

THE POINTS INVOLVED IN JOINT.

In all wood-working the proper connection of the parts is an essential element, and in designing or executing joints and fastenings in wood-work, the following principles laid down by Prof. Rankine should be adhered to, viz.:

1. To cut the joints and arrange the fastening so as to weaken the pieces of timber that they connect as little as possible.

2. To place each slitting-surface in a joint as nearly as possible perpendicular to the pressure which it has to transmit.

3. To proportion the area of each surface to the pressure which it has to bear, so that the timber may be safe against injury under the heaviest loads which occur in practice, and to form and fit every pair of such surfaces accurately, in order to distribute the stress uniformly.

4. To proportion the fastenings so that they may be of equal strength with the pieces which they connect.

5. To place the fastenings in each piece of timber so that there may be sufficient resistance to the giving way of the joint by the fastenings shearing or crushing their way through the timber.

To these may be added a sixth principle not less important than the foregoing, viz.: To select the simplest forms of joints, and to obtain the smallest possible number of abutments. The reason for this is that the more complicated the joint, or the greater the number of bearing surfaces, the less probability there will be of getting a sound and cheaply made connection. To insure a fair and equal bearing in a joint which is not quite true, it is usual after the pieces are put together to run a saw-cut between each bearing surface or abutment; the kerf or width of cut being equal in each case the bearing is then rendered true; this is often done, for instance, with the shoulders of a tenon or the butting ends of a scarf, when careful workmanship has rendered it necessary. When the visible junction of two pieces is required to be as close as possible, and no great strain to be met at the joint, it is usual to slightly undercut the parts and give clearance on the inside.

THE BLUE JAY.

We give our readers on this page, an engraving of a blue jay—a bird as widely known as he is injurious. If "handsome is that handsome does" be true of birds, then the jay is a model of ugliness in spite of his bright colors. Every man's hand is raised against him for he is a destroyer of fruit and grain, and nuts, and is a devourer of eggs and the young of birds, which are of real value to the fruit grower and farmer. In spite of the guns and traps which beset his life, this worse than worthless bird is still abundant and seems to thrive in the adversity which farmers endeavor to visit upon him.

THE TORTOISE AS A BAROMETRE.—M. J. P. Bouchard, says the *London Farmer*, publishes the results of a series of observations he has made for some years past on the habits of the common tortoise as indicative of approaching changes in the weather, more especially of sudden reductions of temperature. At the end of autumn, if a severe winter is at hand the tortoises bury themselves deeply in the ground so as to be completely hidden. If, on the contrary, the winter is about to be exceptionally mild, as was the case last year, they only go just sufficiently deep to cover the openings of the carapace. Taking last winter as an example, he found that they emerged from their retreats during a mild January, and their return to them late in February was shortly followed by severe frosts. One day in March, while the thermometer was standing at 50° Fahr., the tortoises suddenly retired, and the same night it fell to only two degrees above freezing point. Five times in the month of April their disappearance gave timely warning of approaching frosts, and in every instance the warning was justified by the result. M. Bouchard states that by regular attention to the movements of these sensitive weather prophets, he has been able for years past to avoid danger from unexpected night frosts in his numerous glass-houses.

COAL AND IRON IN INDIA.—Mr. Walter Noss, who is under an engagement by the British government to develop the Warora coal fields of Central India, states that in the Warora coal fields there are by computation, 500,000,000 tons of coal within 14 miles. The coal consisted mainly of an 11-foot seam, but owing to the difficulty of native labor, it had to be worked by the long-wall system. It took three or four natives to do the same amount of work done by one English miner. He had some trouble in training the natives to work in the pits, and also as blacksmiths and carpenters, but afterwards they gave him little trouble, as they were amenable to law and order. About 50 miles from where he was engaged in the development of the coal field, there was a hill with a rich vein of iron-ore, and he calculated that it contained 3,000,000 tons of rich ore. He hoped that the time would soon come when the seam would be worked, and iron made in India. He said the coal was not faulty, and he had not seen any gas. All the coal raised at present is used for locomotive purposes. The price is 12 shillings per ton, but this would be reduced when the coal could be worked by skilled workmen.

TO BRILLENTE IRON.—The following method of brightening iron, which appears suitable for some of the less important parts of large clocks, is recommended by Boden. The articles to be brightened are, when taken from the forge or rolls, in the case of such articles as plate, wire, etc., placed in diluted sulphuric acid (1 to 20), where they remain for about an hour. This has the effect of cleansing them, and they are washed clean with water and dried with sawdust. They are then dipped for about a second in commercial nitrous acid, washed carefully, dried in sawdust, and rubbed clean. It is said that iron goods thus treated acquire, without undergoing any of the usual polishing operations, a bright surface having a white glance. Care should be taken by any one using the nitrous acid not to inhale the fumes.

