dull. There are two settled methods of setting a saw—to wit, one (the best) is by means of the swage or upset and a hammer; when this method is adopted side-setting must be wholly ignored, as the two combined are a failure; the other (side-setting) to do perfectly, requires nice manipulation and fine discriminating mechanical judgment; where this method is adopted it would be well to observe that the *points* only and *not* the whole teeth should be bent; by observing the above you will avoid friction, which is, to say the least, desirable.

Filing is an art, the consummation of which is only reached by *practical experience;* the requisites are, a steady hand, good files, parallel jaws, and an understanding and perfect knowledge of what you are about to undertake. Amongst the most dexterous manipulators of the file is the locksmith, yet one of these experts without instructions would, in a very short time, render a saw unfit for use. To all sawyers I will say, in the words of Davy Crockett, "be sure you're right, then go ahead."

In the first place we will consider what is of the most importance—the correct pitch of the teeth. For this there is a set rule unknown to many sawyers, and which I will endeavour to elucidate. Fit a circular piece of wood or leather in the eye of your saw; now from the centre to one-half the distance from the centre to the circumference (the points of the teeth) describe a circle; then, with a straight-edge, draw lines inclining backwards from the point of each tooth, tangent to the circle. This will give the correct pitch to the front of the tooth, and will work equally well in hard or soft wood. The depth of the throat will depend upon the size of the tooth and should always be deep enough to hold the sawdust each tooth will cut; the area of the throat should never be less than the area of the tooth. The teeth both front and back should be filed square with the face of the saw; the fronts should be perfectly straight from the point to the bottom of the throat; were it possible to file the front concave a better cutting edge would be obtained, but as this would necessitate a convex file, and nothing perfect of the kind having been invented, we must forego the desire for so working the teeth. The backs of the teeth should be filed "straight away" from point to heel; some sawyers claim that the back should be reached to strengthen the teeth. Now, this places the strength just where it is not wanted, and renders the acquisition of a perfect cutting edge impossible. The points should be *square,* and exactly resemble so many small firmer chisels.

One other item and I will be done. The saw should but just come through the stock, not only to lessen friction, but also to allow it to cut more nearly with the grain; for this reason, the hinged table and a moderately large saw is suggested. A practical experiment will demonstrate the truth of my statement.

An important item is a properly balanced mandrel; too much attention cannot be given to this fact. Speed is another requisite; as a general thing, ignore the speeding saws furnished gratuitously by saw-makers. You can run a 16in. saw, No. 16 gauge, 3,500 revolutions a minute, with impunity; or, to adopt a more perfect guide, let the circumference of your saw, large or small, pass through 15,000ft. of space per minute; finally, your belting must be good, soft and pliable, worked with the hair side to the pulley, and devoid of metal rivits. Good lap joints, well cemented and properly secured by means of common shoe-pegs, are the best, and approach nearer to everlasting than any other now in use. Hoping this may meet the eyes of many, I give it as a few recollections of the long experience of a professional sawyer.—*English Mechanic.*

DISCOLOURATION OF PAINT.

