw-bar slide and patent regulating depth quadrant. This is said to be a decided improvement on anything of the kind hitherto exhibited. It can be made to lift itself out of the soil at the will and by the slightest effort of the steersman, while it can be as readily and easily dropped down again for working at any required depth. This is accomplished by a very simple arrangement, whereby the cultivator can be instantly lifted out of or put into work, not only at the end of each " bout," but at any other time during the progress of the implement across the field, as the steersman may require, and without stopping the engine. This result, we believe, has never been previously attained. One great advantage is that any depth may be worked, to suit the frequent varying character of the soil in the same field. The cultivator is fixed to a crank axle in the ordinary way, giving the necessary clearness beneath to prevent slacking in the worst possible soil. On the end of the crank axle are the wheels. The lifting power is obtained by two scooped-shaped double ended pawls on a cross-bar at the top of the frame, and two notched wheels that are bolted to the boss of the travelling wheels. When these pawls are depressed, which is easily done by the steersman's foot, the notches and pawls are brought together, when they lift the frame and tines clear from the ground. When it is required that the cultivator should be put into work, the steersman pulls the pawl out of the top catch and drops it into one of the other catches on the quadrant, which is of increased radius, according to the depth he requires cultivating. With this arrangement any depth may be attained without stopping the implement. The lifting at the end is most efficient, at the same time that it is most easily and readily controlled by the steersman. As the cultivator is lifted out of the soil, just before the ball employed on the rope strikes on the lever of the automatic anchor, the sudden double strain of simultaneously pulling the anchor forward and lifting the implement, which would otherwise occur, is thereby effectually avoided. With the patent compensating draw-bar slide, the effect of the back rope in pulling it sideways, and the side thrust thrown on and straining the implement, is so completely overcome that the steersman can put the cultivator with ease out of the line of the pulling rope. With the draw-bar the lightest implement may be used.



PHILLIPS'S TREADLE GRINDER.



HOWARD'S ANGLO-AMERICAN RAKE.

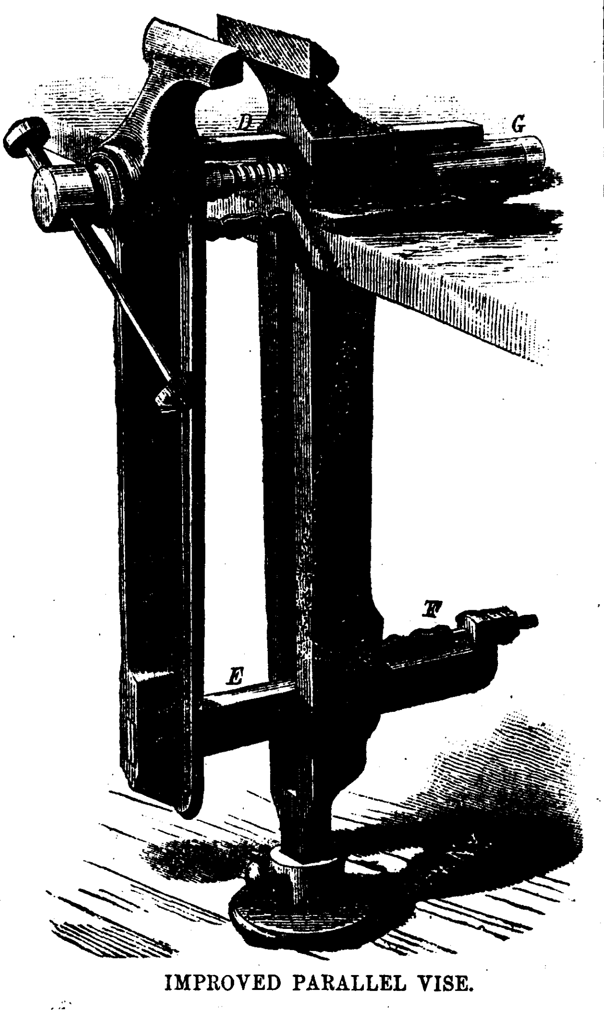
PHILLIP'S TREADLE GRINDER.—It consists of a little grinding machine, of which we now supply an illustration. There are several features in the machine which give it superiority over ordinary grinders used for sharpening reaper and mower knives, and grinding small working tools. When using the treadle machine the grinder can sit at his work and use both feet on the treadle, and is consequently able to work much better and quicker than is the case when he has to stand balancing on one leg and work the treadle with the other. The chief points of merit in this new grinder appear to be portability, efficiency and smallness of cost.—*See preceding page.*

IMPROVED PARALLEL VISE.

The old fashioned vise, hinged below, is a regular nuisance, as it never holds the objects firmly, the jaws being most always at an angle, rarely fitting the piece to be worked at. Nowadays no good workman will have anything to do with such a vise, but wants a parallel vise, made in such a way that the movable jaw is not hinged, but remains parallel with itself while moving. Several systems have been invented to obtain this parallel motion, among which the one represented in the adjoined engraving deserves special notice, on account of the ingenious device by which, while the parallelism is obtained, the holding power is also increased.

The jaws A B, which are of the long pattern, are drawn together by the screw C, and guided by the bars D E, which are fixed in the jaw B and pass through mortises in the jaw A. A chain F is attached to the jaw B just below the screw, and passes over a pulley in the upper part of a slot in the jaw A, and under a pulley in the lower end of the same slot, and is provided with a threaded rod which passes through an ear formed on the end of the bar E. By means of this rod the chain is adjusted. The lower bar E rests upon a roller journalled in the lower end of the slot in the jaw A. The box G, which contains an internal thread for receiving the screw C, has a flange which drops into a socket in the back of the jaw A, and is prevented from turning by the bar D.

It is evident that the moment the vise begins its grip on the object, the latter makes a fulcrum, the screw being the power and the resistance below; the movable bar becomes a lever of the third class, which transmits the effect exerted below by the chain to the point where the power is applied, and aids the screw by pulling in the same direction; while, by loosening the screw, the reverse takes place, and the object is sooner and more easily relieved, as it is obvious that when the jaws are opened the chain F will cause the lower end of the jaw B to move as rapidly



IMPROVED PARALLEL VISE.

as its upper end. It is therefore claimed by the manufacturers that this construction not only secures the parallelism of the jaws, but that it also renders them very effective.

We call the attention of all workmen who appreciate a good vise to the above described style. They will agree with us that no tool is more useful, but at the same time more abused than the vise, and it is on account of this abuse that this tool is so frequently found to be not in really good order. This, however, is often caused by a defective principle on which they are made, and often from defective material, the jaws not being hard enough; but very often it is the fault of those using the vise. We find, however, that a handsome tool like the above commands respect, and that workmen are not so apt to abuse it as a tool which is so defective as to disgust and often exasperate them.

The larger kinds of these vises are intended especially to fill the wants of ship, locomotive, car, and bridge builders, and others who execute heavy work. The smaller kinds are intended for pattern-makers, cabinet-makers, wheelwrights, and carriage builders. They were on exhibition at the last fair of the American Institute in this city, where they were subjected to severe tests in regard to their strength and power, and the result was the award of the highest prize—a medal of superiority.—*Manufacturer and Builder, vol. ii., p. 54.*

Mechanics.

