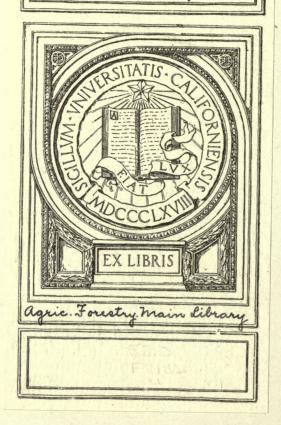
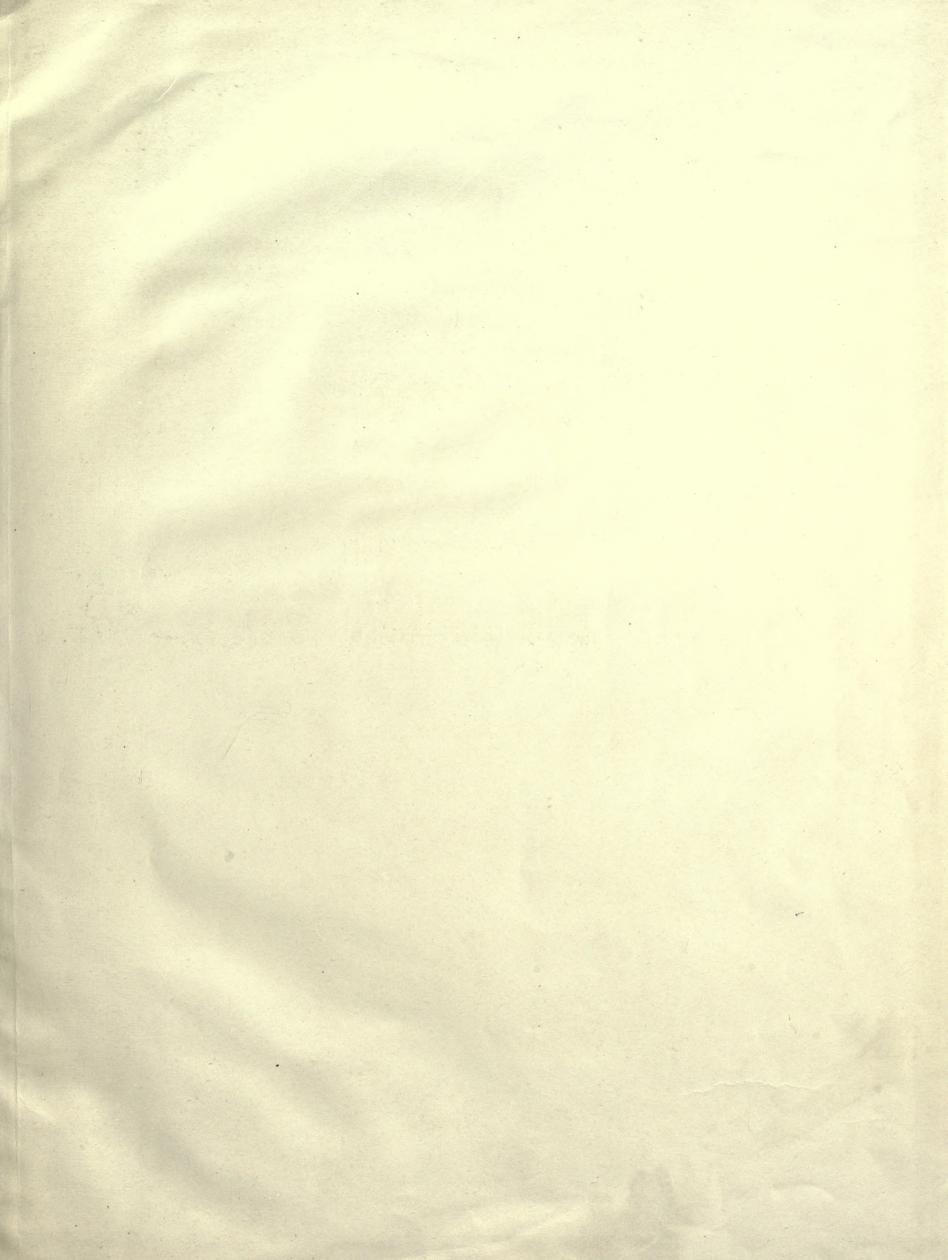
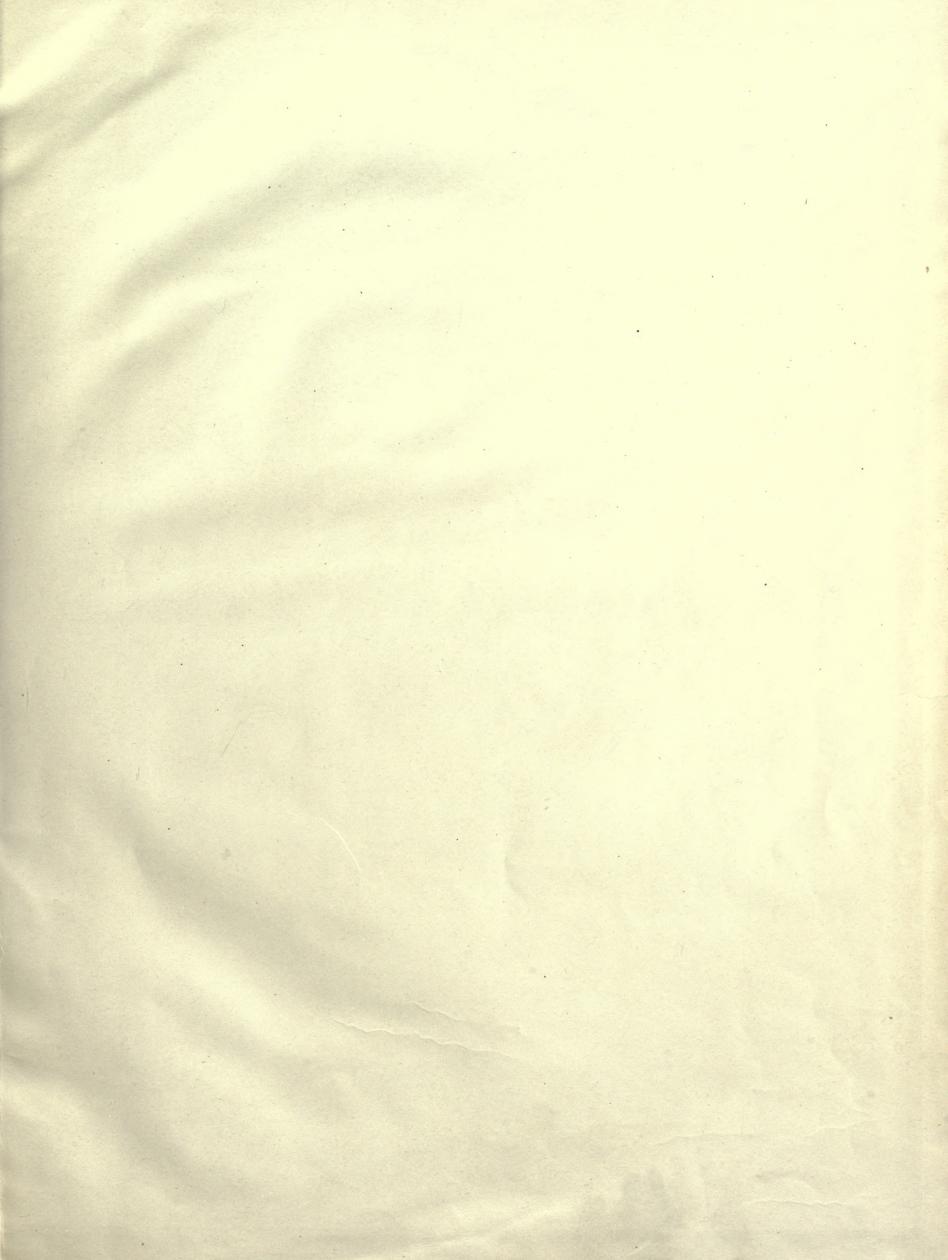


