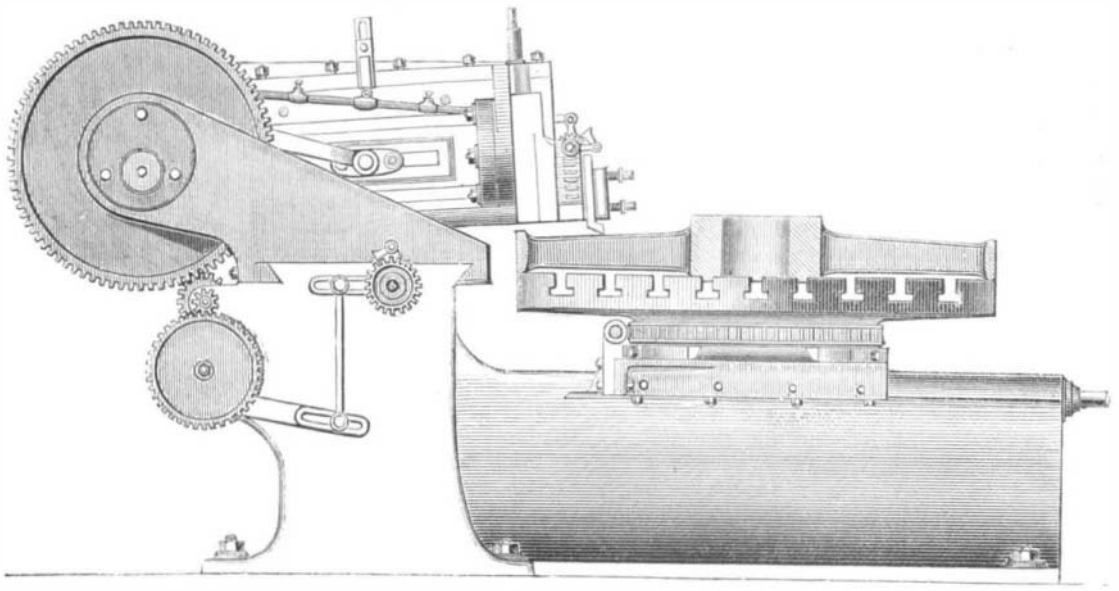
FINISHING LOCOMOTIVE WHEELS.

On page 6 of our current volume, we illustrated an ingeniously designed machine for slotting curvilinearly the insides of locomotive wheels made of wrought iron; and in further illustration of the subject of finishing such wheels, we publish two views of a tool of German origin, exhibited by the Chemnitz firm at the Vienna Exposition. It is designed for planing the spokes of locomotive wheels, the tool traveling at an angle to the horizontal to provide for increased thickness of metal at the hub. The tool holder is located at the outer end of a reciprocating ram, said ram working in guides formed on a plate which can be adjusted at different angles, so that the tool is made to take its cut in a direction corresponding to the desired taper of the wheel spoke.

The tool holder at the end of the ram is adjustable vertically, and it is also provided with a toothed arc actuated by a worm, and so arranged that the point of the tool can be made to traverse on the arc of a circle, convex upwards, this traverse being self-acting. In this way the desired rounded form can be given to the edges of the spokes. The motion is given to the ram by a crank of adjustable throw in the ordinary way, and it will be noticed that the carriage on which the ram is mounted is capable of being traversed along its bed by self-acting gear, the machine being thus made available for a variety of work besides that of spoke edge planing. This machine is, in fact, a very useful one for a locomotive shop where it is desired to turn out highly finished wheels, and is of very good design generally.



WHEEL SPOKE PLANING MACHINE.

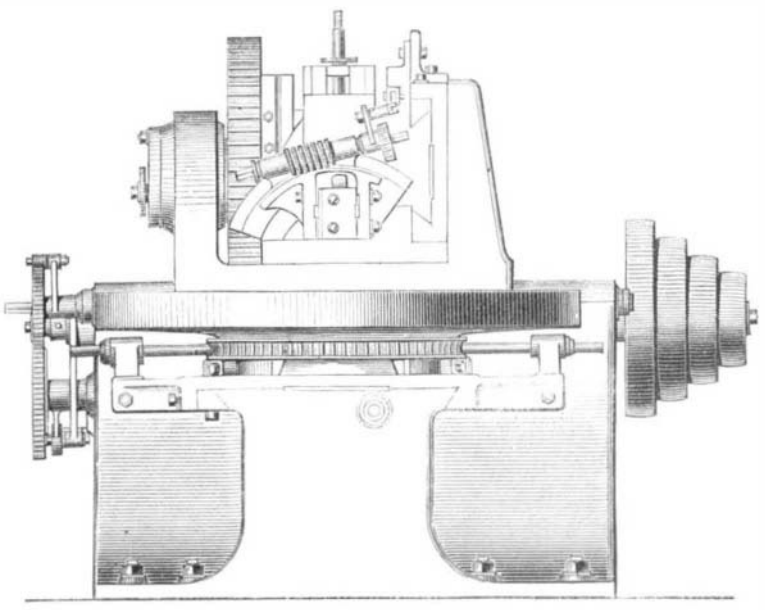
The Protection of Iron Surfaces.

