

TECHNICAL NOTE NUMBER 247

FOREST PRODUCTS LABORATORY
MADISON, WISCONSIN

UNITED STATES FOREST SERVICE
APRIL 1941

NAILING DENSE HARDWOODS

The hardwoods include species having a wide range in hardness and in nailing characteristics. Most hardwoods, as a class, have a greater tendency to warp than softwoods, although there are some hardwoods of which the contrary is true. In general, the less dense hardwoods, such as basswood, buckeye, butternut, chestnut, cottonwood, aspen, cucumber magnolia, willow, and yellowpoplar, present no special nailing problems. The dense hardwoods, on the other hand, are more difficult to nail satisfactorily, not only because the nails are harder to drive, but also because of the tendency to split and the frequent presence of warp. The hardwoods that are difficult to nail include the ashes, gums, elms, oaks, maples, beeches, birches, hickories, pecans, and hackberry. These woods require a different nailing technic from that commonly used with construction lumber.

The problem of nailing the hardwoods has sometimes been solved, especially on the farm, by using the lumber green. This solves the nailing problem, for green lumber is softer and easier to nail than dry lumber and it has not seasoned sufficiently to warp. The use of green lumber, however, has well known drawbacks and cannot be recommended, especially where tightness of coverage is relatively important.

The nailing of dense hardwoods has also been solved, where the method is practicable, by the boring of holes in the boards to be nailed.

A skilled carpenter can nail dry boards of dense hardwoods to framing. The framing is usually softwood, but may occasionally, especially on the farm, be hard-

wood. When the framing is softwood a longer slender nail of the cooler or sinker type is used in order to get holding power to compensate for the smaller diameter or gauge he must use to reduce splitting. When the framing is dense hardwood a shorter nail of the fence type, but of the same diameter can be used because of the high nail-holding power of the dense hardwood. Regardless of the species used for framing the diameter of the nails used in nailing hardwood boards must be smaller than that used with softwoods because of the tendency of hardwoods to split in nailing.

The technic of nailing dense hardwoods also includes the "easing" in of the nails, setting them back as far from the end as practical, using blunt-pointed nails rather than long-tapered, sharp-pointed nails, placing warped boards so as to obtain the maximum bearing at the place of nailing, and using a wedge or shim with warped boards to furnish a temporary bearing under the nails, and waxing nail points so that they will drive easier.

Actual tests have demonstrated the soundness of most of the technic for nailing dense hardwoods that has been developed as the result of experience. Tests made to determine the tendency of wood to split showed that smaller nails are necessary with the dense hardwoods to prevent excessive splitting, and indicated the advantage in "easing" in the nails. The same tests also showed that the dense hardwoods require wider nailing margins. A study of the influence of the size and shape of nails on their holding power and tendency to split the wood lead to the conclusion that a nail with a blunted point will not split the wood so badly as a common nail, and in the denser woods is equal to common nails in holding.

Observations made on the job and in tests indicate that warping is probably responsible for more of the difficulties encountered in nailing dense hardwoods than is hardness. The force of a blow in nailing a

warped board is largely absorbed by the spring of the board. Hence, some carpenters carry a small wedge for use in obtaining a firm nailing base with warped boards. Since the nail is at one angle to the warped board and at another to the framing member to which the board is being nailed, there is a prying action that tends to bend the nail even when hit squarely on the head. Bent nails tend to cause splits more than straight ones. Boards with only a slight cup often split when the board is pulled flat by driving the nail home. In contrast to the above observations, thoroughly dry hickory, beech, and white oak boards were nailed with little trouble when flat and firmly supported.

The use of beeswax to make nailing easier is an old practice. Carpenters frequently have a hole filled with beeswax in the end of the hammer handle for waxing the points of nails. A limited number of tests were made at the Forest Products Laboratory to determine the effect of wax on driving characteristics and holding power. It was found that even a small amount of beeswax on the points materially reduces the force required to drive nails, reduces the percentage of nails that bend in driving, and reduces the splitting. However, it also reduces the holding power. Nails with waxed points driven through hardwood into softwood framing when pulled shortly afterward had about three-fourths of the holding power of nails with no wax on them. Several hours after driving, nails with waxed points had only slightly lower holding power than did unwaxed nails, indicating that possibly over a long period of time the loss of holding power as a result of waxing may be small.

The tests on waxed nails indicate that the practice of waxing nail points is not a trade fallacy or superstition, but has a definite value in making hardwoods easier to nail and that the benefits obtained from the use of wax outweigh the loss in holding power.