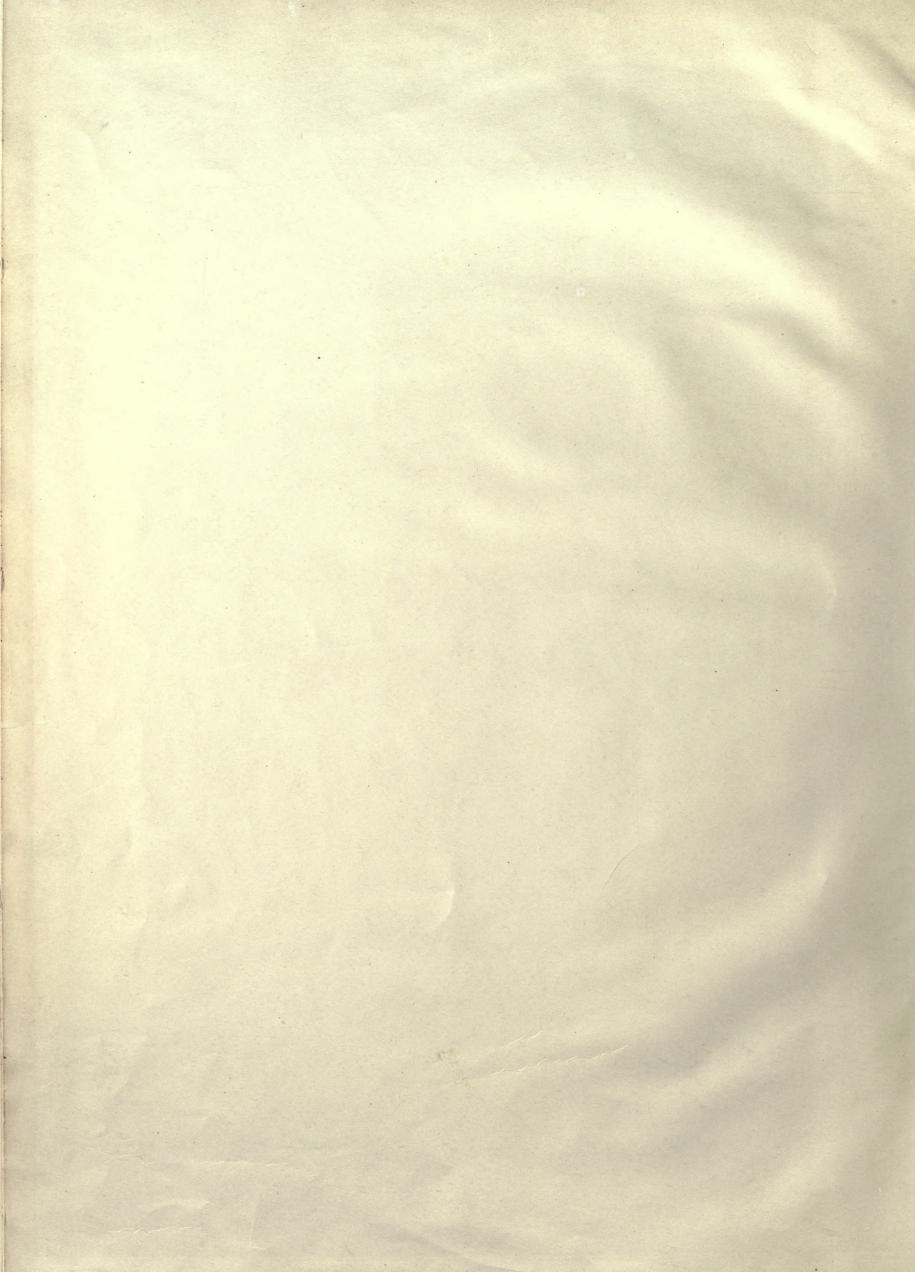
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Talent UTILIZATION

VOL. I

- Montana's Secondary Wood-Using Industries. Compiled by U. S. Forest Service, through Joseph Burke Knapp.
- The Wood-Using Industries of Idaho. By C. W. Dunning.
- The Wood-Using Industries of Tennessee. By Clark W. Gould and Hu Maxwell.
 - The Wood-Using Industries of Missouri. By Charles F. Hatch and Hu Maxwell.
- The Wood-Using Industries of Alabama. By John T. Harris and Hu Maxwell.
 - The Wood-Using Industries of Mississippi. By Clark W. Gould and Hu Maxwell.
- The Wood-Using Industries of Louisiana. By Hu Maxwell.
- The Wood-Using Industries of Texas. By Hu Maxwell, and Charles F. Hatch.

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WOOD-USING INDUSTRIES OF MONTANA INCLUDE A BROAD RANGE OF UTILITY

The study upon which this report is based was undertaken by the Forest Service, United States Department of Agriculture. The statistics were compiled from data collected in the summer of 1911, covering a period of one year from January 1 to December 31, 1910, inclusive.

Preface

Lumbering, mining and agriculture are the principal industries of Montana. Lumbering and mining are confined to the western mountainous section of the state, while the fertile valleys in this region and the plains of Eastern Montana furnish agricultural crops and grazing for sheep, cattle and horses. The towns of Missoula, Kalispeli, Hamilton, St. Regis and Libby are the most important lumber distributing centers. Montana produces more copper than any state in the Union. Butte, the principal city, is the largest metal min-ing camp in the world, and here immense quan-tities of timber are consumed in developing the mines.

Montana's standing timber approximates 65,-600,000,000 feet, board measure; of this, 21,800,-000,000 feet are privately owned, the National Forests contain about 39,500,000,000 feet, and the stand on other government lands, including Indian and military reservations approximates 5,800,000,000

While the cut of iumber in Montana is comparatively small, the state yields a large output in proportion to its population, which in 1910 was 376,053 persons. Montana ranked twenty-eighth in the list of states arranged in the order of Montana ranked twenty-eighth their lumber cut.

Table 1 shows the lumber cut of the state for 1908, 1909 and 1910:

			TA	BLE I.				
Quantity M ft., B. M.				Cent of rease.	Per Cent Total Cut in United States.			
1910	1909	1908	1909 to 1910	1908 to 1909	1910	1909	1908	
319,089	308,582	311,533	3.4	- 0.9	0.8	0.7	0.9	

In 1910, 140 active mills reported the lumber cut; 1909, 180 milis were operating, and in 1908, 173 mills reported.

The iumber cut of Montana in 1910 was made up of ten species and each contributed the following amounts of sawed lumber:

Species.	Cut M Feet.
Western yellow pine	135,817
Western larch	99,283
Douglas fir	53,070
White fir	13,589
Engelmann spruce	10,273
Western white pine	3.090
Lodgepole pine	2,380
Black hemlock	1,201
Black cottonwood	
Western red cedar	126
Total	319,089

to iumber, the milis of this state produced 40,876,000 iath and 533,000 shingles.

Statistics on the amount of wood consumed in the form of mine timbers, poles, railway ties, fence posts, fuei and for other purposes not subsequently mentioned in this report, are not available. Large quantities of lodgepole pine, western larch, Doug-las fir, western yellow pine, Engelmann spruce, and small quantities of other species were used in working the mines of the state and for poles, railway ties and construction work, firewood and general purposes.

The mines at Butte, Montana, annually consume The mines at Butte, Montana, annually consume approximately 70,000,000 feet of lumber, 240,000 stulls, averaging 9 inches in diameter and from 14 to 16 feet long, and 150,000 lagging poles 3 inches in diameter and from 12 to 16 feet long. It is estimated that there are 1,624,000,000 board feet of sawed timber, stulls and lagging underground in the mines of the Butte camp, divided as follows: Sawed iumber, 1,500,000,000 board feet; 2,500,000 stulls containing 100,000,000 board feet, and 2,000,000 iag poles containing 24,000,000 board feet.

Commercial Woods of Montana Western Yellow Pine

Western yellow pine grows in all states west of the Great Plains. In Montana it reaches its best development in the Bitterroot and St. Regis valleys. The wood is soft, has a straight even grain, and works well under a cutting edge. In color it is light yellow, often almost white. Western yellow pine lumber shrinks and warps comparatively little in seasoning. The wood is resin-Western yellow pine grows in all states west

ous, but when properly dried little difficulty is experienced from exuding resin. In 1910 over one-third of the lumber cut of Montana was made up western yellow pine.

Western Larch

Western larch is the most abundant timber in lontana. The heaviest stands are located in Montana. the northwestern part of the state in the vicinity of Kalispell. The texture of the wood renders it less adaptable to general mill work than western yellow pine or western white pine, but on account of its comparative hardness it is preferred locally as a fiooring material. The swelled butts common in western larch trees and the frequency of wind shakes cause considerable waste in logging opera-tions, since it is common practice to "butt off" and discard the lower portion of the trunk. On this account the timber cuts a low proportion of up-

Douglas Fir

The Dougias fir cut in Montana does not furnish as high a quality of lumber as that grown in Oregon and Washington. The better quality of Montana Douglas Fir is used for flooring and finish, but most of it is used as rough lumber for contants. struction purposes.

White Fir

is found in small quantities in mixture with other species in the mountains of West-ern Montana. It is cut occasionally in logging other timber and manufactured into common boards and house framing, but contributes only about ten per cent of the total cut of lumber in the

The wood is light in weight, soft and generally coarse grained, white or light brown in color and straight grained. It is practically free from pitch, works well with cutting tools and has prospects as a pulp wood.

Engelmann Spruce

Engelmann spruce finds its best development in Northern Montana and Idaho. It forms extensive stands at high elevations, but has been little exploited thus far. In dense stands a straight, siender, clear trunk is formed, which is admirable for impler menufactures. iumber manufacture.

The wood is pale reddish yellow in color, light in weight, straight and close grained, but not strong or durable. It is practically odoriess and contains no pitch. It furnishes less than 10 per cent of the iumber sawed in the state at the present time, and is manufactured principally into boards.

Western White Pine

The quantity of western white pine manufactured in Montana sawmills is small compared with the amount of this species manufactured in Idaho, where the largest stands of this species are found. The wood is generally manufactured into shop lumber and plain surfaced forms for supplying wood-working plants in Montana and elsewhere throughout the United States. Western white pine is one of the finest soft woods known to this country, and because of its high known to this country, and because of its high value it is not eniployed where the cheaper woods will serve.

The wood is almost free from resin and is fine The wood is almost free from resin and is fine grained and soft. It can be easily dried and has little tendency to shrink or warp. In color it is white or light yeilow. It is neither strong nor stiff as compared with Douglas fir or western yeilow pine, and is very light in weight. For purposes where a light, soft, even-grained wood with little tendency to shrink or warp is required, the white pine of Montana and Idaho is the equal of the white pine of the Northeast and the Lake States, which has for so long supplied the demands of Eastern manufacturers. of Eastern manufacturers.

