ties because it has too narrow a mouth for convenient manipulation of the tinfoil. The suggestion may have other applications; for instance, a pair of thin glass test tubes, silvered in this way, serve very well in the construction of Regnault's hygrometer.

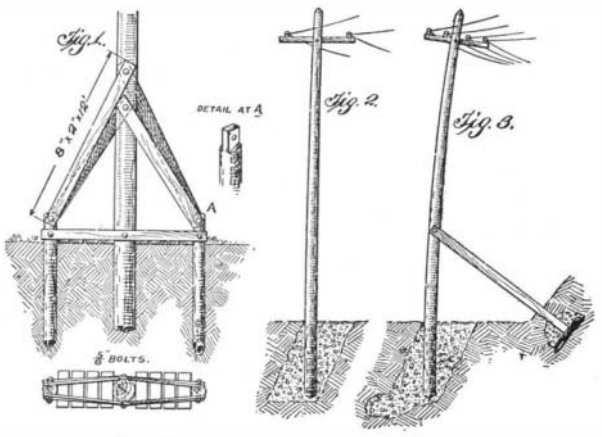
The easiest way to get proper silvering solution is to go down to the mirror maker's with the flasks that need the coating. The solution can be purchased for a trifle. The following formula will do very well: A. Rochelle salt 10 grammes in 1 liter of water. B. Silver nitrate 5 grammes dissolved in a little water. Add 3 grammes of strong ammonia gradually, so that the precipitate at first formed is dissolved. Add water enough to make 1 liter. Mix equal parts of A and B. The glass ought to be perfectly clean and at a temperature of 25 deg. or 30 deg. C. In about half an hour the deposit is complete.

WAYS TO BRACE POLES FOR PRIVATE TELEPHONE LINES.

BY THALEON BLAKE.

The extension of telephone lines to rural districts is one of the real blessings modern science and business enterprise have bestowed upon the farmers. Most of these spurs and cross-country lines are made at the expense of the telephone companies; but sometimes, when the number of subscribers does not warrant it, the prospective customers must furnish or erect their own poles. Even if these are done by the companies, many boys may desire to unite their neighbors' houses with theirs by private telephone or telegraph lines. Telegraphy is a fascinating study to boys. To those who contemplate the erection of a private telephone or telegraph line it may be informing for them to examine these designs of two ways of bracing poles. In fact, the plans are worthy of any farmers' attention who uses poles for any purpose whatsoever about the farm.

It is to be remarked, first of all, that poles get out of plumb and alinement because of wind pressure and wire strain. Eliminate these two stresses upon any



HOW TO BRACE A TELEPHONE POLE.

pole, and unless it be located at the edge of quicksand, or abuts a living spring of water, it will very likely remain erect until it decays. Fig. 1 shows a form of bracing that is excellent to aid a pole to withstand the rocking effect of the wind. Most winds are unsteady in effort, and this accounts for so many poles leaning, for the pressure of the wind comes and goes suddenly, each gust being followed by periods of lull, so that a pole rocks, swinging out with the gust, and back with the following lull. The design is self-explanatory, and is intended for a full-sized pole, set seven feet in the ground. But poles to carry two to four wires need not be so large, either in diameter or in height, nor be set so deeply in the ground. The perpendicular braces, coupled at the top by horizontal timbers, are efficient to withstand the rocking effect of the pole. The oblique braces are also valuable assistants. Strange as it may appear, when oblique braces are used alone, they tend to lift a pole out of the earth as it rocks back and forth. The horizontal braces do not have this tendency. Perhaps children have observed that their swing poles, when braced by oblique braces only, have gradually become loosened and lifted by swinging. This system of bracing poles, therefore, is to be recommended for children's swings. The design shows the parts well proportioned, and they may be proportionally reduced in dimensions in working them out.

Fig. 2 shows how cement may be substituted for wooden braces at a bend of the line where the wind and wire strains are not too severe. The hole in the ground is dug obliquely, the pole is set upright, and the triangular spaces on both sides are filled with cement. Odd-shaped poles, should it be necessary, may be used anywhere when properly braced. One good way of bracing such a pole is portrayed in Fig. 3. A toe of cement may be extended into the ground to give the cement a "grip." If it is still required to have a stronger support, a wooden brace may be affixed as shown, its bottom resting on a large flat stone, with or without a cement binding.

