

tion, and cutting; they don't need to be level, but they should be smooth, of even texture, and uniform in quality.

At the Denver Country Club one man is employed whom we call the approach mower. He spends his entire time going from green to green, keeping the approaches cut and in good condition. He does not use a putting green mower, but the ordinary four-bladed hand lawn mower set low. The ground that he is to cover is determined by the committee with reference to the character of the shot up to the green called for at each particular hole, but in every event he cleans up all the spots near the green left by the fairway mower and not cut by the putting green mower. He does not have a very large area to mow at any one green and can get over *about half the course every day*. The grass that he cuts is thus just a little shorter than the grass on the fairway, but not as short as that on the putting green. His employment is not required except during the short season during which grass is growing, but the cost of his services is many times repaid in added satisfaction enjoyed by the players.

Every piece of approach ground is also given careful attention each spring and fall, has its own quota of fertilizer or top-dressing as regularly as the putting greens, and in every way is treated as a distinct and essential feature of the course to be kept up with as studied care as is devoted to any other portion.

It is only by strict attention to niceties of this character that any course can be maintained at high standard, and no course that does not look after its approach areas as separate and indispensable features requiring definite attention and treatment can hope to hold high rank or afford that lure of irresistible attraction which distinguishes this game of games and constitutes the determining test as to whether a course has the commanding merit of permanent vitality.

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## Hickory and Golf

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I have often wondered which wood was utilized in the making of golf club shafts in the early days before golfers were acquainted with the virtues of hickory. It is evident, however, that when hickory was first introduced in the game and tested as a shaft material, it was such an improvement over the material then in common use that its adoption was prompt and sweeping. I believe that at the present time hickory is the universal wood for golf shafts, and it has been practically the only shaft material until within the last few years, when steel has appeared as a competitor. The combination of strength, toughness, and elasticity in hickory has made it the world's foremost wood for certain purposes. As a shock-resisting wood its equal has not been discovered. The fame of the American axe is largely due to the hickory handle.

Nowadays one is constantly running across statements about the scarcity of hickory. Like the auctioneer, these statements repeat "going, going," but they hesitate over the "gone." Considering the demand, hickory *is* scarce; there is no doubt about it; but there *is* considerable left, and good stuff at that, although it is necessary to pick and choose more carefully than in the old days when there were fine stands in abundance.

The name *hickory* is commonly used as if there were but a single species. As a matter of fact, there are some eight or ten different species, made up of true hickories and pecan hickories. The true hickories (shag-bark, big shellbark, pignut\*, and mockernut), furnish a very large proportion of the high-grade hickory found on the market. The wood of the pecan hickories is less valuable from the standpoint of strength and toughness.

Hickory is a tree of wide range and was formerly found in commercial quantities in every state east and in several states west of the Mississippi. Even yet, after several hundred years of use and abuse, hickory is still listed in the lumber cut of 13 states. This is evidence that its range still extends over the whole east, although the cut is much diminished in quantity.

Hickory generally grows scattered among chestnut, oaks, ashes, and other hardwoods and does best at low or moderate elevations. In the rich bottom lands of the Mississippi and Ohio rivers and their tributaries and in the Southern Appalachians there are still considerable supplies of virgin hickory timber. The remainder of the East has been pretty well combed over for hickory, and many areas which once furnished large supplies now yield but little. An estimate of the remaining supply is hardly more than a guess. The best data available place the total stand at 16 billion board feet, distributed as follows:

Lower Mississippi Valley region.....	7	billion board feet
Central region (timber largely in woodlots).....	3	billion board feet
Southern Appalachians .....	2½	billion board feet
Atlantic and Gulf Coast region.....	2½	billion board feet
Remainder of range.....	1	billion board feet

The states with the largest supplies of standing hickory are in about the following order: Arkansas, Missouri, Tennessee, Kentucky, North Carolina, Louisiana, Mississippi, Alabama, West Virginia. These same states are estimated to contain about two-thirds of the existing supply.

Figures on the consumption of hickory are difficult to secure because a large part of the hickory used does not go through regular sawmills but is cut from the log into billets and shipped to vehicle or handle factories. The accompanying table shows the production of hickory lumber by states for 1909 and 1920.

It is very probable that there was twice as much hickory used in 1920 as the total lumber production figures show. The handle trade alone uses yearly over 100,000,000 board feet. In Michigan in 1920 one-half of the hickory used by factories was in the form of lumber and one-half in the form of bolts. The table shows a striking drop of 66 per cent in the hickory cut during the last decade. It is quite probable, however, that some of this decrease is due to an increasing proportion of hickory being used without passing through sawmills.