Lodgepole Pine

While lodgepole pine contributes little to the iumber cut of the state, this wood is probably the most important in its general uses. The species is found in quantities throughout the forested regions of Montana and is extensively employed for posts, poles, firewood and in the many mines. It is sawed into rough building material. This wood has excellent prospects of becoming highly serviceable as a pulp wood for use by the sulphite and mechanical processes of manufacture.

Lodgepole pine is slightly resinous and is not durable without preservative treatment, especially when in contact with the soil. It is fairly heavy in weight, close, straight grained and easily worked. In color it varies from light yellow to pale brown. The taper of the tree and its strength recommend it for poles, provided the butts are given a preservative treatment.

Black Hemlock

Black hemiock is found in small quantities at high elevations in Western Montana and is re-ported as contributing only 1,201,000 board feet,

or less than one-half of one per cent of the lumber cut in the state in 1910.

It is a very fine grained wood, soft, not strong and pale brown or red in color. It is manufactured principally into common building lumber. It is not greatly dissimilar to the western hemiock of the coast and could readily be substituted for that species in many products.

Black Cottonwood

Black Cottonwood

Black cottonwood is of little importance to the lumbering industry of Montana. However, it serves numerous secondary wood-using industries. Considerable quantities of this species are found within the forests of the state, growing principally along the banks of streams. It is a light, soft, non-odorous wood of light color, and is admirably suited for boxes, butter tubs, slack cooperage, woodenware, excelsior and pulp.

The same species occurs in Western Oregon and Washington, and until the accessible supply was practically exhausted it was extensively used by pulp milis in that region.

Western Red Cedar

Western Red Cedar

Unilke the western red cedar of the coast, this species is of little importance to the lumbering interests of Montana. A smail amount is cut into lumber products by local sawmills. Montana wood-working plants depend more largely on the cedar Imported from the State of Washington, where the trees grow to much larger size. The small trees of Montana yield excellent pole and post forms, and it is for these purposes that the local cedar serves its best use.

The wood is straight and rather coarse grained, light in weight and dark brown or almost red in color. It is fairly strong and very durable in contact with the soil or in exposed situations.

The western red cedar furnishes the standard pole of the Western United States. The natural taper of the tree and its durability, combined with the reasonable strength of the wood, recommend it for this purpose. Its durability and easy splitting properties are its principal assets for use as posts. While extensively used in the manufacture of shingles in Western Washington, the small size of the trees occurring in Montana and the quality of the wood prevent the development of the shingle industry in that state.

Wood-Using Industries

Wood-Using Industries

Wood-Using Industries

Only a small quantity of products manufactured wholly or in part from wood are used in the state on account of its comparatively small population. With the exception of planing mills, the industries in the state which manufacture articles from wood are few in number and generally small in size. The higher class of wood products such as furniture, fixtures, vehicles and agricultural implements, are largely imported from other states.

Planing Mill Products

Planing Mill Products

Planing Mill Products

Montana sawmills generally operate pianing mills for further manufacturing portions of the cut of rough iumber. These planing mills consume a considerably larger amount of wood than any of the other wood-using industries, but the nature of their products and the mixture of like forms from different species prohibit an accurate compilation of the amount of each species manufactured into the different forms. The planing mill products include flooring, siding, finish, ceiling, rustic, shop and factory lumber, all forms of dressed or matched stock, battens, tank stock, molding and general mill work. Fully 25 per cent of the lumber cut by sawmills is further manufactured into planing mill products.

Boxes

Boxes

Five woods are used in the manufacture of boxes and crates in Montana. Ali are soft woods and the entire supply is grown within the state. Box woods should be light and strong, hold nails well, and should be cheap. In general, the woods used combine these requirements. The principal box wood, western yellow pine, supplies \$2.79 per cent of all of the wood consumed annually by Montana's box factories. This is an exceptionally good box wood and is serviceable in the manufacture of all forms of boxes.

tana's box factories. This is an exceptionally good box wood and is serviceable in the manufacture of ali forms of boxes.

The boxes produced in the state are employed iargely for fruit and packing purposes. Some butter boxes are made from western larch and Engelmann spruce. The heavier packing boxes and crates are generally made from western larch or Doglas fir, while apple boxes are made from ali species, but principally from western yellow plne and western white pine. Western white pine and western yellow pine yield superior boxes for the packing of high class articles.

The average price per thousand of all species delivered at box factories was \$11.50. Douglas fir, with an average price of \$17.75, was the most expensive wood used, while western yellow pine, which furnished a preponderance of the demand for box wood, costs less than any of the other species and was delivered at an average price of \$10.67 per thousand feet.

Montana planing mills produce large quantities of lumber which is manufactured into box shooks and shipped outside the state before being assembled. These are not included in this report.

Table II represents only wood used in the actual construction of finished boxes or crates in Mon-

TABLE II—BOXES.								
Kinds of Wood.	Quantity Used Annually— Feet, B. M	Quantity Used Annually— Per Cent	Average Cost— Per 1,000 Feet.	Total Cost— f.o.b. Factory	Grown in State — Feet, B. M	Grown Out of State, Feet, B. M.		
Pine	2,233,000		\$10.67		2,233,000			
Western Larch	164,000	6.08						
Engelm'n Spruce. Wes.t W. Pine	130,000	4.82 4.45						
Douglas Fir	120,000 50,000		15.00 17.75	1,800				
Douglas Fir	50,000	1.80	17,75	887	50,000			
Total	2,697,000	100.00	\$11.50	\$31,031	2,697,000			

Sash and Doors

Sash and Doors

While the woods native to Montana are highly serviceable for supplying the demand for sash and doors, and quantities of these are manufactured in the state, a large proportion of the sash and doors made from Montana woods are made up in other states. Within the state more than one and one-half million feet of wood are used annually in the production of sash and doors. Western yellow pine locally grown furnishes 54.73 per cent of the total quantity of wood employed by this industry. Douglas fir supplies 40.74 per cent, and of the 667,000 feet of this wood used annually 637,000 feet are imported from Western Oregon and Washington, where the timber is superior in quality to the local Douglas fir.

Wood sultable for sash and doors must be fairly strong, straight grained and clear, and must work easily with machine and hand tools. The wood should retain its form permanently after seasonling without shrinking or warping and in general should show a pleasing grain when finished. Where a natural grain finish is desired by staining, Douglas fir or eastern oak is employed; where the doors are to be painted or varnished western yellow pine or western white pine is used.

Western larch is used for sash and doors in only small amounts, although it is well suited for the purpose. It is considered equal to Douglas fir in beauty of grain when properly finished.

TABLE III—SASH AND DOORS.								
Kinds of Wood.	Quantity Used Annually— Feet, B. M	Quantity Used Annually— Per Cent.	Average Cost— Per 1,000 Feet.	Total Cost- f.o.b. Factory	Grown in State— Feet, B. M	Grown Out of State, Feet, B. M.		
W. Yellow Pine	896,000	54.73	\$34.29					
Douglas Fir	667,000		30.80	20,543		637,000		
West. White Pine.	50,000	3.01	15.00	750				
Western Larch	20,000	1.22	15.00	300	20,000			
Eastern Oak	5,000	.30	140.00	700		5,000		
Total	1,638,000	100.00	\$32.32	\$ 52,940	996,00	642,000		

Fixtures

Fixtures

Eight woods are used for the production of flxtures by factories in Montana. Of these, the only wood grown in the state is western yellow pine. Only two soft woods are used, Douglas fir and western yellow pine. Douglas fir supplies 45.45 per cent of all of the wood used annually for fixtures, and all of it is obtained from Western Washington and Oregon.

Eastern oak is imported at an average cost of \$77.11 per thousand feet, delivered at the factory, and furnishes 29.3 per cent of all of the wood used for fixtures. Cherry and walnut are used sparingly and are the most expensive woods employed. These are purchased, mixed, at a price of \$130 per thousand feet, delivered at the factory. Producers of fixtures in Montana pay \$64,151 per year for their raw material, or an average price of \$47.99 per thousand feet.

Wood used for fixtures is generally more expensive than woods used for other purposes. Beauty of grain and finishing properties enhance the value of fixture woods. Only clear material of high grade is employed for exposed parts.

TABLE IV—FIXTURES.								
Kinds of Wood.	Quantity Used Annually— Feet, B. M	Quantity Used Annually— Per Cent	Average Cost— Per 1,000 Feet.	Total Cost- f.o.b. Factory	Grown in State— Feet, B. M	Grown Out of State, Feet, B. M		
Douglas Fir Eastern Oak W. Yellow Pine Western Birch Maple. Blk. Cottonwood. Cherry-Walnut.	608,000 392,000 205,000 95,000 36,000 1,500	29.30 15.30 7.11 2.69 .12		30,227 7,195 5,334 2,900	205,000	95,000 392,000 95,000 36,000 1,500 500		
Total	1,338,000				205,000	1,133,000		

Coffins and Coffin Boxes

The manufacture of coffins and coffin boxes in Montana ranks fourth among the state's Indus-

tries in the quantity of wood consumed annually. Only two species contribute to supply this industry and both grow within the state, although quantities of each are imported from other states. Western white pine is employed principally for coffin boxes, while western red cedar is used for coffins. Western white pine furnished 79.8 per cent of the wood used for this purpose, while western red cedar supplied 20.2 per cent. The average cost of woods used for coffins and coffin boxes in Montana was \$18.38 per thousand feet delivered, and the total cost of all wood used for this purpose annually within the state was \$2,003. for th \$2,003.