FATAL PARASITIC WORMS IN DOGS.—The *New York Independent* condenses from Chinese newspapers an account of a discovery why dogs in China are liable to sudden and apparently unaccountable death. This is often found to be due to the plugging of the pulmonary artery, or to mechanical interference with the action of the valves of the heart, by a mass of filicariae, or worms, occupying the artery and cavities on the right side. On opening the heart the worms are found matted together in a bundle, like a coil of thick cat-gut that has been some time steeping in water. The few sluggish movements they exhibit after the death of the dog form a striking contrast to the liveliness of their minute progeny, which wriggle about in the neighborhood and in the blood throughout the system. On unraveling and extending the parent worms, they can be separated into two kinds. One sort, the larger and plumper, measure from 8 to 12 inches in length by 1.30 of an inch in diameter; the other, the smaller, five to seven inches in length by 1.40 of an inch in diameter. Their progeny are about 1-100 of an inch in length by 1-2,000 of an inch in breadth. A similar disease to this is known in America, France, Italy and other countries. Dr. Manson, in his report on these *Heratonia*, is inclined to believe that the

INGROWING NAILS.—One of the deserved punishments which people suffer from the folly of squeezing their feet into narrow shoes and boots is an ingrowing nail. Mr. South recommends the following treatment for its cure. First get rid of the narrow shoe, so that the toe may be unconfined, and the nail allowed to recover its proper breadth, which, however, it does not do very quickly. Then proceed to relieve the sore skin by the side of the nail of its pressure. It is of no use, however, merely to cut away the pressing nail even freely, and then to press a piece of lint under its edge, which is as painful as it is useless; for the nail, if it is not otherwise managed, will drop, in the course of a few days, upon the old spot, and again render it "angry." The proper treatment is thinning the whole length of the middle of the nail, from its root to its end as much as possible, and this is best done by scraping it perseveringly with the sharp edge of a piece of glass, again and again, till the middle of the nail be as thin as writing paper, and will readily bend under the pressure of the finger-nail. This is, at first, a rather painful operation; but the scraping must be done with a light hand. As soon as the middle of the nail has been thus thinned, it yields to the upward pressure of the skin on its side edges,

THE AGE OF STEEL.

Mr. Lowthian Bell, the English expert, is well known to be of the opinion that the age of iron is approaching its close, and that steel will eventually take its place; and the object upon which the energies of that gentleman have for some time been concentrated is to produce steel from the puddling furnace by a direct process. He candidly told his hearers at Newcastle that "now-a-days, so far as ulterior projects were concerned, it was neither bar iron nor pig iron they required, but steel; and, however their interests might deceive them into the belief that malleable iron was going to retain the position it had occupied for some thousands of years, there was no doubt in his mind that steel was destined to supplant it." It cannot be ignored, says the *London Telegraph*, that, at least as regards rails, the hulls and boilers of metal ships, and many other articles, patent facts yield increasing support to the forecast of Mr. Lowthian Bell. In consequence of the increasing pressure given to steel for rails, the iron rail trade of South Wales and Middleborough has almost entirely disappeared. When railway companies renew their permanent way, if it should happen to have been formerly laid with iron, they now invariably substitute steel, for the sufficient reason that rails of the latter metal will wear three or four times longer than those made of the former, notwithstanding that steel rails cost only 10 shillings per ton more than iron ones. Besides, Lloyd's have already sanctioned the construction of steel ships at a reduction of 25% on the standing required in the case of iron vessels; and the advantages in favor of steel, in respect of durability, lightness and capacity for accommodating freight, are self-evident. Steel bridges span the great rivers of America and the dykes of Holland, and it cannot be long before the security of this material for similar purposes in England is generally recognized. There is, however, an important consideration which, in a commercial point of view, might be regarded as a drawback to the displacement of iron by steel. If, for example, steel rails will last 10 years instead of four—the average duration of iron rails—and if steel vessels last proportionately long, it is obvious that, unless enterprise in these departments develops on a scale vast beyond anticipation, the greater durability of the one metal, as compared with the other, will prevent orders from being so frequently repeated for replacing wasted material.

IMPROVED CARMINÉ INK.—The *English Mechanic* says: The solubility of carmine lake in caustic aqua ammonia is attended with this disadvantage: that in consequence of the alkaline properties of ammonia, the cochineal pigment will, in time, form a basic compound, which in contact with a steel pen no longer produces the intense red, but rather a blackish color. To avoid this evil, prepare the ink as follows: Saturate 1 gramme of pure carmine with 15 grammes of acetate of ammonia solution and an equal quantity of distilled water in a porcelain mortar, and allow the whole to stand for some time. In this way a portion of the alumina which is combined with the carmine dye, is taken up by the acetic acid of the ammonia salt, and separates as precipitate, while the pure pigment of the cochineal remains dissolved in half saturated ammonia. It is now filtered, and a few drops of pure white syrup added to thicken it. In this way an excellent red drawing ink is obtained, which holds its color for a long time. A solution of gum arabic cannot be employed to thicken this ink, as it still contains some acetic acid, which would coagulate the bassorine which is one of the natural constituents of gum arabic.