The increasing utilization of iron as a material of architectural and engineering construction, and the necessity for protecting it from surface deterioration by means of some kind of paint which is at once economical and durable, have given the subject to be considered in this article a very great practical importance to painters. Until within a short time, our painters have not seemed to realize that iron required special treatment, very different from that which would answer with wood or brick; and during the first ten or fifteen years of the history of iron architecture in this country, the best effects of design and ornamentation were spoiled by heavy coats of white paint, which were sure to become streaked with reddish stains very soon after they were put on. There has been a very decided progress—towards a style of painting at once tasteful, durable, and adapted to iron as a material of construction—since white iron fronts were general, and many of the iron buildings in New York are models of beauty as well as strength; but we may consider the painting of iron an art yet to be learned by a majority of painters, if we may judge by the many conspicuous examples of ugliness and bad taste which disfigure our finest business streets.

In mixing paints for iron surfaces, it is of the first importance that the best materials only be used. Linseed oil is the best medium, when free from admixture with turpentine. A volatile oil, like turpentine, cannot be used with advantage on a non-absorbent surface like that of iron, for the reason that it leaves the paint a dry scale on the outside, which, having no cohesion, can be readily crumbled or washed away. Linseed oil, on the other hand, is peculiarly well adapted for this purpose. It does not evaporate in any perceptible degree, but the large percentage of linolein which it contains combines with the oxygen of the air, and forms a solid, translucent substance, of resinous appearance, which possesses much toughness and elasticity, and will not crack or blister by reason of the expansion and contraction of the iron with variations of temperature. It is, moreover, remarkably adhesive, is impervious to water, and is very difficult of solution in essential oils, spirits, or naphtha, and even in bisulphide of carbon. Another important advantage of linolein is that it expands in drying, which peculiarly adapts it to iron surfaces; since cracks, however minute, resulting from shrinkage, expose enough of the metal to afford a chance for corrosion, which will spread in all directions, undermining the paint and causing it to scale off, besides discoloring it.

With all its advantages, however, the best linseed oil paint is but poorly adapted to long service as a protection to iron surfaces exposed to extreme variation of temperature and to all kinds of weather. Even the continuous film of linolein, notwithstanding its compactness and the additional substance afforded by the body of the paints, gradually losses its toughness, curls up, and peels off. If chipped off by accident before it had lost its hold on the iron, we find, if we carefully examine the exposed spot, that a thin film of oxide has formed under it. This fact accounts for its diminished adhesion. Iron, in uniting with oxygen to form a rust, increases its bulk in proportion to the amount of oxygen it has taken up, and necessarily occupies increased space. In a word, it swells, and in so doing pushes off the paint film, which, sooner or later, drops away from it. This undermining action of the rust is the chief difficulty to be contended with in effectually preserving iron surfaces by means of paints or varnishes. It is not improbable that the linolein itself an oxide, may impart oxygen to the iron, and thus promote its rusting. This idea has been suggested by Professor Williams in a recent treatise on the subject; and while it is purely speculative, it may account for the oxidation of iron surfaces, when to all appearance effectually protected by a film of paint thick enough and continuous enough to exclude both air and dampness.

In selecting a paint for iron, mechanical adhesion is a consideration of the first importance. In this respect, paints differ widely, but it must be remembered that, in painting or varnishing a metallic surface, mechanical adhesion is all we have to depend upon. With absorbent surfaces it is different. Professor Williams gives it as his opinion, based on observation and experiment, that pitchy or bituminous films are especially effective as regards their adhesion to iron: for example, solutions of asphalt or pitch in petroleum or turpentine. These are also very effective as regards continuity, owing to the fact that, in drying, they form plastic films, which yield with the expansion and contraction of the iron, and manifest no tendency to crack. If the surface is rusty, they penetrate the oxide scale, and envelope the particles very effectually, making them a portion of the paint. The solubility of such a film in water may be counteracted by mixing it with linseed oil. The experiment may easily be tried by mixing about two parts of Brunswick black with one of white, red, or stone colored paint, the body of which is composed of red or white lead or litharge. Red lead is the best for many reasons, if finely ground and thoroughly mixed with linseed oil. Any one of several kinds of bitumen may be used, either natural mineral asphalt, pine pitch, or artificial asphalt, such as gas tar or the residuum of petroleum distillation in cases where the crude oil has been distilled before being treated with acid. This gives a very hard, bright pitch, which is soluble in "once run" paraffin spirit, and which makes the base of an excellent, cheap, and durable paint for ironwork in exposed positions.