ECONOMY CLOTHING BOILERS.

The following are the results of some experiments conducted several years ago, at the Newport Iron Works, Middlesborough-on-Tees, Eng., to test the value of a good lagging—Jones' non-conducting cement. The boiler (vertical) was connected with a puddling furnace, and was not protected by a roof. It was worked at 50 pounds per square inch, and in the second experiment the whole of the shell, an area of about 280 square feet, was coated with the composition. During the experiments the weather was fine and warm, and the coal used, the iron produced, the time of the experiments, and all other circumstances, were exactly similar in the two cases. A water meter was attached to the feed-pipe, and this showed the ex amount of water evaporated with and without the covering. The results were as follows:

BOILER NOT COVERED.

Total water vaporized per meter, Monday to Saturday, 11,690 gallons.

Total time, 126 hours=92$\frac{3}{4}$ gallons=14.8 cubic feet per hour.

BOILER COVERED.

Total water vaporized, Monday to Saturday, 16,060 gallons.

Total time, 126 hours=127.5 gallons=20.4 cubic feet per hour=5.6 cubic feet per hour more than when the boiler was uncovered, a difference which plainly shows the immense loss of heat under the latter circumstances.

Experiments by Jacob Perkins long ago proved that in case of pipes filled with steam at 100 pounds per square inch, 100 feet of surface exposed to the atmosphere is, under ordinary circumstances, sufficient to condense per hour the steam produced by the vaporization of a cubic foot of water.

Regarding this experiment *Engineering* says: "It will be seen that a square foot of ordinary heating surface has about one-fifth the heat-transmitting power of a square foot of freely exposed cooling surface; or supposing that in any given boiler the areas of heating and cooling surface are equal, the effect of the latter, if freely exposed, would be to reduce the evaporative efficiency of the boiler 20 per cent."

The exposed surface of a boiler, or its cooling surface, in no way differs from its heating surface; it is subject to the same laws, and, under similar circumstances, would produce similar effects. That a square foot of cooling surface withdraws from the contents of the boiler a less amount of heat than is imparted to them by an equal area of heating surface, is merely due to there being a less difference between the temperature of the atmosphere and that of the contents of the boiler, than there is between the latter and temperature of the gases in the flues. Other circumstances being equal, the transmitting power of any given area of boiler surface varies directly as the difference in the temperature on the two sides of it, any increase in this difference enabling the surface to transmit a proportionately increased amount of heat in a given time.

WELDING OF METALS AT LOW TEMPERATURES.

Some time ago, in order to estimate the amount of hydrocyanic acid in a solution, Mr. Charles A. Fawcett, of Glasgow, Scotland, precipitated it with silver nitrate. After having filtered and washed the precipitate, he reduced it to the metallic state by heating to the required temperature. Just as he was about to allow it to cool he noticed a small piece of dirt among the reduced silver. In order to separate them he took a thin platinum wire and pushed the silver to one side, but on attempting to take the wire away the silver remained in contact with it. As he thought this curious, he tried the following experiment: He took a piece of silver foil, about one centimeter square, placed it in an inverted porcelain crucible lid, and heated it to about 500° C.; then he brought into contact with it the extremity of a thin platinum wire, and to his astonishment the wire raised the silver from the lid, and it remained in contact when cold.

The silver being so much below its melting point, its behavior puzzled him, so he wrote to Sir W. Thomson for an explanation. On witnessing the experiment, Sir William pronounced it a remarkable case of "cohesion," the two metals, in fact, "welding," although the temperature was far below the melting point of silver. Mr. Fawcett says that the experiment can be performed successfully at lower temperatures than 500° C., if smaller pieces of foil are taken; and that other metals, for instance, copper and aluminum, cohere to silver in the same manner as platinum, but less strikingly.—*Scientific American.*

NEW LIGHT ON STEEL MAKING.

It would seem that the presence of more than one or two-tenths per cent. of phosphorus in pig iron is no longer to be considered, as heretofore, an insuperable obstacle to its conversion into ingot steel. It has been fully established that as much as 0.32% of phosphorus can be tolerated in very mild steel, and, as it is well known, large quantities of Martin steel made from old iron rails and pure pig have, by the aid of ferro-manganese, been manufactured on this principle. The difference between the cost of changing old iron rails, and that of using pure materials, is, however, in most localities not sufficient to cover the extra expense of using ferro-manganese.

It remained, however, an axiom with steel makers that no removal of phosphorus could be hoped for in any direct steel process till it was announced from the Blaenavon iron works that there were means by which phosphorus could be removed with certainty and economy, and that intensity of temperature was no obstacle to its removal. In confirmation of the Blaenavon experiments, we learn that very important results have been obtained in Belgium with M. Ponsard's ferro-convertisseur lined with one of the Blaenavon basic preparations. The maintenance of the necessary highly basic slag was effected by the addition of lime and a certain amount of ore, as prescribed by Mr. Thomas, the patentee of the process, who assisted at the operations. In the first cast of four tons, notwithstanding that the operations were conducted under very unfavorable circumstances, an analysis of the steel showed that 90% of the phosphorus contained in the pig had been removed. An examination of samples taken at intervals shows a progressive decrease of phosphorus in the bath and its transference to the slag; the amount of silica in the latter being kept at about 22%. A somewhat more basic slag is, however, generally preferred. The second cast gave very similar results. As the Ponsard apparatus is able to deal with pig very low in silicon there appears to be now no class of pig which may not be considered as available for the manufacture of steel. The only impurity which is not removed almost completely is sulphur, though this is eliminated to a considerable extent; fortunately, however, sulphur is readily removed in the blast furnace. We understand it is now in contemplation to regularly work the Ponsard converter in combination with the new basic process on the highly phosphoretic pig of Belgium and Germany. This will give an economy of from 30 to 50 francs a ton over the use of Bessemer pig, and give a fresh life to the drooping fortunes of the manufacturers of phosphoretic pig.—*Iron Age.*

BLACK FINISH FOR BRASS.—Optical and philosophical instruments made in France often have all their brass surfaces of a fine dead black colour, very permanent and difficult to imitate. The following, obtained from a foreign source, is the process used by the French artisans: Make a strong solution of nitrate of silver in one dish and of nitrate of copper in another. Mix the two together and plunge the brass into it. Remove and heat the brass evenly until the required degree of dead blackness is obtained.

Miscellaneous Mechanical Items.

CASE-HARDENING IRON.—In order to economize in the more expensive materials for case-hardening cast, wrought or malleable iron, and to harden only portions of the article in different degrees, if required, Mr. Gracie S. Roberts, of Brooklyn, makes use of an improved method. After polishing the surface, he glues to the portions to be case-hardened a coating of yellow prussiate of potash. A number of coats are given, according to the degree of the case-hardening required. A cheaper material or simply boneblack is used where a slight effect only is required. When the glue is set hard, the article is packed in powdered charcoal, heated to redness in a quick fire and maintained at that heat for half an hour. Then it is hardened and tempered in the usual manner.