By either of these methods, a private line of telephone or telegraph wires can be maintained against the blasts of Boreas himself, whether the old mythological god blows hot or cold, hard or easy.

THE DRIVING OF A NAIL.

BY W. D. GRAVES.

The driving of a nail is deemed so simple a matter, that inability to do the job is often spoken of as though typifying entire lack of mechanical ability; yet it may be that some skilled mechanics have something to learn in regard to this elementary operation.

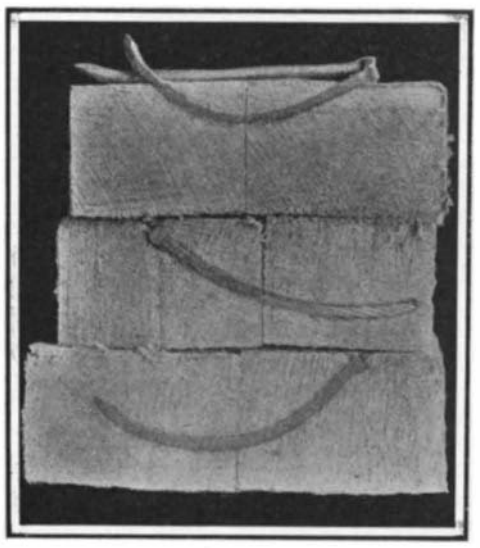


Fig. 1.—NAILING A BUTT JOINT.

It usually takes a woodworker's apprentice a year or more to learn that he doesn't know how.

A fledgeling mechanic, who spoke sneeringly of a man whom he heard using several blows of the hammer to drive a shingle nail, was somewhat crestfallen when told that the nail would hold better when driven "home" by several light taps, than when driven by one heavy one.

"Why?" he asked, in surprise.

"Because," said the other, "when you drive a nail home with a heavy blow, it is apt to rebound a trifle, loosening the grip of the wood fibers on it. Drive it *almost* down, if you will, with as hard blows as you wish, but finish the job with several light blows."

One who thinks that the driving of a nail simply consists in getting the whole length of it out of sight, has little conception of the real nature of the operation. A nail driven by an expert will often hold several times as much as one ill driven; while, too, it is often made to draw the parts into place. If you have ever watched a mechanic driving nails, you have doubtless noted that he rarely drives one at right angles with the face of the work. There is a reason for this. Suppose that he is nailing the "sheeting" on the frame of a building, and desires to draw the board down tightly against the one below it; he points the nail downward, and a few well-considered blows at the last produce the desired effect. If the board is bent edgewise, so that much force is required, probably he will start the nail in the upper edge, pointing very sharply downward. Again, two nails driven in a board at different angles will hold it in place much more firmly than the same nails would if they were driven in at right angles with the face of the board.

Did you ever notice that, in driving a nail in very hard wood, one man will do it successfully, while another succeeds only in doubling the nail up before the point has fairly entered the wood? The difference lies in the fact that the expert strikes the nail fairly, and not too hard, "coaxing" it in; while the other strikes too hard and with indirection. It may be profitably mentioned, right here, that in driving a nail into very hard wood, it is usually profitable to dip the end into oil or grease. This will not sensibly interfere with the holding qualities of the nail, while it will very materially facilitate its driving.

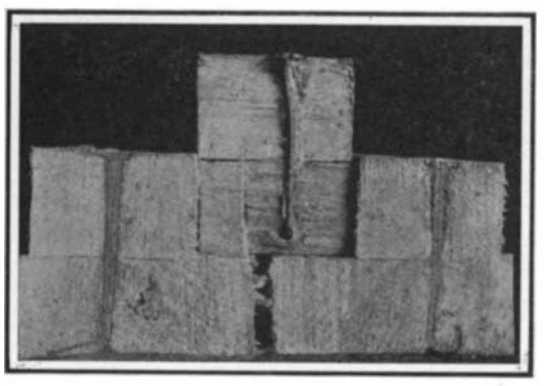


Fig. 2.—METHODS OF CLINCHING A NAIL.