Wood for coffln boxes must be light in weight, soft and straight grained and must hold nalls well. In fact, any wood sulted to the manufacture of packing boxes can be used for coffin boxes. For coffins, however, a higher class wood is generally employed, and western red cedar supplies the demand for low grade coffins only. This is generally covered with cloth after being shaped in the form of a casket. Its principal recommendations for this use are its easy working properties, light weight and durability. This cedar is used in quantitles throughout the Northwest for caskets. White pine is also serviceable for caskets when the finished box is to be covered with cloth. High grade caskets made of hardwoods or other materials are not produced locally.

TABLE V-COFFINS AND COFFIN BOXES. 161:1:1:

Kinds of Wood.	Quantity Used Annually— Feet, B. M.	Quantity Used A nually— Per Cent	Average Cost— Per 1,000 Feet.	Total Cost- f.o.b. Factor	Grown in State— Feet, B. M	Grown Out of State Feet, B. M.
West. White Pine. West. Red Cedar.	87,000 22,000		\$18.22 19.00	1,585 4.18	67,000 3,000	20,000 19,000
Total	109,000	100.0	\$18.38	2,003	70,000	39,000

Cabinets

Cabinets

Four woods are used in Montana for cabinet work. Cottonwood, the only broad leaf tree employed, furnishes 62.5 per cent of all of the wood used for this purpose. This wood is all grown within the state. The only wood imported by cabinet makers is Douglas fir, which supplies 2,000 feet, or 5 per cent, of the total consumption. Only high grade material is employed for cabinet work, as is indicated by the average price paid in Montana, which is \$37 per thousand feet for all woods. The industry is not extensive, and it is significant that no Eastern hardwoods, such as oak, walnut, cherry, and imported woods, such as mahogany, are employed. This indicates the somewhat low grade cabinets produced in the state. High class products of this nature are imported from regions affording a better class of wood.

Cabinet woods are generally selected because of the beauty of their grain when stained, or their ability to take a smooth finish. They should work well and retain their form when finished. High grade clear stock is generally demanded.

In addition to the cabinet woods reported in Table VI, large amounts of local woods are used by carpenters and other woodworkers for built-in cabinet work in stores and houses.

Table V1								
Kinds of Wood.	Quantity Used Annually— Feet, B. M	Quantity Used Annually— Per Cent	Average Cost— Per 1,000 Feet.	Total Cost— f.o.b Factory	Grown in State— Feet, B. M	Grown Out of State, Feet, B. M		
Blk. Cottonwood. W. Yellow Pine	25,000 10,000		\$30.00		25,000 10,000			
West, Red Cedar Douglas Fir	3,000 2,000		50.00 40.00		3,000	2,000		
Total		100.0	\$37.00		38,000	2,000		

Trunks and Cases

Trunks and Cases

While most of the trunks and cases which ultimately reach the consumer in the state of Montana are imported, nevertheless trunk manufacturers in the state consume 27,000 board feet of lumber annually. Of the five species employed by trunk makers in Montana, four are hardwoods. The only softwood used is western white pine, which goes into trunk boxes and trays. Elm and cherry are used for slats, while cottonwood, in the form of three-ply veneer, and bass wood are employed for boxes and trays.

The requirements of a good box wood are essential for trunk boxes and trunk trays. They must be light in weight, straight grained and clear, and must hold nalls well. Trunk slats must be hard and strong and resist abrasion.

Trunk boxes and trays made of white pine grown in the state consume 74 per cent of all the wood used by this industry. While all of the cottonwood used for cabinet work in Montana was grown within the state, that used by trunkmakers all came from outside the state.

The average price of woods used for trunks and cases in Montana was \$27.74 per thousand feet. Basswood at \$60 per thousand feet f. o. b. factory

was the most expensive wood used, while white pine at \$22 per thousand feet was the cheapest. The manufacture of trunks and cases is confined almost entirely to the cities of Missoula, Butte and Great Falls.

TABLE VII—TRUNKS AND CASES.								
Kinds of Wood.	Quantity Used Annually— Feet, B. M	Quantity Used Annually— Per Cent	Average Cost— Per f,000 Feet.	Total Cost- f.o.b. Factory	Grown in State— Feet, B. M	Grown Out of State, Feet, B. M.		
West. White Pine. Blk. Cottonwood. Elm Basswood Hickory	20,000 4,000 1,500 1,000 500	5.6	60,00	\$ 440 180 48 60 21	20,000	4,000 1,500 500		
Total	27,000	100.0	\$27.74	\$ 749	21,000	6,000		

Furniture

Only 21,000 feet of wood is used annually in Montana for furniture, and practically all of this goes into furniture repairs rather than the manufacture of new stock. Practically all of the furniture used in the state is manufactured in Eastern markets.

markets.
Only two woods are used for furniture repairs, Douglas fir and maple. The Douglas fir is obtained from the west coast of Oregon and Washington, and the maple in Eastern markets. The first of these supplies 7I.4 per cent of the wood used at an average price of \$40 per thousand feet. The second supplies 28.8 per cent at an average price of \$125 per thousand feet. The wood is obtained as clear stock, as is indicated by the high price. price.

TABLE VIII-FURNITURE Quantity Used Annually— Feet, B. 1 Kinds of Douglas Fir..... Maple 15,000 71.4 \$40.00 \$ 6,000 28.6 125.00 15,000 Total..... 21,000 100.0 \$64.34 \$ 1,350 21,000

Wagon Stock

Wagon Stock

Montana wagon makers use only 10,000 feet of lumber annually and this is employed entirely in the production of specific parts for repair work. Five species of hardwoods supply the entire demand for wagon stock and no softwoods are reported by wagon repairers in the state. Eastern oak, which is employed in the running gear, for poles, felloes and single and double trees, supplies 40 per cent of the wood used. For body work on wagons and automobiles yellow poplar and basswood are employed. These furnish, respectively, 18 per cent and 7 per cent of the total consumption.

All woods used for wagon stock in Montana are imported from the East at an average cost of \$94.71 per thousand feet delivered. Hickory and maple are used interchangeably for repairs to the running gear of wagons. Woods used for wagon wheels and axles, single and double trees and poles are selected for their strength, stiffness and toughness, while woods used for wagon beds, boxes and the bodies of automobiles and buggies are generally comparatively soft with good finishing and working qualities and susceptible to bending.

11 201	TABLE 1X—WAGON STOCK.								
Kinds of Wood.	Quantity Used Annually— Feet, B. M	Quantity Used Annually— Per Cent	Average Cost— Per 1,000 Feet.	Total Cost— f.o.b. Factory	Grown in State— Fect, B. M	Grown Out of State, Feet, B M.			
Eastern Oak	4,000	40	\$90.00	\$ 360		4,000			
Hickory Yellow Poplar	3,000		108.34	325		3,000			
Yellow Poplar	1,800 700	18	100.00	150		1,800 700			
Basswood	500	5	75.00			500			
Maple	300	3	10.00	07,00	******	300			
Total	10,000	100	\$94.71	\$947.50		10,000			

Miscellaneous

Miscellaneous

The miscellaneous consumption of wood in the state is chiefly for veneer, patterns and excelsior. One hundred and eighty-five thousand feet, board measure, are manufactured into these three commodities annually. Cottonwood, the only local hardwood used in Montana, supplies practically the entire demand for veneer and excelsior wood, and 180,000 board feet are used annually for these purposes. White pine used for patterns is grown outside the state, and the annual consumption is only 5000 feet. This wood is purchased at an average price of \$40 per thousand feet, delivered to the consumer.

average price of \$40 per thousand feet, delivered to the consumer.

Cottonwood is quite generally employed throughout the Northwest for veneer and excelsior. In fact, for excelsior it is used almost to the exclusion of other species. Cottonwood veneer supplies the berry box and basket trade, and is some-

WOOD-USING INDUSTRIES OF MONTANA.

times used for cores to be covered with veneers

times used for cores to be covered with veneers of higher grade woods.

Woods for patterns must work easily with hand tools and must retain their form after manufacture. The white pine of Idaho and Montana is a superior wood for this purpose and is employed in quantities throughout the Western United States. Its principal competing species are western red cedar and redwood. Wood for the manufacture of excelsior must be light in weight and tough. Veneers for baskets or berry boxes must be strong, tough, light and odorless. Cottonwood is the best species available in the Northwest for excelsior, berry boxes and baskets.

TABLE X-MISCELLANEOUS. (Veneer, Patterns and Excelsior.)								
Kinds of Wood.	ty U ally eet,	Quantity Used Annually— Per Cent	Average Cost— Per 1,000 Feet	Total Cost— f.o.b. Factory	Grown in State— Feet, B. M	Grown Out of State, Feet, B. M		
Blk. Cottonwood. West. White Pine.	180,000, 5,000	$97.4 \\ 2.6$	\$13.37 40.00	\$ 2,406 200	180,000	5,000		
Total	185,000	100.0	\$14.09	\$ 2,606	180,000	5,000		

Summary of Woods Used by Manufacturing Plants

Table XI shows the quality and cost of each species employed by Montana wood-using industries exclusive of planing mills; also the proportion grown in the state and the proportion imported. The total quantity, 6,065,000 board feet, indicates the present development of wood-using factories in the state. Of this quantity, 6445 per cent was grown in the state and 32.55 per cent imported. Eastern hardwoods and Douglas fir from the Pacific Coast comprise practically all the imported. Eastern hardwoods and Douglas in from the Pacific Coast comprise practically all the

from the Pacific Coast comprise practically all the woods imported.