PETROLEUM LAMPBLACK.—One of the largest establishments for the manufacture of lampblack is at Petrolia, Pa. The method of production is remarkable. The flames of several thousands of gas jets are made to impinge against sheets of slate, on which the smoke or fine carbon is deposited, just as a piece of glass is smoked when held over a candle flame. When a sufficient deposit of the smoke has formed on the slates, it is scraped off, packed, and sent to market. The gas which supplies this lamp-black comes from the ground near the works. Besides its oil wells, Petrolia is celebrated for its wonderful gas wells, which furnish inexhaustible supplies of fuel for steam engines, heating, &c.

HEAVY RAILS PREFERABLE.—English engineers are fast coming to the conclusion that heavy steel rails are economical. They entertained this belief long ago, and it was based upon scientific reasons. Now that steel is so very cheap, their scientific views are more than confirmed. The Phœnix Bessemer Steel Company are now making exceptionally heavy rails for the Midland Railway Company, the weight being 85 pounds to the yard. A heavy rail like this ensures a smooth run, and adds to the safety of the train. Rails now in course of delivery by the Dronfield Steel Works to the Great India Peninsular railway are 80 pounds to the yard.

SAFE AND CONVENIENT METHOD OF TESTING DYNAMITE.—The *Chemiker Zeitung* contains a description of a method of testing dynamite. The percentage of nitro-glycerine is determined by extracting it with ether, which dissolves it, but leaves the infusorial earth unchanged. The difference in weight of the dynamite and of the infusorial residue, directly yields the percentage of nitro-glycerine. In order to ascertain whether the dynamite contains any other bodies soluble in ether, the ether extract is diluted with water, which precipitates any foreign substances present.

TO MAKE IRON TAKE A BRIGHT POLISH LIKE STEEL.—Pulverize and dissolve the following articles in one quart of hot water: Blue vitriol, one ounce; borax, one ounce; prussiate of potash, one ounce; charcoal, one ounce; salt, one half pint; then add one gallon linseed oil. Mix well, bring your iron or steel to the proper heat and cool in the solution. It is said the manufacturers of the Judson governor paid $100 for this recipe, the object being to case-harden iron so that it would take a bright polish like steel.

A NEW ROTARY ENGINE.—Mr. Babbitt, the well-known soap manufacturer, of New York, has invented a rotary steam engine, which is said to develope extraordinary power, with a very small steam supply. A correspondent of the *American Machinist* reports having seen one, four inches in diameter, running 20,000 revolutions a minute, with steam supplied by an ⅛ inch pipe, which defied the efforts of the heaviest men to stop it by throwing their weight upon a good lever.

MALLEABLE BRASS.—A German periodical is responsible for the following method of making malleable brass: Thirty-three parts of copper and twenty-five of zinc are alloyed, the copper being first put into the crucible, which is loosely covered. As soon as the copper is melted, zinc purified by sulphur is added. The alloy is then cast into moulding sand in the shape of bars, which, when still hot, will be found to be malleable and capable of being brought into any shape without showing cracks.

AN IMMENSE LOCOMOTIVE.—An immense locomotive has recently been built at Philadelphia for the Mexican and Southern Pacific railroad. The engine weighs within a fraction of 60 tons, has eight driving wheels, and a pony (two-wheel) truck. The weight is so great that the Western railroads, over which it must pass, will not permit it to go over bridges, so it will be taken to pieces and carried over in sections. It passed over all the bridges of the Pennsylvania road without being dismantled.

THE LOCOMOTIVE.—The ordinary life of a locomotive engine is stated at 30 years. Some of the small parts require renewal every six months. The boiler tubes last five years, and the crank axles six years; tires, boilers and fire-boxes six to seven years. The side frames, axles and other parts 30 years.

TO CHILL CAST IRON VERY HARD.—Use a liquid made as follows: Soft water, 10 gallons; salt, one peck; oil vitriol, one-half pint; saltpeter, one-half pound; prussiate of potash, one-quarter pound; cyanide of potash, one-half pound. Heat the iron a cherry-red and dip as usual, and if wanted harder, repeat the process.

Amateur Mechanics.

CHASING AND KNURLING.

Among the multitude of operations possible with a foot lathe perhaps none is more vexatious to the amateur than that of cutting a good screw thread, and no acquirement is more valuable than to be able to chase a screw thread easily and accurately.

The ordinary chaser, Fig. 1, is a simple tool, which is easily made when one has the hubs for the different sizes; but wanting these, we recommend the purchase of chasers. A blank for an outside chaser is shown in Fig. 2, and the hub used in cutting the teeth is represented in Fig. 3. The latter consists of a piece of good steel having a thread of the desired pitch, which is traversed by spiral grooves to form cutting edges. This tool must have about the same temper as that of a tap. When used it is placed between the lathe centers and revolved at a slow speed, while the end of the chaser blank is held against it, being at the same time supported by the tool rest. The hub should be oiled during the cutting process. After cutting, the tool is hardened and tempered and ground on the elevated portion, which is the face, and smoothed on the back which slides upon the tool rest.

An inside chaser is shown in Fig. 4, the blank from which it is made in Fig. 5. For convenience in cutting the teeth, the blank is bent at right angles; after cutting and before hardening it is straightened.

The manner of starting a thread for chasing is shown in Fig. 6, the tool used in Fig. 7. The rest is placed a short distance from the work, the tool is held firmly upon it, and while the work revolves with a uniform speed the tool is moved dexterously so as to make a spiral line on the work, which is nearly, if not exactly, of the same pitch as the thread to be cut. If the operator is fortunate in the attempt, it will be a simple matter to start the chaser and move it along as indicated in Fig. 9. After a little practice it will in most cases be found an easy matter to chase threads without first starting them with a pointed tool. It is much easier to chase an inside thread than an outside one. A chaser seldom goes wrong when working on the inside.

A method of chasing thimbles is shown in Fig. 10. The threaded thimble which forms the guide screw is driven on the larger end of the tapering mandrel; the thimble on which the thread is to be cut is placed on the smaller end of the mandrel. One arm of the forked tool has a vertical chisel edge which engages the guide screw; the other arm has a chasing point which cuts the thread. The chisel edge is first brought into engagement with the guide screw, the point is then quickly brought against the work with more or less pressure. After the thread is well started it may be finished with an ordinary chaser or with a pointed tool.

Fig. 11 shows a method of starting an inside thread. The chaser has a tracing edge that follows the guide screw projecting from the center of the chuck, and a cutting point that forms the thread. Fig. 12 shows the tool in detail.