Most of our readers are familiar with the fact that light-coloured paints, especially those having white lead as a basis, rapidly discolour under different circumstances. Thus white paint discolours when excluded from the light; stone colours lose their tone when exposed to sulphuretted hydrogen, even when that is only present in very small quantity in the air; greens fade or darken, and vermilion loses its brilliancy rapidly in a smoky atmosphere like that of London. Herr Ludersdof, of Berlin, thinks that the principal cause of the destructive change is due to a property in linseed oil which cannot be destroyed. The utility of drying oils for mixing pigments depends entirely on the fact that they are converted by the absorption of oxygen into a kind of resin which retains the colouring pigment in its semblance; but, during this oxidisation of the oil—the drying of the paint—a process is set up which, especially in the absence of light and air, soon gives the whitest paint a yellow tinge. Herr Ludersdoff therefore proposes to employ an already formed but colourless resin as the binding material of the paint, and he selects two resins as being specially suitable—one, sandarac, soluble in alcohol; the other, dammar, soluble in turpentine. The sandarac must be carefully picked over, and 7 oz. added to 2 oz. of Venice turpentine, and 24 oz. of alcohol of specific gravity 0·833. The mixture is put in a suitable vessel over a slow fire or spirit lamp, and heated, stirring diligently, until it is almost but not quite boiling. If the mixture be kept at this temperature, with frequent stirring, for an hour, the resin will be all dissolved, and the varnish is ready for use as soon as it is cool. The Venice turpentine is necessary to prevent too rapid drying, and more dilute alcohol cannot be employed, because sandarac does not dissolve easily in weaker alcohol, and, furthermore, the alcohol, by evaporation, would soon become so weak that the resin would be precipitated as a powder. When this is to be mixed with white lead, the latter must first be finely ground in water and dried again. It is then rubbed with a little turpentine on a slab, no more turpentine being taken than is absolutely necessary to enable it to be worked with the muller. One pound of the white lead is then mixed with exactly half a pound of varnish and stirred up for use. It must be applied rapidly, because it dries so quickly. If when dry the colour is wanting in lustre, it indicates the use of too much varnish. In such cases the article painted should be rubbed, when perfectly dry, with a woollen cloth to give it a gloss.

The dammar varnish is made by heating 8 oz. of dammar in 16oz. of oil of turpentine at 165° to 190° Fah., stirring diligently and keeping it at or about this temperature until all is dissolved, which requires about an hour. The varnish is then decanted from any impurities and preserved for use. The second coat of the pure varnish, to which half its weight of oil of turpentine has been added, may be applied. It is still better to apply a coat of sandarac varnish made with alcohol, because dammar varnish alone does not possess the hardness of sandarac, and, when the article covered with it is handled much, does not last so long.—*English Mechanic.*

GIRARD AVENUE BRIDGE.

(See pages 40, 44 and 45.)

This bridge spans the Schuylkill river in the city of Philadelphia, at the main avenue of approach to Fairmount Park and the Exhibition buildings, and is one of the great public works that will interest visitors to the Centennial Exhibition. It is remarkable as the first attempt in the United States to combine the American system of pinjointed, openwork girders, distinguished for their lightness of appearance, with a solid roadway of stone, constructed in that massive and substantial manner which is customary in England and on the Continent. To this is added a higher degree of architectural ornament than is common. The height of the roadway above low water is 55 feet. The girders rest on three piers and two abutments, and form the centre spans of 197 ft. each and two side spans of 137 ft. each. The height of the lower chord above low water is 23 ft. The bridge has a camber of 18 in. in its total length.

FOREIGN GLEANINGS.

TICKET CEMENT FOR TIN GOODS.—An effective cement for fastening paper tickets to tin goods is said to consist in a solution of gum to which ammonia has been added. Glue with which a small quantity of glycerine has been mixed is another good cement.

PARIS OMNIBUSES.—The following statistics respecting the traffic of the omnibuses have been published:—In 1855, the omnibuses carried forty million passengers; in 1860, seventy-two millions; in 1867, Exhibition year, 121 millions; in 1869, 119 millions; in 1871, seventy-eight millions; in 1872, 111 millions, and in 1874, over 115 millions.

UNBREAKABLE GLASS.—Mr. F. M. Stahl, the manager of the Berlin Meteorological Instrument Company, has succeeded in making glass cylinders hard enough to resist any change of temperature; they stand good even if plunged, after heating, into cold water. Another Berlin Company, that for domestic warming and ventilation, sells lamp cylinders of hard glass.

IMPORTATION OF MACHINERY INTO RUSSIA.—In 1863, the Russian imports of machinery were valued at 6,000,000 roubles; in 1873, 24,000,000 roubles; other metal goods in 1863, 5,000,000 roubles; in 1873, the Russian export of corn alone was 164,000,000 roubles, and flax, 41,000,000 roubles.