The total cost of all woods used by secondary industries was \$157,257, with an average cost of \$25.93 per thousand feet. Cherry and wainut imported from the East and used for fixtures, are the most expensive woods used in the state, and cost \$130 per thousand feet, delivered at the factory. The cheapest wood employed by the industries of Montana is western iarch, with an average cost of \$11.14 per thousand feet delivered. Practically all of the western larch is used for boxes and crates.

Western yellow pine, all of which was grown

boxes and crates.

Western yellow pine, all of which was grown within the state, furnished 55.1 per cent of all the wood used by secondary industries, while Douglas fir, 94.04 per cent of which was imported, furnished 22.1 per cent of the wood used. Only 5.96 per cent of the Douglas fir reported for the state was locally grown.

Black cottonwood is the only local hardwood employed by Montana industries. This species furnished 3.48 per cent of the wood consumed by the industries.

employed by Montana Industries. This species furnished 3.48 per cent of the wood consumed by the industries.

Sixteen distinct species of wood were reported for Montana and nine of these were supplied entirely from without the state.

The small diversity of wood-working plants and the low grade of articles produced is indicated by the minor consumption of hardwoods, which supply only 5.91 per cent of the total annual consumption of wood as reported in Table XI. While western white pine and western larch are cut in quantities by Moutana sawmills, these two important native species yielded only 7.71 per cent of the total consumption by secondary industries. Western red cedar furnished only 0.41 per cent of all of the wood used in the wood manufacturing industries of Montana. Seventy-six per cent of the western red cedar was imported, chiefly from Western Washington and Idaho. The cedar grown locally is employed principally for poles, piling and posts.

used in the state are purchased at an average price of \$11.50 per thousand feet, delivered at the fac-

Eight specific wood-consuming industries are reported within the state, while three industries manufacturing veneer, patterns and excelsior are classified as miscellaneous.

The manufacture of sash and doors is second only in importance to the production of boxes, and sash and door factories take 27 per cent of the wood annually consumed. The excellent quality of locally-grown woods favors the sash and door industry. For high grade softwood sash and doors no wood is superior to western yellow pine and western white pine. The local demand for such doors is extensive because of the natural settlement of the state, and quantities also find distribution throughout the United States.

Table XII shows the apportionment of consump-

Table XII shows the apportionment of consumption by the industries of the state and the cost of the lumber delivered for consumption at the

factories.

The wood used for wagon stock has the highest average price, which is \$94.71 per thousand feet. This industry is supplied entirely by Eastern hard-This industry is supplied entirely by Eastern hard-woods, which must bear a heavy freight rate before delivery, and are, furthermore, high priced in the region of their production. Woods used for furniture repair rank second in their average price at the factory. The total cost of all wood used annually by the secondary industries of Montana is \$157,257.

TABLE XII—SUMMARY OF WOOD USED BY MONTANA INDUSTRIES.

Industry	Quantity Annual Feet B. M.		Average Cost Per 1000 Ft. f. o. b. Factory	Total Cost f. o. b. Factory	
Boxes. Sash and Doors. Fixtures. Miscellaneous. Coffin and Coffin Boxes Cabinet Work. Trunks and Cases. Furniture. Wagon Stock	z 2,697,0000 1,638,000 1,338,000 185,000 109,000 40,000 27,000 21,000	44.50 27.00 22.05 3.05 1.80 .66 .44 .34	\$11.50 32.32 47.99 14.09 18.38 37.00 27.74 64.34 94.71	\$31,031 52,940 64,151 2,606 2,003 1,480 749 1,350 947	
Total	6,065,000	100.00	\$25.93	\$157,257	

Kinds of Wood Used by Different Industries.

Table XIII shows the percentage apportionment of the kinds of wood used by the various industries of the state. Douglas fir and western white pine each supply five different industries, but are employed in like industries in only two instances,

trunks. Eighty-five and five-tenths per cent of all of the cottonwood reported is employed for veneers and excelsior, while 11.9 per cent of it is used for cabinet work. A greater variety of woods is used for fixtures than for any other manufactured wooden commodity. None of the industries reported employ less than two species.

Summary of Average Prices

Summary of Average Prices

Table XIV gives a summary of the average prices paid for each kind of wood by the various industries of the state. The range in the price of the same wood indicates the varying quality required by the various industries. Native species, such as western yellow pine and western white pine, vary greatly in price according to the use intended. Yellow pine for boxes brought an average delivered price of \$10.67, while cabinet-makers employing this wood paid \$50 per thousand feet for the quality of material they required. Western white pine for boxes cost \$15 per thousand feet, while pattern-makers paid \$40 per thousand feet for the same species.

In general, the box industry paid the minimum price for its raw material, while the material employed in the repair of wagons brought the highest average price. Woods obtained from outside the state were generally the most expensive employed, both on account of freight charges and their relative scarcity.

The National Forests of Montana

The National Forests of Montana

The National Forests of Montana

The area of the state of Montana is given as 93,806,080 acres, 93,296,640 acres of land and 509,440 acres of water surface. Twenty and five-tenths per ceut, or 19,205,100 acres of Montana's gross area, is included in the National Forests. Of this area approximately 3,000,000 acres are in private ownership, leaving a net of 16,192,503 acres of National Forest land. These forests are confined chiefly to the more mountainous western and southwestern sections of the state, and contain little or no agricultural land.

The following species occur in large quantities on the National Forests: Western yellow pine, western white pine, western larch, lodgepole pine, Engelmann spruce and Douglas fir. The estimated stand for all species of timber on the National Forest areas of Montana is approximately 39,500,000,000 feet, board measure.

Timber on the National Forests is for sale where it is mature or dead, and can be cut without injury to streamflow. Contracts for short or long term periods are granted, depending upon the quantity of timber sold and the cost of improvements necessary to get it to market. All timber over \$100 in value is advertised for thirty days

TABLE XIII-PER CENT OF DIFFERENT WOODS USED BY EACH INDUSTRY.

Species	Box	Cabinet Work	Coffins and Coffin Boxes	Fix- tures	Fur- niture	Sash and Doors	Trunks and Cases	Wagon Stock	Miscell- aneous
Western Yellow Pine. Douglas Fir. Eastern Oak. Western White Pine. Western Larch.	3.73 42.53 89.00		30.86		1.12	11.00	7.09	.98	1.78
Black Cottonwood Engelmann Spruce Western Birch Eastern Maple	100.00			100.00			1.90		85,50
Western Red Cedar. Basswood. Hickory		12.00	88,00				58.80 14.20	41.20 85,80 100.00	
Yellow Poplar. Elm. Cherry—Black Walnut. Total.			,						

namely, for boxes and for sash and doors. rankery, for boxes and for sash and doors. Western yellow pine, which supplies 55.1 per cent of all of the woods used in the state, is employed in four different industries; 66.8 per cent of all of the western yellow pine reported is manufactured into boxes and 26.8 per cent is consumed by sash and door factories. Engelmann spruce, western

TABLE XI-SUMMARY OF WOODS USED BY MANUFACTURING PLANTS IN MONTANA.

Kinds o	Quantity Annua		Average Cost	Total	Grown in	Grown	
Common Name	Botanical Name	Feet B. M.	Per Cent	per 1000 Feet	f. o. b. Factory	State Per Cent	nut of State Per Cent
Douglas Fir Eastern Oak Western White Pine Black Cottonwood Western Larch Engelmann spruce Western Birch Maple Western Red Cedar Hickory Yellow Poplar Basswood	Quercus Pinus monticola Populus trichocarpa Larix occidentalis. Picea engelmaunii Betula lenta. Acer rubrum Thuja plicata Hicoria Lirindendron tulipifera Tilia americana Ulmus americana	401,000 282,000 210,500 184,000 130,000 95,000 42,500 25,000 3,500	55.1 22.1 6.61 4.67 3.48 3.04 2.16 1.56 .72 41 .06 .03 .03 .02	\$18.58 30.11 78.03 16.96 16.34 15.59 15.00 56.15 87.89 22.72 98.92 100.00 62.06 32.00	\$62,138 40,407 31,290 1,783 3,439 2,868 1,950 5,334 3,735 568 346 180 106 48	100 5.96 48.6 98:55 100 100	94.04 100 51.4 1.45
Total		6,065,000	100.00	\$25.93	\$157,257	67.47	32.53

Consumption by Industries.

The manufacture of boxes in Moniana takes 44.5 per cent of all of the wood reported as used by the secondary wood-consuming industries of the state. The box industry is fostered by the suoply of excellent box woods, such as western yellow pine and western white pine and the local or nearby demand for boxes. The grade of lumber required by this industry is low and the box woods

each employed in one industry only. Eastern basswood and hickory each supply two industries; 58.8 per cent of the basswood is used for trunks, while 85.8 per cent of the hickory is employed for wagon repairs. birch, yellow poplar, elm, cherry and walnut are each employed in one industry only. Eastern

Cottonwood, the only native hardwood used by Montana industries, furnishes raw material for cabinet work, fixtures, veneers, excelsior and

for competitive bids, Smaller amounts than \$100 worth can be sold directly by the forest officers on the ground. Certain restrictions in cutting are required in order to insure protection from fire and to young growth, and to provide for reproduction. These restrictions are established practical methods and have been applied successfully in a large number of cases. Timber is scaled, and paid for on that basis. Advance deposits sufficient to cover approximately three months' cut is the general plan of payments required, although this may be modified to meet special requirements in particular cases. Inforation concerning the bodies of timber available for cutting may be obtained from the District Forester at Missoula, Montana, or from the local Forest Supervisor. bids.