CAUSE OF MILL FIRES.—A correspondent of the *London (England) Miller* writes as follows concerning fires in flour mills: "I have been for more than 30 years connected with the trade, and in that time it has been my misfortune to be once burned out of a situation. I have also seen and know many mill fires, the majority of which have taken place in the night, and most of those after the mills have shut down several hours, many of them breaking out of a Sunday morning, and even as late as the evening, or after midnight—in other words, on Monday morning. The cause of the long interval I attribute to the smouldering of dust around some hot bearing till it has assumed a body of fire and charred wood, when a slight draught has produced a flame, and before being noticed was spread too far to stop. It is the mill and its contents have been reduced to a heap of ruins. In most cases this might have been prevented by it being made the duty of one man to go round and look to all bearings before locking up the place for the night.

TO STOP NOSE-BLEED.—A correspondent of the *Duggell's Advertiser* says: The bleeding may arise from an impoverished state of the blood, or it may be the symptom of some other disease. If the attack gives rise to serious apprehensions seek the advice of a physician. At times simple remedies relieve great ills, and perhaps a knowledge of the following simple remedies might prove serviceable: Bleeding may be stopped by raising the arms above the head. Sponging with ice-water with has contact with the shoulders. Application of a strong solution of alum to the inside of the nostrils, or plugging the nostrils with lint or cotton wool soaked in this solution. Placing a small roll of paper or muslin under the upper lip, above the front teeth, and pressing firmly on the same, which by compressing the arteries, checks bleeding.

A SICK WHALE.—A white whale (*Beluga borealis*) was lately carried to England from America for the Westminster Aquarium. It was very thin when it arrived, not having eaten anything for twelve days, and the spinous processes protruded two to three inches along its back. It was fed on eels, and seemed to improve rapidly, but died in a few days. Dissection proved that it died of inflammation of the lungs, which has surprised people, as occurring in an aquatic species. But a whale's fat is its clothing, and it is not strange that it should catch cold when its clothing is used up.



THE BLUE JAY.

great frequency of aortic aneurism among Europeans in China might possibly be traceable to the existence of these worms in the heart and blood-vessels. With the practice he has acquired in the detection of these worms in the blood of the dog, he searched for them in man. No selection was made of cases; but the first patient or healthy person who presented himself and was willing to have his fingers pricked was examined, six slides of blood, at least, being carefully searched. In this way he of 100 cases found the worms in 15 or about 8.

CURLING OUTHORN FEATHERS.—A correspondent of the *Inter-Ocean* says: If possible, an old plume should be used to practice on until one gets her "hand in," as two or three broken feathers in a nice plume might spoil it. With the left thumb and forefinger hold that part of the quill to which the feathers being curled are attached, and with a rather dull but pointed penknife take up the slender feathers, one at a time, beginning at the base of the plume and working toward the point. The pointed blade will enable one to pick up the feathers readily; then, with a quick movement, acquired only by practice, the blade and thumb between which the feathers is held are to be drawn to and of the end of the feather, when it will curl back toward the quill, more or less according to how tightly it was held while being drawn between the thumb and knife. If it is only desired to curl the tip end, as in long plumes, it is best to hold part of the way down the vane, instead of holding the quill. Patient practice will enable one to curl plumes nicely within a reasonable time and their added beauty will repay the trouble.

A bill has been introduced in Congress by Joyce, adjusting the salaries of Postmasters on the basis of the number of stamps cancelled instead of the number sold.

readily bends, and offers no further resistance. The sore place being no longer irritated by pressure, the "proud" flesh soon drops down, and the sore heals. If narrow shoes or boots be again used, the foolish wearer may expect a repetition of his plague.

THE STARFISH.—The *Independent* says that in a richly illustrated volume on the embryology and anatomy of the starfish, Mr. Alexander Agassiz takes exception to the prevailing Darwinian views in the following language: "While," he says, "the successive appearance of the great types of Echinid in geological time—in other words, their paleontological development—is in the strictest harmony with what we know of their embryological development, we are certainly not knowing whatever of the causes which have brought about their sequence in time, in such striking agreement with the sequence in their places of growth. The case of successive modifications of the ancestral horse, which has so often been brought forward as a convincing example of the genealogy of the group, although more familiar, is far less complete and much more limited in time than the succession to be traced from the paleontological evidence of Echinid. But, while natural selection gives a plausible explanation of like problems among vertebrates, it fails utterly when applied to the majority of the invertebrates, and we have completely failed, thus far, to find any causes for their paleontological development differing from those acting upon their successive embryological stages at the present day, of which we know absolutely nothing.

MILAN is preparing for an International Exhibition in 1879. The outline for the building, which is to be in the London Crystal Palace style, is set at the modest sum of £150,000, two-thirds of which sum have already been subscribed in England and the rest in Italy.