TALKS WITH WOOD-WORKERS.

THE mechanic who uses his tools awkwardly may be set down as a poor mechanic. It has been remarked that there is a right way and a wrong way of doing everything, and in the handling of tools it is most important that the workman knows how to handle these in the right way. Some men, says Mr. F. J. Harmon, writing in the Wood Worker, are better workmen than others, and it is not fully decided that a good deal of this superiority does not arise from the position of the man while working. The largest amount of good work can not be done while the body is in a cramped position. It is not enough to hold correctly and use them right, but the body, too, should be handled right, in order that a man may do the maximum amount of work he is capable of turning out. To this effect, all prolonged work should be executed with the chest out and the shoulders thrown back. A contracted chest will produce shortness of breath and palpitation of the heart. The head should be held erect as possible. By keeping the head in a bent position the passage of the blood through the veins of the neck and throat is impeded (the vein tubes being stretched vertically) and at the same time the muscles at the back of the neck which hold up the head, become strained. When we are erect, much of the weight of head is supported by the spine. Again, in a bent position we look at things from a wrong angle. This makes it almost impossible to do accurate work.

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In sawing, some people claim that the feet should be so far apart that the legs form an angle of 90 degrees. Other people say that 60 degrees is right. I believe it depends upon the kind of work to be done. For light, easy sawing I can work to advantage with my feet 45 to 60 degrees apart, but on the very heaviest kind of sawing, by bracing out to the 90 degree angle work is done to greater advantage. The arms and shoulder must be in line with the saw kerf, so as to swing in the direction which the saw is to take. There is just one way in which the head may be held high when shoving a saw or a plane, and the chest may be kept well expanded, and that way is by having the work supported at exactly the right height. To this end every bench ought to be made, especially for sawing, so that it may be raised or lowered as the work requires.

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When sawing with the right arm, the left foot should be extended, with the leg out straight and parallel with the bench. When sawing with the left arm (and a man can saw as well with one as the other if he will only practice equally with each), the right foot is to be put forward; in either case the arm should move in the direction of the resistance. The saw always ought to move in a line parallel with the bench, then there will be no danger of running into that piece of apparatus and possibly damaging the saw on a nail or screw. The body should never be held stiff. Good, fast work can not be done unless the body moves slowly backwards and forward, and its swing should be regulated by the amount of resistance to be overcome. Therefore, in light, easy sawing there need be much less motion than when a tough bit of stuff is being attacked and full power of the man is required.

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In planing, the left knee (right-hand work) should be parallel to the bench and one foot at right angle to the other. The pressure on the plane, so that the plane-iron will catch the wood, should come from the weight of the plane. Very little force should be put upon the plane with the arms. Planing is different from drilling or boring. In performing either of these operations the weight of the body should be used to overcome the resistance of the material.

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The scope of this article includes the grinding and setting of plane-irons or the filing of saws, but unless the tools are in perfect condition, no man, be he ever so good a workman, can hold himself in the correct working position while using such tools. For instance, a plane is dull; the iron will not pick up a chip unless considerable weight be put upon the plane, and the very act of "riding" upon the plane prevents the workman from keeping in position. Suppose a board of eight feet long has both edges to be jointed up so it can be used as a straight edge. In taking a chip off this board the workman desires to cut a continuous shaving without once stopping the plane. He must take off a continuous chip or he can not get the edge smooth and true. Every time the plane stops a slight ridge or bunch will be left; therefore it is necessary to walk along the work and push the plane, consequently the tool must go easily, and a little bearing down beyond its weight can be permitted. If the plane is dull, bearing down harder is necessary to make it cut. But bearing down hard is fatal to true work, hence the tool must be sharp to insure good work, through a correct position of the workman.

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Upon correct position, then, depends much more than is apparent at first sight. The man who grasps a hammer handle close up under the head, does not expect to do as much work as the man who seizes the handle in its proper place. The old German mechanic understood this point when he marked off his hammer handle into inches and marked the first mark from the head $1.25, the next mark $1.50 and so on up to the eight-inch mark, which he labelled $3.00. Being asked the meaning of the marks Hans said: "Ven I gits $1.25 a day, I takes him at dot mark," and he struck a blow that had but very little force, "but when I gits $3.00, I takes him dere" (the eight inch mark), and Hans struck a blow that had unmistakable force. Correct position then is the correct thing for the wood-worker to attain, in order to do the greatest possible amount of the very best work.

JAS.

ROPE DRIVING.

THE subject of rope driving may properly be placed under two heads, according to the nature of the material composing the ropes—whether fibrous or metallic. With few exceptions metallic or wire ropes are used almost exclusively on long-distance or telodynamic transmission, while fibrous ropes are employed for intermediate and comparatively short drives. Among the materials used in this method of power transmission we find manilla rope in much favor in this country, as well as in Great Britain and Germany.