Forester at Missoula, Montana, or from the local Forest Supervisor.

In 1910, 36,754,000 feet of timber were cut on the National Forests in Montana, while the saw-mills of the state reported a cut of 319,089,000 feet. The greater part of the timber cut on the National Forests is sawed into lumber. A large amount, however, is used as mining timbers in the mining regions around Butte, Anaconda, Great Fails and Red Lodge. The following list shows the classes of material cut in 1910:

Saw timber, thousand feet	,	B.	M.				36,754
Poies, number							135,694
Posts, number							191,721
Cordwood, cords							
Totai, including all classes		M	ft.	B.	M		54.733

Uses of Different Kinds of Wood as Reported by the Wood-Using Manufacturers of Montana

Basswood—Automobile bodies, trunk boxes, trunk trays, vehicle body sides.
Black Cottonwood—Berry boxes, cabinet work, chip baskets, drawer bottoms, drawer sides, exceisior, fixtures, furniture, interior finish (back-

ing), sheives, trunk boxes (3-ply veneer), trunk

trays (veneer), veneer (basket), veneer cores.

Cherry—Fixtures, trunk slats.

Douglas Fir—Bar fixtures, cabinet work, casing, chairs, chiffoniers, crates, doors, drawers, dressers, frames, fruit boxes, fruit crates, furniture, house finish, household fixtures, packing boxes,

ing, crates, doors, interior finish, meat crates, packing boxes, sash, vegetable crates.

Western Red Cedar—Cabinets, caskets, Shirt-

waist boxes

Western White Pine—Boxes, casing, caskets, cof-fin boxes, door casing, doors, fruit boxes, packing boxes, patterns, sash, screen frames, trunk boxes, trunk trays, window casing. Western Yellow Pine—Boxes, cabinets, door cas-

TABLE XIV—SUMMARY OF AVERAGE COST F. O. B. FACTORY, REPORTED BY THE SEVERAL IN-DUSTRIES FOR THE DIFFERENT KINDS OF WOODS.

Species	Box	Cabinet Work	Coffins and Coffin Boxes	Fix- tures	Fur- niture	Sash and Doors	Trunks and Cases	Wagon Stock	Miscell- aneous
Western Yellow Pine	\$10.67	\$50.00		\$35.10		\$34.29			
Douglas Fir. Eastern Oak	17.75	40.00		30.14 77.11	\$40.00	30.80 140.00		\$90.00	
Western White Pine. Western Larch.	15,00		\$18.22			15.00	\$22,00		
Black Cottonwood		30.00		70.00			45 00		19 97
Engelmann Spruce. Western Birch	15.00								
Eastern Maple				56.15 80.54	125.00			75.00	
Western Red Cedar Basswood		50.00	19.00						
Illekory							49 00	65.00 108.34	
Elm							32 00		
Cherry—Black Walnut				130.00			02,00		

paneis, poultry crates, sash, screen frames, shelves, store finish, store fixtures, tables, vegetable crates.

Engelmann Spruce—Butter boxes, fruit boxes.

Hickory—Felloes, spokes, trunk slats, wagon gears, wagon poles.

Maple—Furniture repair, laundry washers, wagon gears, wagon poles.

Oak (Red and White)—Bar fixtures, cabinets, doors, double trees, felioes, finish, sash, show cases, single trees, store fixtures, table tops, wagon bottoms, wagon poles, wagon sills, wagon stakes, wall cases.

Walnut—Fixtures.

Walnut—Fixtures.
Western Birch—Finish, fixtures.
Western Larch—Apple boxes, butter boxes, cas-

ing, door framing, doors, fixtures, fruit boxes, interior finish, meat boxes, packing boxes, sash, screen frames, shelving, window casing, window

frames.
White Elm—Trunk slats.
Yellow Poplar—Automobile bodies, vehicle body

DIRECTORY

The following is a list of wood-using manufacturers in Montana who contributed data on which this report is based. Manufacturers producing several of the classified products appear in the list, with their addresses, under each industry in which their product is classified.

Boxes

Anaconda Copper Mining Co., College of AG Jessup Milling Co., Jessup.
Libby Lumber Co., Libby.
Western Lumber Co., Lathrop.

Cabinet Work

McRae & Cluston, Great Fails. L. F. Thibodeau, Anaconda.

Coffins and Coffin Boxes Capital Casket Co., Butte.
Fixtures

Fixtures

Ben Benson, Helena.

Brown Lumber Co., Helena.

Great Falls Lumber Co., Great Falls.

Hutchinson Lumber Co., Whitefish.

Interstate Lumber Co., Helena.

Montana Sash & Door Co., Billings,

McRae & Cluston, Great Falls.

Riverview Manufacturing Co., Hamilton.

H. F. Smith, Helena,

L. F. Thibodeau, Anaconda.

Furniture

Furniture

McRae & Ciuston, Great Falls, Riverview Manufacturing Co., Hamiiton.

Miscellaneous

Patterns

Billings Foundry & Manufacturing Co., Billings Sash and Doors

C. Cain, Heiena, C. C. Cain, Heiena.
Libby Lumber Co., Libby.
McRae & Cluston, Great Falls.
Montana Sash & Door Co., Billings.
Riverview Manufacturing Co., Riverview.
L. F. Thibodean, Anaconda.
Western Montana Fiouring Co., Missouia.

Trunks

Evans Brothers Trunk Co., Missoula. Great Falis Trunk Factory, Missoula.

Wagon Works

Billings Foundry & Manufacturing Co., Billings. L. F. Thibodeau, Anaconda.

FOREST SERVICE GIVES RESULTS OF VALUABLE TESTS OF STRUCTURAL TIMBERS

The U. S. Forest Service has recently issued Bulietin 108, "Tests of Structural Timber," by McGarvey Cline, Director of the Forest Products Laboratory, and A. L. Heim, Engineer in Forest Products. This builetin is a summary of the results of investigations of the mechanical properties of the most important structural timbers of the United States, and is of particular interest to Northwest lumber manufacturers, timberland owners and engineers. It gives the properties of our most important Northwest woods and woods from other regions of the United States with which these woods come in competition.

These timber tests are part of the program of testing work inaugurated by the government a number of years ago, and are the most exhaustive series of investigations for determining the mechanical properties of wood ever undertaken by any government.

number of years ago, and are the most exhaustive series of investigations for determining the mechanical properties of wood ever undertaken by any government.

The publication describes the various species on which tests were made and contains a map showing the distribution of these species. The tests were made on various commercial sizes, so that the results are directly applicable and representative of the strength of the wood in the various grades in which it reaches the market.

The tables contained in the publication give ali of the strength functions of the wood, including its bending strength, stiffness, shearing strength, compressive strength along the grain, and compressive strength across the grain. In addition, laboratory, determinations of the average moisture content of the wood, its rate of growth and weight, are included. The authors have presented in concise diagrammatic form the variation in strength through the limits of quality represented by the various species, and also give in like form the relationship between the rate of growth, weight and other physical elements, and the strength and stiffness of the various woods.

This bulletin is the first composite statement of the results of tests on many woods, and readily shows the relatiive structural merits of the principal timbers of the United States. It contains an analysis of the effect of various defects found in commercial size timbers on the strength of the timber and its stiffness—two important elements considered in the design of timber structures. The analysis of the effect of knots and their location in timber beams on the mechanical properties of the various species is both interesting and conclusive. The results of the tests form the basis for a discussion of the grading rules now used for the various kinds of timber, and indicate the reliability of these rules for dividing the timbers according to the service which they should give.

In addition to the composite tables showing the average strength values for like grades and like s

The following table shows the average strength

values on the various sizes of the most important woods tested as beams, and gives the relation be-tween the strength of commercial sizes and the strength of small pieces of the same wood contain-ing no defects. These results are based entirely on tests of green material, since the moisture content of wood materially affects its strength, and green material is used so that all species may be

compared on a uniform basis:
The column headed "Modulus of Rupture" in the

above table gives the unit strength of the species and is a measure of the maximum load required to work the timber to destruction. The column headed "Modulus of Elasticity" gives the unit measure of the stiffness of the wood.

This is a publication of merit which should serve an excellent purpose in standardizing the structural timbers of the country. It can be obtained upon request to any of the offices of the Government Forest Service or to the Public Printer at Washington, D. C.