WHEEL SPOKE PLANING MACHINE.—END VIEW.

During the past few years the writer has heard many accounts of the preservative influence of paraffin when applied to iron surfaces, and can recommend it for all classes of ironwork which can be treated hot. The most effective method of applying it is to heat the iron in vacuo, in order to expand it and open its pores, when paraffin, raised to the proper temperature, is run upon it. By this means the iron is penetrated to a sufficient depth to afford a very effectual protection against oxidation, especially when a suitable paint is subsequently applied. Any non-oxidizable substance would probably answer, but paraffin is as cheap as any, and quite as good if not better, the only exception as to quality being made in favor of some kind of vitreous enamel, which, while costing more, would certainly be more permanent in its benefits. Brushed upon the outside merely, it is doubtful if paraffin would have much effect in preserving the iron, while it would certainly tend to lessen, if not destroy, the mechanical adhesion of a surface paint. There is no reason, however, why bridge work, iron fronts, etc., should not be treated with paraffin before they leave the shops where they are made, which would greatly simplify the problem of their easy and economical preservation from oxidation. In the absence of such treatment, a careful coating with the paint above described will probably prove the most effectual means of protecting iron surfaces.—*Painters' Magazine.*

An Unhappy Attachment.

The Dover (Ohio) *Reporter* states that a painful scene occurred in a church in Bucks township, Ohio, a few Sundays ago. The church had lately undergone repair. Amongother improvements a new coat of paint was placed on the pews, followed by a coat of varnish; the result was most pleasing to the eye, but unfortunately varnish had been appli in the week that it ha time to become hard b day, when the cong flocked to their seats. No parent inconvenience was suffered until the clergyman was about to deliver the benediction, when the congregation were horrified to find that they were unable to stand up; they were, in fact, glued, or rather varnished, to their seats. Their spasmodic efforts to rise were most distressing to witness; in vain did the clergyman exhort them from the pulpit to resignation. They were seized with a kind of panic, all the more frightful because they were for the moment powerless; at last, by what seemed to be a simultaneous and herculean jerk, they managed to tear themselves from their sittings; but at what a sacrifice! The pews were literally covered with fragments of Sunday apparel. Shreds of silk, lawns, calico, broadcloth, and cassimeres were left as souvenirs of the tenacity of the varnish used in beautifying that church and the hapless congregation, rushing from the doors, hurried homewards with an expression on their faces as though their hearts were evenmore severely rent than their garments.

Chemical Action of Sea Water on Boilers.

In all boilers in which salt water is used, the plates are attacked and the portion of the iron dissolved is ultimately found in the scale, or the mud, to which it imparts a brick red tinge. Out of the three principal salts always present in salt water, namely chloride of sodium, chloride of calcium, and chloride of magnesium, to the former two the deleterious action mentioned is ordinarily attributed. This, however, is an error, since both salts are neither decomposed nor altered at the highest temperatures, and hence they cannot be caused to affect the iron through the heat in the generator.

The chloride of magnesium, however, a writer in the *Annales de l' Industrie* points out, decomposes into hydrochloric acid and magnesia. The former in contact with the iron attacks it, forming chloride of iron, which is soluble in water. When the chloride of magnesium is deposited by the salt water on the portions of the boiler, this result takes place; and the chloride of iron, dissolving in combination with the carbonate of lime already in solution, forms chloride of calcium and red oxide of iron, which is found in the scale. It remains, therefore, to find a means of combatting this action of chloride of magnesium, in order to preserve marine and other boilers in which sea water is used.

DISAPPEARANCE OF A VALUABLE BOOK.—The London *Builder* states that the Book of Kells, written by Saint Columbkill in the year 475, the most perfect specimen of Irish art, with illuminations, and valued at $60,000, has disappeared from Trinity College library. It is alleged to have been sent to the British Museum for the purpose of being bound. The volume is regarded as the palladium of Ireland. A receipt for it, signed by a Mr. Bond, purporting to be from the British Museum, has been placed in the hands of the Provost of Trinity College, Dublin. The greatest excitement prevails in the College respecting the mysterious disappearance of the volume.

APPLES HALF SWEET, HALF SOUR.—We are indebted to Mr. J. H. Parsons, of Franklin, N. Y., for specimens of fruit as above. They are of the greening species, sound and ripe. The two flavors are quite distinct; the sour portions have a greener and more full appearance than the sweet parts, which are softer and of a yellow hue.

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