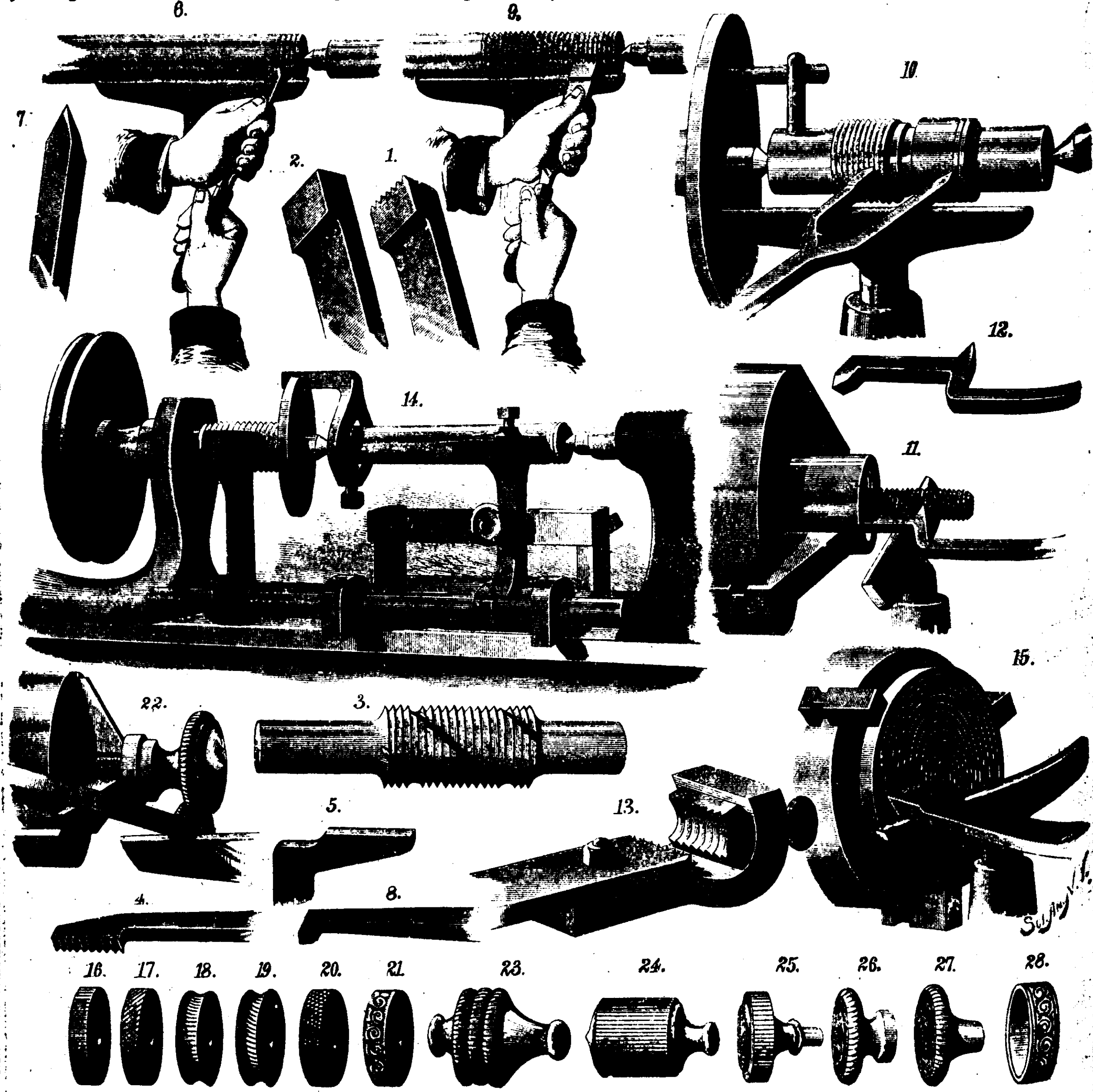
Threads cut by a chaser without some kind of a guide to start them are often more or less crooked or drunken. To correct such threads and in cutting large threads, the doctor, shown in Fig. 13, is sometimes employed. The follower opposite the chaser is moved up by the thumbscrew as the thread deepens.

The most expensive, and at the same time the most desirable, contrivance for chasing screw threads is shown in Fig. 14. A casting fitted to the lathe bed has two ears, which are bored to receive the round sliding rod carrying the tool holder and the tracer. The tool holder is placed on the sliding rod between the two ears, and it carries a well fitted screw, which bears against the horizontal bar supported by two square posts which form a part of the main casting. This bar forms a guide which may be adjusted within narrow limits by means of the screw seen in the right hand post.

The lathe is provided with a face plate having a long boss arranged to receive thimbles having leading threads of different pitches cut on them. The tracing arm carries a thin tracing tool which engages the threaded thimbles, and is capable of yielding to admit of moving the cutting tool forward against the

It is sometimes desirable to form spiral grooves in the face of a disk ; this may be accomplished in exactly the same manner as in the case of the cylindrical work. The method of doing it is illustrated by Fig. 15.

Knurls of various patterns are shown in Figs. 16 to 21, inclusive ; these are employed in "beading," "milling," or knurling the heads of screws, the handles of small tools, &c. The manner of using this tool is shown in Fig. 22. The knurl is placed between the forks of a holder and upon a pin that passes through the fork, and is held with considerable pressure against the work as it revolves.

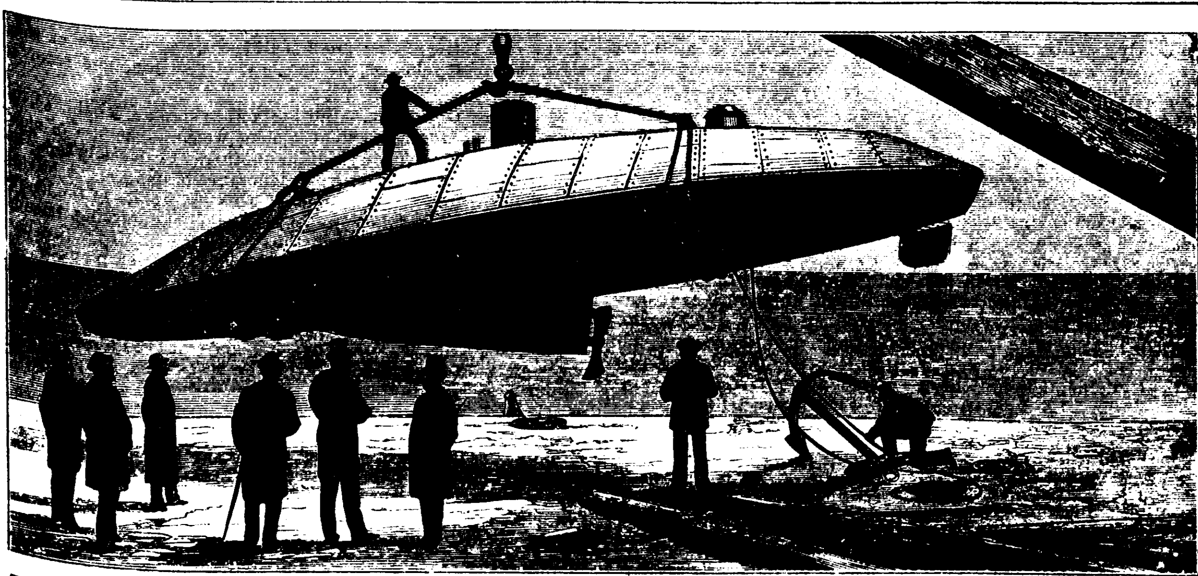


TOOLS FOR CHASING AND KNURLING.

object being threaded ; but being well fitted to the mortise in the arm it cannot move laterally without carrying the sliding rod and all attached to it. The tracing tool is slotted to receive a pin which passes transversely through the head of the tracing arm, and in the slot is placed a spiral spring which tends to throw the tracer forward.