AVERAGE STRENGTH VALUES FOR BENDING TESTS ON GREEN MATERIAL OF DIFFERENT SIZES

	Siz	es				at e	stress lastic nit.		lus of ture	Modu elast	lus of icity	Calcu	
Species.	Cross section.	Span.	Number of tests	Moisture.	Rings per inch.	Average per square inch.	Ratio to 2 by 2 inches.	Average per square inch.	Ratio to 2 by 2 inches.	Average per square inch.	Ratio to 2 by 2 inches.	Average per square inch.	Ratio to 2 by 2 inches.
Longleaf pine	Ins. 12x12 10x16 8x16 6x16 6x10 6x 8 2x 2	Ins. 138 168 156 132 180 180 30	4 4 7 1 1 2 15	Per cen 28.6 26.8 28.4 40.3 31.0 27.0 33.9	9.7 16.7 14.6 21.8 6.2 8.2 14.1	Lbs. 4,099 4,193 3,147 4,120 3,580 3,735 4,950	0.83 .85 .64 .83 .72 .75	Lbs. 6,710 6,453 5,439 6,460 6,500 5,745 9,070	0.74 .71 .60 .71 .72 .63 1.00	1,000 1,bs. 1,523 1,626 1,368 1,190 1,412 1,282 1,540	0.99 1.05 .89 .77 .92 .83 1.00	Lbs. 261 306 390 378 175 121 303	0.86 1.01 1.29 1.25 .58 .40
Douglas fir	8x16 5x 8 2x12 2x10 2x 8 2x 2	180 180 180 180 180 180 24	191 84 27 26 29 568	31.5 30.1 35.7 32.9 33.6 30.4	11.0 10.8 20.3 21.6 17.6 11.6	3,968 3,693 3,721 3,160 3,593 5,227	.76 .71 .71 .60 .69 1.00	5,983 5,178 5,276 4.699 5,352 8,280	.72 .63 .64 .57 .65	1,517 1,533 1,642 1,593 1,607 1,597	.95 .96 1.03 1.00 1.01 1.00	269 172 256 189 171 333	.81 .52 .77 .57 .51 1.00
Douglas fir (fire-killed)	8x16 2x12 2x10 2x 8 2x 2	180 180 180 180 30	30 32 32 31 290	36.8 34.2 38.9 37.0 33.2	10.9 17.7 18.1 15.7 17.2	3,503 3,489 3,851 3,403 4,360	.80 .80 .88 .78 1.00	4,994 5,085 6,359 5,305 7,752	.64 .66 .69 .68 1.00	1,531 1,624 1,716 1,676 1,636	.94 .99 1.05 1.02 1.00	330 247 216 169 277	1.19 .89 .78 .61 1.00
Shortleaf pine	8x16 8x14 8x12 5x 8 2x 2	180 180 180 180 180 30	12 12 24 24 254	39.5 45.8 52.2 47.8 51.7	12.1 12.7 11.8 11.5 13.6	3,185 3,234 3,265 3,519 4,350	.73 .74 .75 .81 1.00	5,407 5,781 5,503 5,732 7,710	.70 .75 .71 .74 1.00	1,438 1,494 1,480 1,485 1,395	1.03 1.07 1.06 1.06 1.00	362 338 277 185 258	1.40 1.31 1.07 .72 1.00
Western larch	8x16 8x12 5x 8 2x 2	180 180 180 28	32 30 14 189	51.0 50.3 56.0 46.2	25.3 23.2 25.6 26.2	3,276 3,376 3,528 4,274	.77 .79 .83 1.00	4,632 5,286 5,331 7,251	.64 .73 .74 1.00	1,272 1,331 1,432 1,310	.97 1.02 1.09 1.00	298 254 169 269	1.11 .94 .63 1.00
Western hemłock	8x16 2x 2	180 28	39 52	42.5 51.8	15.6 12.1	3,516 4,406	.80 1.00	5,296 7,294	1.00	1,445 1,428	1.01 1.00	261 284	. 92 1.00
Redwood	8x16 6x12 7x 9 3x14 2x12 2x10 2x 8 2x 2	180 180 180 180 180 180 180 180 28	14 14 14 13 12 13 13 157	86.5 87.3 79.8 86.1 70.9 55.8 63.8 75.5	19.9 17.8 16.7 23.7 18.6 20.0 21.5 19.1	3,734 3,787 4,412 3,506 3,100 3,285 2,989 4,750	.79 .80 .93 .74 .65 .69 .63 1.00	4,492 4,451 5,279 4,364 2,753 4,079 4,063 6,980	.64 .64 .76 .62 .54 .58	1,016 1,068 1,256 947 1,052 1,107 1,141 1,061	.96 1.00 1.18 .89 .99 1.04 1.08 1.00	300 224 199 255 187 169 134 248	1.21 .90 .80 1.03 .75 .68 .54 1.00

United States Department of AGRICULTURE

Forest Service

HENRY S. GRAVES, Forester



WOOD-USING Industries of Idaho

By C. W. DUNNING

Reprinted From

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Timber Resources and Wood-Using Industries of State of Idaho

The state of Idaho is distinctly a lumbering, mining and agricultural state. The lumbering and mining regions are confined mostly to the north-ern and central portions of the state, while horticulture and agriculture are the pursuits in the southern part. Idaho has a population of about 325,594 people and is one of the least densly popuated states of the country. The natural environment of the state and its small population precludes at this time an extensive development of manufacturing industries. The manufacture of manufacturing industries. The manufacture of lumber is by far the most important of the industries represented here.

It is estimated that the stand of timber in Idaho

approximates 129 billions of board feet. Of this amount 71 billion feet are within the National Forests, 8 billion on other government lands, and 50 billion are privately owned. It is the privately owned timber which furnishes the great bulk of the lumber output of the state, although government timber is coming into the market more and more each year through sales from the National Forests by the Forest Service.

As a rule privately owned timber is immediately accessible to the mills, while the greater quantities of government stumpage lie in more inaccessible mountainous regions.

It is the purpose of this report to present data regarding the industries of the state which further manufacture sawmill and woods products into finished articles of general use, made wholly or in part of wood, and to correlate data concerning like industries to show the present uses of various species of wood and their suitability for different manufactured products. The Bureau of the Census, United States Department of Commerce and sus, United States Department of Commerce and Labor, annually compiles statistics of the production and consumption of lumber and other forest products which are not included in this study.

The following table contained previously obtained statistics from the lumber industry of the

Lumber Cut of Idaho for Various Years.

Quan	tity, feet, D	. M,		ent of	Tot	rcent of tal Cut	In
1910	1909	1908	1909 to 1910	1998 to 1909	1919	1909	1908
745,984,000	645,800,900	518,625,00	0 15.5	24.5	1.9	1.5	1.6

Idaho ranked twenty-first of all the states in lumber output in 1910. Over 229 active sawmills are represented in the cut reported for that year. In addition to iumber, Idaho mills produced 84,134,000 lath and 60,425,000 shingles during 1910. The state's lumber cut in 1910 is shown below by

species.	reet.
Western yellow pine	.280,533,000
Western white pine	.232,442,000
Western larch	.100,512,000
Douglas fir	. 62,793,000
Western red cedar	. 38,831,000
White fir	. 25,266,000
Western hemlock	. 3,423,000
Lodgepoie pine	. 934,000
Engelmann spruce	. 842,000
Cottonwood	. 408,000

In addition to lumber, lath and shingles, Idaho's forests furnish large quantities of poles, piling and posts, mine timbers, hewed ties and other and posts, mine timbers, hewed tles and other forms of forest products not reported by the census or included in subsequent statistics of this report. Northern Idaho is one of the largest pole producing regions of the country, and Western red cedar poles produced here are distributed throughout the United States. The longest poles of the country are obtainable in this region.

The principal woods of the state, namely, Western yellow pine and Western white pine, are employed in greater quantities than other woods by secondary wood consuming industries operating

secondary wood consuming industries operating within the state.

The species of timber on National Forests are ractically the same as those on private lands. Western yellow pine, white pine, Douglas fir, larch, spruce and lodgepole form the bulk of the stands of timber. Owing to the absence of hardlarch, spruce and lodgepole form the bulk of the stands of timber. Owing to the absence of hardwoods, no substitutes from the National Forests are available to replace the species already in use. The timber on the National Forests is sold wherever it is old and mature under regular contracts in which the operator removes the timber as he pays for it at a stipulated price per thousand feet, determined upon competitive bidding.

The study upon which this report is based was undertaken by the Forest Service, United States Department of Agriculture, the work being done under the direction of I. B. Knapp, Assistant District Forester, Portland, Oregon. The statistics were compiled from data collected in the summer of 1911, covering a period of one year from January I to December 31, 1910, inclusive.

Detailed information can be obtained through any authorized forest officer.

Planing Mill Products.

In Idaho, sawmills generally operate planing milis which are employed in remanufacturing rough lumber into many forms for final use. These planing mill products include surfaced dimension and lumber of all forms; flooring, siding, rustic, finish, ceiling, shop and factory lumber, dressed and matched stock, O. G. stock and battens, tank stock, finish and mouldings. Fully 25 per cent of the lumber cut of the state passes through some form of further manufacture after

leaving the sawmill proper.

The nature of the milling operations and the common practice of mixing species makes it impossible to obtain authentic statistics on the amount of the various kinds of wood remanufactured into specific forms at planing mills.

Planing Mill Products by Species.

Western Yeilow Pine (Pinus ponderosa).

Western Yeilow Pine (Pinus ponderosa). The texture and general quality of this wood make it highly serviceable for many of the common planing mill products. Thick finish from 1½ to 2 inches, inch finish, siding, flooring, factory plank or shop common, factory selects, thick common lumber, common boards, shiplap, grooved roofing and dressed and matched (D. & M.), dimension, fencing, and lath are the principal products into which western vellow nine is separated mension, fencing, and tath are the principal products into which western yellow pine is separated when it leaves the yard or planer. Many of these products are shipped in the rough as they come from the sawmill, but the bulk of the material is run through the planer and either surfaced or remanufactured into some of the finished forms. This renders possible a closer grading and at the same time by lightening the weight assists consame time by lightening the weight assists considerably in reducing freight charges. The grades into which western yellow pine as well as western white pine are separated as the lumber comes from the saw are:

C Select, D Select.