The weight of a piece of hickory is the best criterion of its strength; but in judging a single piece, means of determining weight are not always convenient, and a visual method is necessary. It has been found by an extensive series of tests made by the Forest Service that few growth rings

\* This is not the bitternut of the middle states but is the hickory frequently known as "black" hickory, and is the best of the true hickories.

## HICKORY LUMBER PRODUCED IN 1909 AND 1920

State	Number of active mills reporting		Quantity reported			
	1920	1909	M feet B. M.		Per cent	
	1920	1909	1920	1909	1920	1909
United States.....	2,686	7,796	131,553	333,929	100.0	100.0
Arkansas .....	174	384	28,594	45,133	21.7	13.5
Tennessee .....	306	655	21,993	53,477	16.7	17.5
Kentucky .....	259	673	11,492	41,656	8.7	12.5
West Virginia .....	206	456	11,448	21,774	8.7	5.0
Indiana .....	267	858	9,532	23,513	7.2	7.0
Mississippi .....	79	142	9,345	21,967	7.1	6.6
Ohio .....	309	959	6,818	21,774	5.2	6.5
Missouri .....	130	630	6,370	33,259	4.9	10.0
Louisiana .....	43	43	4,913	7,704	3.7	2.3
Pennsylvania .....	134	791	3,799	15,267	2.9	4.6
Virginia .....	179	287	2,982	5,528	2.3	1.6
Illinois .....	70	432	2,848	11,095	2.2	3.3
North Carolina .....	104	186	2,327	3,132	1.8	0.9
Alabama .....		158		7,076		2.1
Maryland .....		106		4,267		1.3
Oklahoma .....		60		2,572		0.8
Connecticut .....		177		2,442		0.7
Michigan .....		142		1,850		0.6
All other states.....	426	657	9,092	10,665	6.9	3.2

indicate a stronger and tougher piece of hickory than many rings. Figure 1 shows sections of two hickory handles of slow (many rings) and fast growth (few rings). The best wood generally contains not more than 20 growth rings to the inch, although considerable good material may have more. A method of determining the resiliency or spring in a golf shaft is to strike the butt on a concrete floor, while held loosely in the hand. A clear ringing note indicates a "quick" shaft, while a dull sound indicates one with a slow recovery after bending.

It is commonly held that "white" hickory is better than "red" hickory. By "white" and "red" are meant the sapwood and heartwood, respectively, as shown on the cross-section in Figure 2. The formation of wood in a growing tree takes place on the inner side of the bark. Each year a new growth ring is added, consisting of a hard and soft layer. The sapwood is constantly being added to on the outside and constantly turning into heartwood on the inside.

The belief that white hickory is superior to red probably arose from the observation that young, rapid-growing hickory trees, which are nearly all sapwood, or white wood, generally have excellent strength properties. As the tree matures, however, this same sapwood is transformed into reddish heartwood; and a half-million tests made at the Forest Products Laboratory of the Forest Service have failed to show any change in the strength of the wood of any species due to this natural change from sapwood into heartwood. A special set of tests upon many specimens of red and white hickory shows conclusively that, weight for weight, sound hickory has the

same strength, toughness, and resistance to shock, regardless of whether it is red, white, or mixed red and white.

The best hickory for golf shafts is heavy (although not necessarily the heaviest); has a clear ring when dropped, as stated above; and presents a glossy, oily surface when sanded smooth. This glossy surface is more noticeable in white hickory than in red hickory.

A supply of hickory adequate to meet the demands both for internal consumption and for export depends on two things—cutting so as to in-