The operation of this device needs no special explanation. The arm that carries the cutting tool is moved forward until its adjusting screw strikes the horizontal guide bar ; the tracing tool at the same time engages the leading screw and carries all forward. When the tool has travelled as far as desirable it is drawn back and returned to its original position. With this tool threads may be cut on either cylindrical or tapering work.

The knurls shown in Figs. 16, 17, 18 and 19 are easily made. All that is required is a hub something like that shown in Fig. 3. This is placed between the centers of the lathe, and the knurl blank is brought in contact with it and allowed to revolve in a holder supported by the tool rest. The straight blank is moved up and down until every part of the surface is cut the same way. The concave blanks cannot be moved, but the hub should fit the hollow of the face of the blank. The knurl shown in Fig. 21 must be made by a die sinker. Figs. 23 to 28, inclusive, represent examples of knurling done with the different knurls shown in the preceding figures.—*M., Scientific American.*



THE HERRESHOFF TORPEDO LAUNCH, RECENTLY BUILT AT BRISTOL, R.I., FOR THE ENGLISH GOVERNMENT.

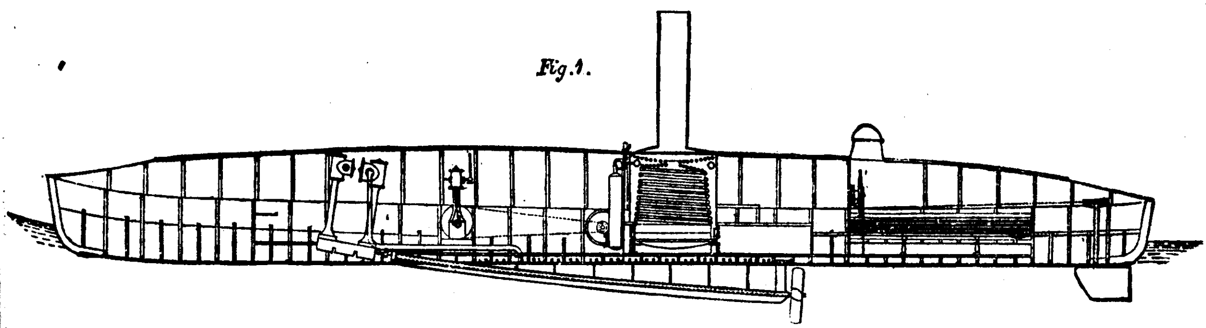


FIG. 2.—MACHINERY OF HERRESHOFF TORPEDO LAUNCH.

THE HERRESHOFF TORPEDO LAUNCH.

We are indebted for these engravings and description to the London *Graphic* and *Engineer*. This launch, as will be remembered, was built in Bristol, R. I., for the English Government. It arrived in the Thames on New Year's Day, having crossed the Atlantic on the deck of the National Line steamer *Denmark*.

The boat, which is shown in section in Fig. 2, is 59 feet 6 inches long, by 7 feet 6 inches beam and 5 feet 6 inches deep, with 1 foot 3 inches draught of water, there thus being 4 feet 3 inches of freeboard. Her working draught, however, is 4 feet 6 inches, as the screw and rudder are both placed below the keel. The vessel is constructed with five watertight bulkheads, and her hull is of composite construction below the water line, having a steel framing covered with wood planking. The upper part of the hull is wholly of steel, the plates being one sixteenth inch thick, the top side sloping inward, and the upper work forming a protective superstructure for the crew and machinery. She is propelled by a screw, which is placed beneath the vessel in a central position, and which is driven by a direct-acting condensing engine placed in the forward part of the boat.

The diameters of the steam cylinders are 10½ inches and 6 inches respectively, with 10 inch stroke, and they are of 100 horse power estimated. There is an independent feed pump and air pump. The stoke hole is inclosed, and is supplied with air by a Sturtevant blower, which is driven by an independent engine of 2½ horse power. The propeller is a two bladed screw, 38 inches in diameter and 5 feet pitch, the screw shaft being 23 feet in length. The vessel is steered by means of a balanced rudder placed a short distance from the stern and under the ship, the helmsman being located in a stern cabin with a protected lookout raised just above the deck. The hull and machinery together weigh 6 tons, but with the working crew of four men, and fuel, stores, and two torpedoes on board, the boat weighs about 7½ tons.

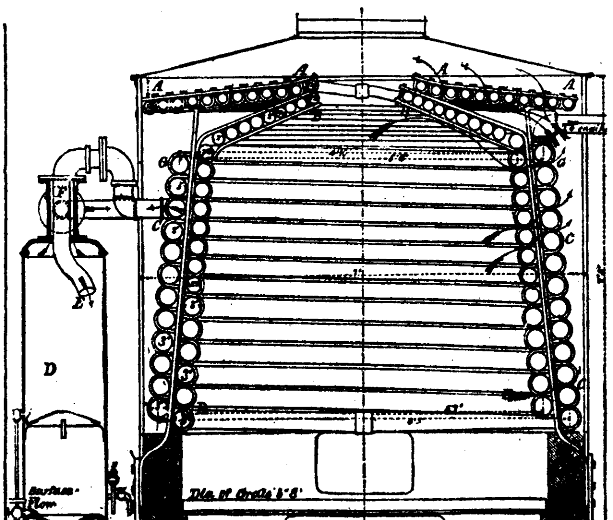


FIG. 3.—HERRESHOFF STEAM GENERATOR.

Steam is supplied by a Herreshoff coil boiler, which constitutes another novelty in this boat. The boiler, which is shown in section in Fig. 3, consists of a circular combustion chamber, which in the present instance is 4 feet in diameter internally, and within which is a coil of about 300 feet of 2 inch pipe, coiled to nearly the diameter of the chamber. This coil is continued at the top so as to form a kind of dome under the cover of the combustion chamber. By the side of the boiler is a separator, into with the steam passes before it goes to the engine. The water from the feed pump is admitted at the top of the coil, and during its course to the bottom the greater portion of it becomes converted into steam. Having passed through the entire length of the coil, the steam and water are discharged together into the separator, in such a manner that the water is entirely separated from the steam, and can be blown off as required. The steam is taken from the top of the separator, and returns through a short coil placed inside the combustion chamber, where it becomes superheated, and is led thence to the engines. It is claimed for this boiler that it cannot explode destructively, inasmuch as there is but a very small quantity of water in it at any time, and that it is distributed along the entire length of the coil. A rupture at any point would only be attended by a moderate blowing off of steam. The rapid circulation of the water is found to prevent the deposit of salts, the surplus water not converted into steam carrying with it all impurities.