In order that a nail may hold its best, it is necessary that the pieces it penetrates should be in close contact. A few well-judged taps of the hammer at the finish will serve to bring about this contact; while a heavy, ill-judged blow often destroys it, on account of the rebound.

So, too, the direction in which a nail goes is governed, not merely by the direction in which it is started, but very largely by the shape of the point. You have doubtless noticed how a horseshoe nail, by having a chisel point, is made to swerve and to come out of the hoof but little above the shoe. By filing the point of a nail off on one side, it may readily be made to take a curved course in driving, or the same result may be attained by bending the point slightly with the claws of the hammer. The photograph, Fig. 1, shows how two boards may be secured, edge to edge, by nails bent in this way.

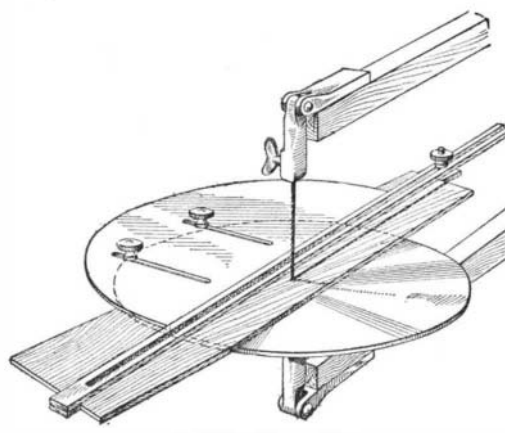
In driving a clinch nail, there is room for the exercise of some skill. In Fig. 2 the central figure is that of a clinch nail driven down onto a hard surface, thus being driven and clinched at the same operation. It will be noted that it is bent in the middle, "crippled," thus loosened in the wood and deprived of much of its holding capacity. At the left and right are nails which were first driven through the wood, and had the points bent over afterward, while a heavy hammer, or the like, was held against the head. The one on the left was carelessly bent, leaving a clinch which will straighten easily; while the one at the right was first bent over a trifle at the extreme point, then hammered firmly down. By the latter method, it will be seen, the point is driven into the wood, and thus more securely held in place.

SCROLL-SAW GUIDE.

BY W. AND K. PARKHURST.

The object of the device here illustrated is to enable one to obtain a true edge with a scroll saw.

On the saw plate is clamped a semicircular guide, by means of two thumbscrews. The guide plate should be raised from the saw-plate about ⅛ of an inch by running several washers on the screws between the



SCROLL-SAW GUIDE.

two plates, so that the article to be cut may be slid under the guide, as is hereafter explained. Two slots about 3 inches long should be made in the guide to receive the screws and permit adjustment of the plate.

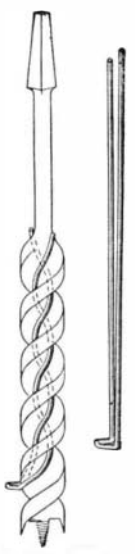
A strip of ¼-inch walnut about two feet long and one inch wide is procured and a quarter inch slot is cut in it extending nearly its entire length. A thumbscrew is fitted to run in this groove and engages a block which is adapted to slide along the under side of the strip. At one end of the strip a permanent block is fastened.

To make a straight cut in a board at any prescribed angle with one of its edges the walnut strip is fitted to it parallel to the line of the desired cut and so that the two opposite extremities of the board are clamped between the permanent block and the adjustable block. The guide plate is then clamped in position, its edge parallel to the plane of the saw, at such a distance that when the strip is placed against the edge of the guide, the saw will exactly coincide with the line to be sawed.

GAGE FOR AUGERS.

BY L. G. HANDY.

When boring a number of holes to the same depth, it is of considerable advantage to have some means for marking positively the extent to which the bit should penetrate the wood. The accompanying engraving illustrates a very simple attachment for this purpose. It consists of a piece of soft iron or copper wire about 8 inches long, bent double and formed with a foot at the top end. Wind the free ends tightly about the auger as shown. The gage will be adjustable. When using be careful not to bring the foot into actual contact with the edge of the hole.



GAGE FOR AUGERS.