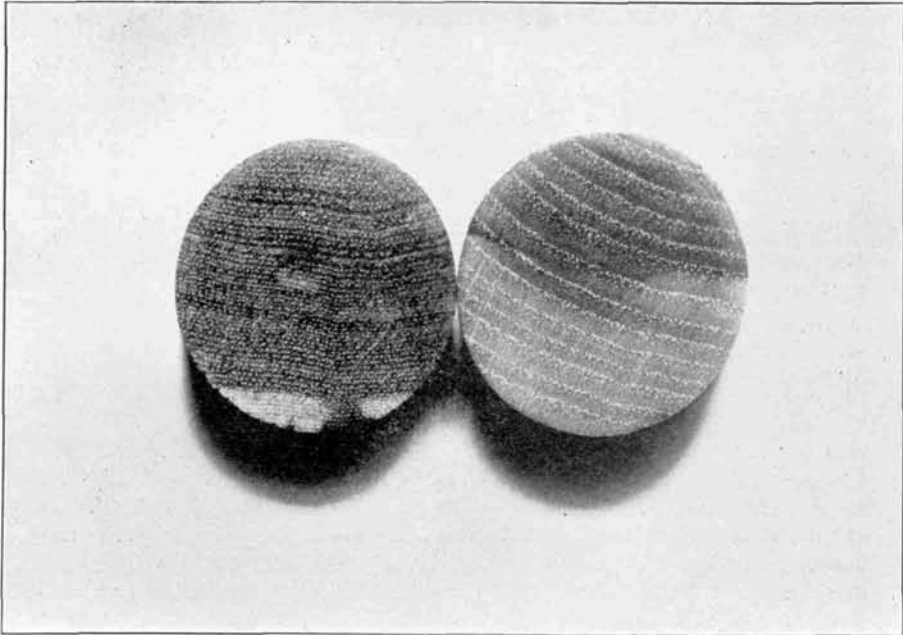


Figure 1—Cross-sections of two hickory handles, one of slow, the other of fast growth

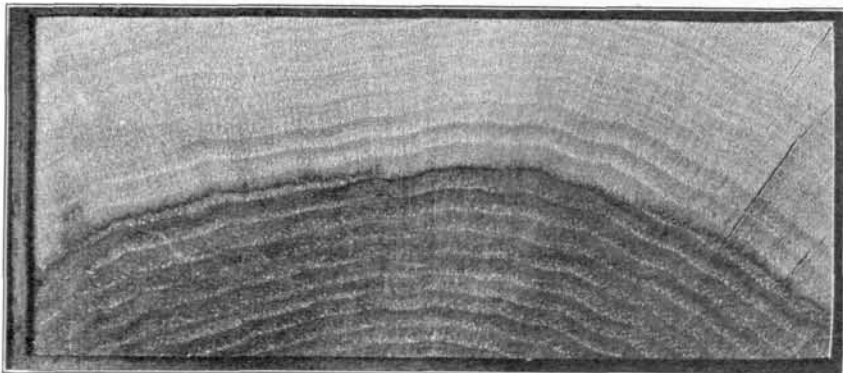


Figure 2—Cross-section of hickory vehicle stock showing "white" sapwood and "red" heartwood

sure reproduction and the reduction of waste in lumbering and manufacture. Hickory reproduces easily; and given a reasonable chance, a new crop will start promptly after a cutting operation. It can not, however, when in the seedling state, compete successfully with fire and cattle. The supply of large hickory is being exhausted, and it will in time be necessary to depend largely on second growth from small holdings, such as farmers' woodlands. The waste in hickory is placed at 40 per cent of the yearly cut of merchantable material. The unwarranted discrimination against red hickory is accountable for part of this, and the specialized character of hickory products for more. Frequently what is waste in the manufacture of one product could be used as the raw material for another. The wood of hickory is superior to any other commercial wood in strength and toughness. For a number of special uses no satisfactory substitute has been found. It behooves all golfers to do what they can to ensure a continued supply of a material essential to the royal game.

### **How Course Construction and Maintenance Suffer from Poor Business Management**

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With the improvements in business the fire has again been lighted, and interest in new golf course construction and playing the game have been given a great impetus. Ninety per cent of the men having charge of construction of new courses, and thus representing their clubs, are selected by their clubs on account of their business ability. Not one out of a hundred has had any experience in the work to be done. In addition to this, not five per cent of these men have the time or can afford to take the time or will sacrifice the time to give the golf course the same personal and intensified interest that they would give their own businesses. This is the answer to the waste and apparent extravagance in the construction and upkeep of golf courses.

First, if you have secured the land and completed your organization and are to build a course, employ the best architect possible, just as you would employ the best lawyer if you had an important legal case. The value of the land of the average eighteen-hole course in this district increases about fourfold as soon as the course and clubhouse are completed. You are the trust officers of a fund of some two to three hundred thousand dollars, more or less, put into your hands by friends and acquaintances with whom you are socially to deal. Can you look them in the face while you spend their money extravagantly? Your duty is to see that every dollar of this money is as wisely expended as it would be if you had formed a corporation and were to sit at your desk and protect your stockholders. Therefore, when you have employed your architect, live on the golf course until it is completed.

Take everything out of the course that does not belong there. Put everything into the course that does belong there. Soils differ greatly in this locality; but grass is the easiest thing known to man to grow. It does not require expert knowledge to raise grass, but it does require common sense, eternal vigilance, and a realization of the fact that two or three