One condition of the contract was that the hull should be strong enough to be slung from a ship's davits without bending or "springing," and the larger engraving represents the vessel being lifted by the big crane at the Victualing Yard, Deptford, fully manned and equipped, her weight in that condition being about eight tons. The First Lord of the Admiralty was present, accompanied by Admirals Hood, Wellesley, and Sir Houston Stewart, the Controller of the Navy, and Mr. Barnaby, the Chief Constructor.

The vessel was then lowered into the water, and steam got up in five minutes after lighting the fire. The great handiness of the boat, and her powers of rapid stopping, starting, and turning, were next shown. She was stopped from full speed in a distance of one third her length, and immediately went astern at a rate nearly equal to her forward speed. She then, at full speed, turned in complete circles of a diameter of three times her length, and this either going ahead or astern. Her guaranteed speed is sixteen knots an hour, and this, it is stated, she attained, with two tons of coal on board, on the occasion of her official trial over the two knot course in Long Reach. Altogether the Herreshoff torpedo launch promises, from its powers of maneuvering and the great rapidity with which it can be got ready for sea, to form an important addition to our naval resources, while its numerous special featnres give it particular interest from a mechanical point of view.

Health and Home.

To do up Shirt Bosoms.—The following information has been given to a contemporary in reply to a correspondent. Many housekeepers feel interested in this matter :—We sympathize with our young correspondent in her domestic difficulties, and will endeavor to help her out of the dilemma in the particular case she asks about. For doing up shirt bosoms, we think that the following recipe will give our correspondent the appearance to her husband's shirts that she wishes to impart to them : Take two tablespoonfuls of the best starch, add a very little water to it, and rub and stir with a spoon into a thick paste, carefully breaking all the lumps and particles. Add a pint of boiling water, stirring at the same time ; boil half an hour, stirring occasionally to keep it from burning. Add a piece of "enamel" the size of a pea ; if this is not at hand, use a tablespoonful of gum arabic solution, (made by pouring boiling water upon gum arabic and letting it stand until clear and transparent), or a piece of clean mutton tallow half the size of a nutmeg ; a teaspoonful of salt will do, but it is not as good. Strain the starch through a strainer or a piece of thin muslin. Have the shirt turned wrong side out, dip the bosoms carefully in the starch and squeeze out, repeating the operation until the bosoms are thoroughly and evenly saturated with the starch, then proceed to dry them. Three hours before ironing, dip the bosoms in clean water, wring out and roll up tightly. First iron the back by folding it lengthwise through the centre, next iron the wristbands and both sides of the sleeves, then the collar-band ; now place the bosom-board under the bosom, and with a dampened napkin rub the bosom from the top toward the bottom, smoothing and arranging each plait neatly. With a smooth, moderately hot iron, begin at the top and iron downward, and continue the operation until the bosom is perfectly dry and shining. Remove the bosom-board and iron the front of the shirt. The bosom and cuffs of the shirt, and indeed all nice, fine work, will look clearer and better if they are first ironed under a piece of thin old muslin. It takes off the first heat of the iron, and removes any lumps of starch.

Morphine Drinking.—But I set out to speak of a habit which prevails to an alarming extent among women—the use of morphine, to quiet pain of one kind or another. I can easily imagine that the habit may grow from ignorance of danger. A fearful pain is lulled by seemingly simple means—an opiate in the shape of morphine. The suffering one rests easy, and pitying friends may believe that morphine was just the thing needed. But has the opiate cured the disease which caused the pain ? Not a bit of it. It has only beaten down and silenced the faithful monitor, the nerves, which, in the shape of pain, told of injury and begged that help be given to the injured part. It is true that Nature, and not medicine, performs the cure, and that the blessed work of restoration to health usually goes on best during sleep, but it should be natural sleep. This will usually come of itself if you put the body into suitable condition—the pores of the skin open, by bathing or rubbing judiciously, the bowels properly relieved, the stomach nourished by simple food, easy of digestion, the lungs supplied with pure air, and cleanliness and quiet all about the patient. But when you give or take the dose of morphine, you make a deadly attack upon the nervous system, and leave the evil condition of things in the body to go on. The dose must soon be repeated, and as the habit of resorting to an anodyne strengthens, the dose must gradually increase, in order to produce the desired effect. Such a course fianally breaks down the nervous system, and leaves the one who resorts to it a hopeless wreck—the worst kind of a drunkard.

Heisch's Test for Sewage Contamination.—The delicacy of the sense of smell and of taste varies greatly in different individuals ; one person may fail to detect the foul condition of a given water, which would be very evident to a person of a finer organization. But if the cause of a bad smell or taste exists in the water, the injurious effects on health will remain the same whether recognized or not. Moreover, some waters of very dangerous quality will fail to give any indication by smell or taste. Heisch's test for sewage contamination or the presence of putrescible organic matter is so simple that any one can use it. Fill a clean pint bottle three-fourths full with the water to be tested, and dissolve in water half a teaspoonful of the purest sugar—loaf or granulated sugar will answer—cork the bottle and place it in a warm place for two days. If in 24 to 48 hours the water becomes cloudy or milky, it is unfit for domestic use. It it remains perfectly clear it is probably safe to use.—*Prof. Kedsie.*

How to Utilize Old Fruit Cans.—Perhaps one of the most appropriate uses of an old fruit can that can be divised is to make it contribute to the growth of new fruit to fill new cans. This is done in the following manner : The can is pierced with one or more pin holes, and then sunk in the earth near the roots of the strawberry or tomato or other plants. The pin holes are to be of such size that when the can is filled with water the fluid can only escape into the ground very slowly. Thus a quart can, properly arranged, will extend its irrigation to the plant through a period of several days ; the can is them refilled. Practical trials of this method of irrigation leave no doubt of its success. Plants thus watered flourish and yield the most bounteous returns throughout the longest drouths. In all warm localities, where water is scarce, the planting of old fruit cans, as here indicated, will be found profitable as a regular gardening operation.

Weak Eyes.—Bathe in soft water that is sufficiently impregnated with spirits of camphor to be discernible to the smell—a teaspoonful of spirits of camphor to a tumbler of water. For inflamed eyes use milk and camphor, adding a little more of the camphor than above.—*Herald of Health.*

Flint Bricks.—Under the title of "Improvements in furnaces and other building blocks, retorts, crucibles, and other fire-resisting articles" a patent has recently been taken by Mr. D. Selwey, of Bridgend, Glamorganshire, for bricks composed of pure flint, without the admixture of alumina or any other substance to detract from the high refractory character of the material. The inventor treasts the flints in such a manner as to produce from them, when in a pulverized condition, bricks or blocks of great structural strength and durability, superior in fire-resisting properties, it is said, to the best descriptions of fire-clay goods. His patent also extends to the manufacture of artificial stone for building purposes. The material when burned resembles a fine-grained freestone, and is sufficiently hard to resist the action of the weather. It is in furnace work and similar applications, however, that these bricks are expected to be most successful.

COOKED CELERY FOR RHEUMATISM.