In many cases ropes of cotton are also used, as they are generally softer and more pliable than the ordinary manilla ropes, thus allowing smaller pulleys to be used with less injury to the fibres. In fact, cotton ropes of small diameter have been used for years in cotton machinery bandings over pulleys and under conditions which would wear out a manilla rope in one-third the time. There is also an advantage, in that there is less internal chafing and wear when the rope is bent over a pulley, on account of the smoothness of the fibres and the great elasticity of the yarns.

The fibre of cotton is in itself a single cell, or hair, which grows on the coat of the seed and is thus a unit. These fibres are divided into two classes, constituting what are known as the short and long stapled varieties, in which the length varies from 3-8 inch to 1¾ inches. The unit cell, when attached to the seed in the plant, is in the form of an elongated cylinder, but when dried and separated from the plant the walls of the cells collapse; the flattening of the cells is not uniform nor continuous in a straight line, and as a result the fibre assumes the appearance of a twisted ribbon of numerous convolutions, somewhat resembling a corkscrew.

The shape of the fibre is thus well adapted to the work of being twisted into yarns and on account of each fibre being a unit its surface is comparatively smooth; the structure of the fibre permits considerable elongation, and especially in the long stapled varieties, the natural wax on its outer surface acts as a lubricant and permits a freedom of motion between the unit fibres without undue wear.

Thus it will be seen that cotton ropes are particularly well adapted to the transmission of power, in which the rope is constantly undergoing a varying strain, and is subjected to much flexion. The strength of cotton ropes is, however, extremely small, and although the weight is about one-third less than manilla the actual first cost is from fifty to seventy-five per cent. greater than for the latter. The working strength of cotton transmission rope may be taken higher, in proportion to its ultimate strength, than is used for manilla, for the latter is weakened by the grease with which it is lubricated, and, moreover, a large factor must be allowed for wear on account of the character of the manilla fibre, which breaks more easily under bending strains.

As compared with manilla, then, the advantages of cotton ropes of the same diameter are: Greater flexibility, greater elasticity, less internal wear and loss of power due to bending the fibres, and the use of smaller pulleys for a given diameter of rope. Its disadvantages are greater first cost, lesser strength, and possibly, a greater loss of power due to pulling the ungreased rope out of the groove—in any case this is very small with speeds over 2,000 feet per minute.

In England manilla is now being used very largely, but cotton were formally preferred to the exclusion of all others for all kinds of driving, but the most probable cause of this was not that cotton was the best or most economical for the purpose, but that rope driving is most common at cotton factories, and cotton ropes were made in the locality by men who were familiar with the local product and had for years been making spindle and rim bands of small size. When the demand for large sizes arose these rope makers applied themselves to the newer industry and shut out other materials.

In the mills of Dundee and vicinity, and in the North of Ireland, where flax and hemp are worked, we find ropes of hemp, a local product, used entirely.

Rawhide ropes, which are made from 3-8 inch to 2 inches in diameter, are used to a limited extent. Where the stress in a rope is not great and the accompanying slip is small, rawhide works very well, and will last from three to six, and, in some cases, ten years. Under ordinary circumstances, it is not necessary to use any dressing, as sufficient lubrication is furnished by the rope itself; if the rope slips in its groove the leather will be burned and lose its flexibility and also its adhesive qualities to a certain extent. A rawhide rope has very little tendency to rotate on its axis, and for this reason the wear is not uniform, and with a heavy tension it is liable to take the set of the groove in which it runs; this is rather an advantage for a straight drive, where the rope always runs in the same direction, but in those cases where a rope is led on to the pulleys at an angle this will be a disadvantage, as under such conditions the rope often slips and wear is excessive. Where the rope is subject to wet or dampness, rawhide is an excellent material to use, as it is very little affected by dampness.

The cost of rawhide rope will average about six times that of a good quality of manilla transmission rope.

Solid round and square ropes of leather are sometimes used, and steel ropes with leather washers closely threaded on have been tried with considerable success, but the expense of such a rope would necessarily limit its application.

As we have already noted, manilla rope is used very extensively for transmission pusposes, but its application has not always met with that success which would follow a more thorough knowledge of its requirements. Inefficient rope drives are erected and run for a few months, or perhaps only days, and are replaced with larger ropes if the sheaves will permit, or, as in many cases, the ropes give way to leather belting and henceforth rope driving is condemned. The true cause is not so much the inefficiency of the ropes as it is the lack of knowledge concerning their use and application.—Flather, in the Electrical World.

EXPANSION OF CYLINDERS.

MUCH trouble is experienced in long stroke engines by the cylinder working loose on the foundation, caused by expansion in the cylinder body from the heating of the steam. Various means for overcoming this have been adopted and the most satisfactory seems to be to fasten one end of the cylinder solid to the foundation and leave the other end free to expand endwise, but of course prevent from vertical motion by the proper appliances, in other words, have a sliding expansion joint at one end. In tandem engines where one cylinder is fastened to the other direct, that is, the back end of the first to the head end of the next, this expansion is something considerable and should be provided for. This expansion can be diminished by not connecting the cylinder as first stated, but connecting the head of the first cylinder to the head of the second by rods running outside of the smaller cylinder.