The many who are fond of the crisp leaf stems of celery would hesitate before reducing it to the estate of "cooked stuff," and yet it is said to be of good taste and to have "virtues" besides. An English writer proclaims cooked celery as a cure for rheumatism, which it certainly will not harm if it fails to cure. We read as follows: Celery, cooked, is a very fine dish, both as nutriment and as a purifier of the blood. I will not enumerate the marvelous cures I have made with celery, for fear the medical men should, like the corn dealers, attempt to worry me. Let me fearlessly say that rheumatism is impossible on such diet. Plainly let me say, cold or damp never produces rheumatism, but simply develops it. The acid blood is the primary cause and the sustaining power of evil. While the blood is alkaline there can be no rheumatism and equally no gout. I must return to cooked celery. Cut the celery into inch dice; boil in water until soft. No water must be poured away unless drunk by an invalid. Then take new milk, slightly thicken with flour and flavor with nutmegs; warm with the celery in the saucepan; serve up with diamonds of toasted bread round dish, and eat with potatoes."

A DANGEROUS THOUGH POPULAR EYE-WATER.

It is a popular impression that a dilute solution of "sugar of lead," or acetate of lead, is a perfectly harmless application for any slight inflammation of the eyes. The time was when it was so regarded by physicians, who were in the habit of ordering a little acetate of lead dissolved in rose water, with perhaps a few drops of laudanum added, for these ocular aliments. But the use of the lead salt for this purpose was long ago condemned by the best authorities, and most physicians are now aware of the fact. In domestic medicine, however, new ideas are slow in replacing the old ones that have come down from the grandmothers, and sugar of lead is still a favorite basis for home-made eye-waters.

A recent article in the Philadelphia *Medical and Surgical Reporter*, by Dr. W. S. Ross, gives a succinct statement of the reasons why this use of lead salts is dangerous. The Doctor says that the great danger of the use of lead in the eye is that a doposit often takes place on the cornea, especially if the cornea is in the least abraded, from whatever cause. Ulceration of the cornea is a very common occurrence, especially where there is high inflammation in the conjunctiva and sclerotic. If the acetate of lead is used, in solution, in an ulcerated condition, it does not matter of what strength, there will be a deposit of albuminate of lead the entire extent of the cornea denuded.

The opinions of quite a number of distinguished medical writers are quoted to the same effect. One writer says: "This bad effect may result from a single application. The deposit is extremely apt to fix itself on ulcers of the cornea. It attacks every abrasion on the slightest denuded surface. Hence, when such exist, acetate of lead should never be used."

This deposit resembles wet chalk, and can be removed only with difficulty and at considerable danger to the sight of the eyes, especially if the patient is advanced in years.

Possible Effect of the Moon in Early Geologic Time.—In a note to *Nature*, Mr. W. Davies writes: "In considering the climatic changes which have evidently taken place on various parts of the earth's surface, it seems to me that what may have been a very important factor has been rather strangely left out of calculation by physicists, never having been noticed hitherto, as far as I am aware. It is that of the heat which must at one period or the other have been transmitted from the moon. There can be scarcely a doubt that this must at one time have influenced the earth's climate to a very powerful degree, producing the effect of a second or additional sun. In the absence of any perceptible marks of atmospheric or aqueous erosive action on the moon, it is at present impossible to arrive at an idea of its relative age, or at what period its heat may have been most abundantly radiated; but if the much hotter climate which once prevailed in northern latitudes could be referred to this cause, it might give us some clue to the difficulty. Something also might be done in comparing the various changes of climate which have taken place in certain parts of the earth's surface, as indicated by geological evidence, with the actual course of the moon. The subject is at least worth entertaining, and may be recommended to the consideration of physicists."

THE ART OF COOKING.

We take from the *Housekeeper* the following excellent hints on the art of cooking: The science and art of cooking may be divided into a few principal parts: the rest is all fancy. These parts are baking, boiling, broiling, frying, roasting, seasoning, simmering and stewing. Tasting is an adjunct to all.

Baking.—In baking, see that the furnace or oven is properly heated; some dishes require more heat than others. Look at the object in process of baking from time to time, and especially at the beginning; turn it round, if necessary, in case it be heated more on one side than the other, to prevent burning. In baking meat and fish, besides keeping the bottom of the pan covered with broth or water, place a piece of buttered paper over the object in the pan. It not only prevents it from burning, but acts as a self-basting operation, and keeps the top moist and juicy. If the top of a cake bakes faster than the rest, place a piece of paper ou it.

Boiling.—This is the most abused branch in cooking. We know that many well-meaning housewives, and even professional cooks, boil things that ought to be prepared otherwise, with a view to economy; but a great many do it through laziness. Boiling requires as much care as any other branch, but they do not think so, and therefore indulge in it. Another abuse is to boil fast instead of slowly. Set a small ocean of water on a brisk fire and boil someting in it as fast as you can; you make much steam but do not cook faster, the degree of heat being the same as if you were boiling slowly. If the object you boil, and especially boil fast, contains any flavor, you evaporate it, and cannot bring it back. Many things are spoiled or partly destroyed by boiling, such as meats, coffee, &c. Water that has been boiled is inferior for cooking purposes, its gases and alkali being evaporated.

Broiling.—Whatever you broil, grease the bars of the gridiron first. Broiling and roasting are the same thing: the object in process of cooking by either must be exposed to the heat on one side and the other side to the air. Bear in mind that no one can broil or roast in an oven, whatever be its construction, its process of heating, or its kind of heat. An object cooked in an oven is baked. It is better to broil before than over the fire. In broiling by gas there is a great advantage. The meat is placed under the heat, and as the heat draws the juice of the meat, the consequence is that the juice being attracted upward it is retained in the meat. A gas broiler is a square flat drum, perforated on one side and placed over a frame. Broiling on live coals or on cinders without a gridiron is certainly not better than with one, as believed by many; on the contrary, besides not being very clean, it burns or chars part of the meat. That belief comes from the fact that when they partook of meat prepared that way, it was with a sauce that generally accompanies hunters, fishermen, &c., hunger, the most savory of all savory sauces.

FACTS OF VALUE TO THE HOUSEWIFE.

The salt will curdle new milk; hence, in preparing milk-porridge, gravies, etc., the salt should not be added until the dish is prepared.

That fresh meat, after beginning to sour, will sweeten if placed out of doors in the cool air overnight.

That clear, boiling water will remove tea stains and many fruit stains. Pour the water through the stain, and thus prevent it from spreading over the fabric.

That ripe tomatoes will remove ink and other stains from white cloth, also from the hands.

That a tablespoonful of turpentine boiled with your white clothes will greatly aid the whitening process.

That boiled starch is much improved by the addition of a little sperm, or a little salt, or both, or a little gum arabic dissolved.

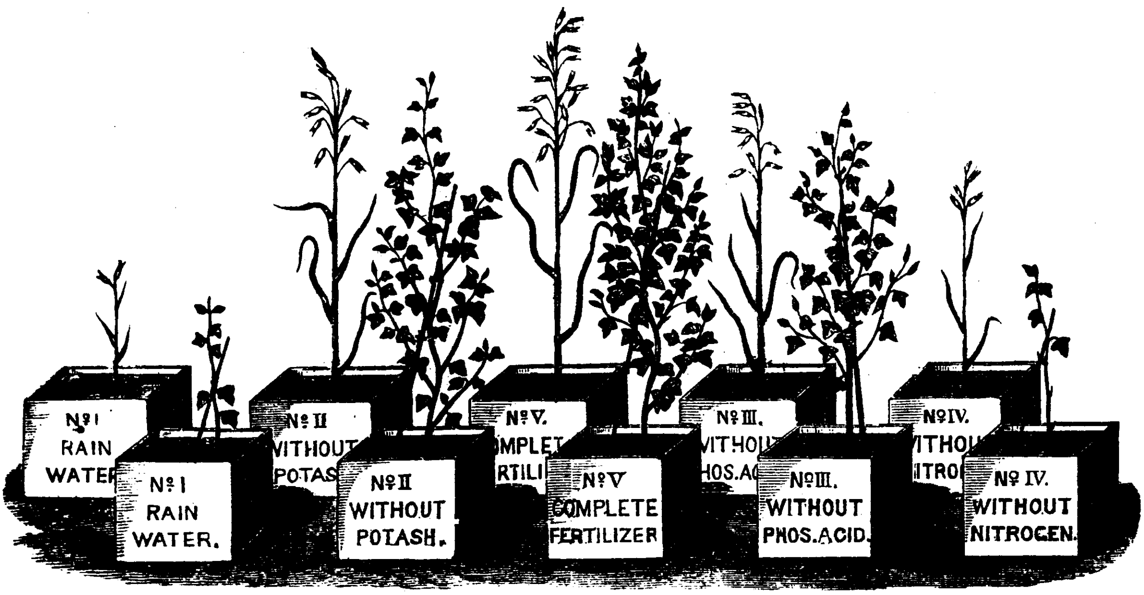
That beeswax and salt will make your rusty flat-irons as clean and smooth as glass. Tie a lump of wax in a rag, and keep it for the purpose. When the irons are hot, rub them first with the wax rag, then scour with a paper or cloth sprinkled with salt.

That blue ointment and kerosene mixed in equal proportions and applied to bedsteads is an unfailing bedbug remedy, and that a coat of whitewash is ditto for the walls of a log-house.

That kerosene oil will soften boots or shoes which have been hardened by water, and render them as pliable as new.

That kerosene will make your tin kettle as bright as new. Saturate a woolen rag and rub with it. It will also remove stains from, and clean, varnished furniture.

That cold rain-water and soap will remove machine grease from washable fabrics.

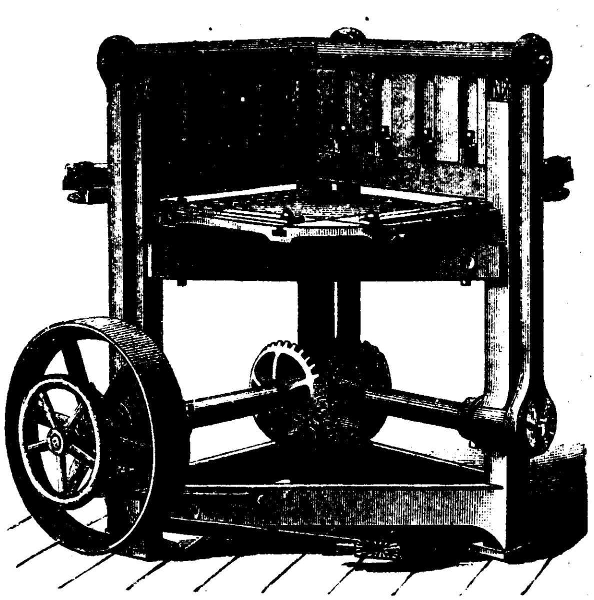


EXPERIMENT WITH BUCKWHEAT AND OATS GROWN IN BARREN SAND, AND SUPPLIED WITH DIFFERENT FERTILIZING INGREDIENTS.

Natural Strength of Soils, and Economy in Making Use of it.—Every one who has travelled through that part of Connecticut will remember the barren plains just north of New Haven. Large portions of this soil, if such a dry, drifting sand may be called a soil, are entirely devoid of vegetation. It comes nearer my idea of a desert than any other territory in this part of the country. The experiments referred to were made on portions of the poorest of this sand. Fifteen wooden boxes, each one foot square, were filled with the sand and arranged in three series of five each. The boxes of each series were numbered I., II., III., IV., V. In the first row buckwheat was sown ; in the second oats, and in the third beans. To fertilize these, several solutions were prepared by dissolving the proper chemical salts in water. One of these contained all the materials which plants require for their food from the soil. This "normal solution" was the same as is used in the experiments in "water culture," previously described, and was applied to No. V. of each series. Another solution, containing the same ingredients, except that nitrogen was omitted, was used to water the plants in No. IV. A solution, with everything but phosphoric acid, was applied to No. III. of each series. Potash was in like manner omitted from No. II. Finally each No. I. received only rain-water. The plants came up, and grew. Those supplied with the complete fertilizer, No. V., were healthy, did well, and gave a fair crop. Where potash was omitted, No. II., the plants were about as tall, but thinner, and the yield of seed was only about half as large. Without phosphoric acid, No. III., the plants looked about as well, but the amount of seed was extremely small. Where nitrogen was left out, everything else being supplied, the plants were stunted, spindling, and sickly. They yielded almost no seed, and were, in fact, no better than those which had nothing but rain-water.—*American Agriculturist.*

STILES' IMPROVED POWER SHEARS.

The Stiles & Parker Press Company, Middletown, Conn., have recently brought out a new machine for cutting and squaring all sorts of sheet metal, of which we give an illustration on this page. It is only within a few years that machines of this kind, capable of doing large and accurate work, have been manufactured. It is only a short time since a large establishment in this city expended many thousand dollars in having a power squaring shears built for them, at that time nothing of the kind being in the market. The finally successful machine was only obtained, at least, after a great many trials and failures. The Stiles & Parker Press Company's machine is intended to meet the wants of those who need accurate and powerful shears for sheet metal. There are three sizes, made to cut 30, 36 and 42 inches wide, and up to three-sixteenths of an inch in thickness.



STILES' NEW POWER SQUARING SHEAR.

These machines are furnished with both front and back gauges, and, when desired, the back gauge can be had with screw attachment for moving it, and graduated scale for setting it accurately to parts of an inch. The bed is strongly made and braced, and the gearing arranged so as to give great power. The cut is made by means of two connecting rods attached to the frame which carries the upper knife, which at the lower end are connected to cranks upon the main shaft. A clutch is arranged to throw the shaft into gear whenever the cut is to be made. This clutch, we believe, is the same as that used by these manufacturers on most of their power presses, and is so arranged that, no matter where in the stroke the foot is placed upon the lever to disconnect the driving wheel, the cutting shear is left at the top of the stroke. The tool, taken as a whole, seems to be a very desirable one.

—*Plumber and Sanitary Engineer.*