B Select.

Factory or shop lumber:

No. 1 Common, No. 2 Common, No. 3 Common,

No. 5 Common.

The first five grades called "selects" yield the largest part of the profit in lumber manufacture. Numbers 4 and 5 common scarcely pay for the cost of production, and many milis do not attempt to save them. When putting through the planing mill or sorting for final disposition these grades mili or sorting for final disposition these grades are redistributed into those classes above named for which they are best suited or for which the demand calls. Shiplap, grooved roofing, dressed and matched material (fencing, drop siding and poorer classes of flooring), dimension timbers and common lumber come from the "common" grades, while the other and higher classes of products usually come from the "select" grades. Other usually come from the "select" grades. Other classes and grades are manufactured in smaller quantities and require less amounts of shaping or further mechanical effort.

The wood is well sulted for flooring, although considerably softer than its chief competitors, Douglas fir and western larch, or even than the yellow pines of the South. Its even grain and wearing properties commend its use for flooring and it does not shrink or warp greatly after proper seasoning.

The wood is very serviceable for drop siding, and is inferior only to white pine or western red cedar for bevei siding. Its light weight, ease of working, lack of pitch, suitable grain and ability to hold its shape and to hold paint make western yellow pine one of the favorite woods for siding. Douglas fir drop siding, manufactured by coast milis, is the chief competitor in Idaho markets.

As a finishing wood, for window and door casings and baseboards it readily meets a big demand, especially when it is to be painted. Its grain figures do not enhance its value for finish

when it is desired to stain the wood, in which case it gives place to western larch and Douglas fir. Its resistance to warping and checking commend it for paneling and general finish, especially

when enamel paints are used.

For shop and factory lumber the western yellow pine is in great demand for sash and door stock, cahinet work, furniture parts and general finishing and manufacturing purposes. grain, smooth finish, easy working properties and resistance to warping and checking enhance its value for uses of the trades. In its general service-ability for secondary manufacturing plants requiring soft woods it is exceeded among its associated species by western white pine (Pinus monticola), for which it is often mistaken and substituted.

Common lumber of western yellow pine is often manufactured in planing mills for use as tank stock, step plank and box lumber. Large quantitles of surfaced lumber are consumed for hox manufacture within or without the state. Lumber consumed in the actual manufacture of boxes in the state is listed in a subsequent part of this

Western White Pine (Pinus monticola).

The western white pine is in many ways the equal of the eastern white pine, the superior soft wood of the United States. It is serviceable for planing mill products, more particularly shop iumber and plain surfaced forms which are later to be remanufactured into finished products by weed working plants. Sach and door stock of woodworking plants. Sash and door stock of western white pine has no superior in its own region and in this form large amounts of the wood are consumed by factories throughout the United States. The wood is too valuable for general work and as common lumber forms; it is in demand for cabinet work, furniture, drawing boards, patterns and numerous other similar uses.

The wood is aimost free from pitch, is white or light yeilow in color, fine grained and soft. It does not shrink after thorough seasoning, retains its manufactured form permanently, is very light in weight and is neither strong nor stiff when compared with western yellow pine, Douglas fir or larch, the other common species in the regions of its growth.

Western Larch (Larix occidentalis)

The western larch and Douglas fir occurring in the state of Idaho are rather inferior commercial woods when compared with the highly valuable and widely used white and yellow pines. The two species have many qualities in common and are often utilized for the same purposes, so that they are mixed in manufacture and are not separated when placed on the market. Larch, however, yields a larger percentage of clears and therefore most of the products made from the select grades are of that species and are sold as larch. The most important of these products are flooring and finish. Larch is particularly suited for these uses because of the fineness and beauty of its grain, its hardness and the small amount of pitch it contains. Its even and uniform grain and hardness cause larch flooring to be particularly serviceable. For these uses larch is quite the equal of Coast Douglas fir. Larch is also used for ceiling, beveled and drop siding and some other purposes.

Its qualities recommend it for practically the same uses throughout as those to which Coast Douglas fir is put, although the presence of other better-known woods have hitherto prevented its extensive utilization for high-grade products. The bulk of the species is cut into timbers, dimension and common lumber, for structural purposes, since the stiffness, strength, hardness and other qualities of the wood eminently adapt it for that class of work.

Douglas Fir (Pseudotsuga taxifolia). Because of its smaller size and absence of clear iength the Douglas fir manufactured by Idaho mills is inferior to the same species which forms the principal output of west coast mills, the quantity of high grade material, called "ciears" on the Coast and "selects" in the Inland Empire, being a very small percent. A small amount of fir finish and civil a very small percent. A small amount of fir finish and similar products is manufactured along with the larch, but prohably 98 per cent of the rough fir lumber from the saw mills is used in the rough or surfaced state in structural forms. Most of it is made into timbers and dimension stuff, although the larger part of the common grades of boards used locally are of this species or of larch. Douglas fir is most highly prized for mining timbers and railway cross ties, for which uses larch is considered as second choice.

Secondary Wood-Using Industries.

The industries of Idaho which consume lumber in the manufacture of their products are small in number and with but few exceptions consume no great quantity. All of the industries combined use only 19,489,800 feet of lumber annually. Of this amount 85.5 per cent is grown within the state, and the balance, 14.5 per cent, is imported from other states to serve the needs of local manu-

The following is a summary of the wood used in the state of Idaho, by species, and gives data which indicates the scope of the development of industries in the state which consume wood in the process of manufactu

The thickness of box boards varies according to the kind of boxes manufactured, but is one inch

yellow plne being the most serviceable, is especially sulted for casing and framing because it does not warp easily, takes paint well and has a

12016	LI-BUXES &II	d Crates,	Packing.			
Kinds of Wood.	Quantity Annua		Average Cost per	Total Cost f. o. b.	Grown in Idaho	Grown out
	Feet, B. M.	Per Cent	Feet	Factory		Feet, B. M.
Western yellow pine Western white pine Black cottonwood Western larch	100,000 50,000	98.49 .97 .49 .05	\$13.31 18.00 22.00 10.00	\$134,297 1,800 1,100 50	10,090,000 100,000 50,000 5,000	
Totals	10,245,000	100.00	\$13.40	\$137,247	10,245,000	

Sash and Doors, Blinds and Millwork.

ure:	F'or	the	manufacture	Οľ	sash	and	doors	severa	l

Table 1—Summary of Kinds of wood osed in idano.										
KINDS OF	KINDS OF WOOD				Total	Grown	Grown out of			
Common Name	Botanical Name	Feet B. M.	Per Cent.	Per 1,000 Feet	f. o. b. Factory	in Idaho Per Cent.	Idaho Per Cent.			
Western yellow pine Western white pine Douglas fir	Pinus ponderosa Pinus monticola Pseudostuga taxifolia	14,420,500 3,767,500 1,039,000	73.99 19.33 5.33	\$ 14.67 21.02 30.76	\$211,488 79,195 31.955	99.98 56.63 2.41	0.02 43.37 97.59			
Redwood	Sequoia sempervirens Quercus alba		.51	70.00 129.84 22.00	7,000 9,608 1,100	100.00	100.00 100.00			
Black cottonwood Western larch Western red cedar	Larix occidentalis Thuja plicata	25,000 8,000	.13	13.60 35.00	340 280	100.00				
Philippine mahogany Sitka spruce Black ash		4,000 500 500	.02	187.50 40.00 174.00	750 20 87		100.00 100.00 100.00			
	Hicoria Malus malus	500 300	*	140.00 26.67	70	100.00	100.00			
Totals* Less than 1/100 of 19	6.	19,489,800	100.00	\$17.54	\$341,901	85.48	14.52			

The total cost of all woods used by Idaho industries annually as shown by Table 1 is \$341,901, based on delivered prices. The average cost is \$17.54 per thousand feet board measure, which indicates the cheap quality of wood necessary to sustain the wood-using industries of the state. It is significant that the principal timber species of Idaho, western yellow pine, furnishes 73.99 per cent of all wood used by its industries, while western white pine, which ranks second in the importance of the commercial species of the state. importance of the commercial species of the state, furnished 19.33 per cent. No other wood is used in appreciable quantities except Douglas fir, which furnishes 5.33 per cent of the total consump-

Only thirteen species of wood contribute raw material for the industries of the state, and it is significant that less than 1 per cent of the wood consumed is represented by six species of hard-woods. Two of these hardwoods are produced within the state, namely, black cottonwood and apple wood. Cottonwood itself constitutes about one-third of the hardwoods utilized.

While western white pine is cut in large quantities by Idaho sawmills, 43.37 per cent of the amount reported by the industries was imported from outside the state. The Douglas fir used in the state is obtained principally from the west coast. The local trees of this species yield material unsulted to the needs of such industries. Only two and forty-one one hundredths per cent of the Douglas fir was supplied by local saw mills, while the state itself supplied 97.59 per cent of the western yellow pine to its wood working plants.

Boxes and Crates, Packing.
The manufacture of boxes ranks first in the amount of wood consumed by wood-using indus-tries in Idaho. The manufacture is confined largely to fruit boxes for use in Southern Idaho and for packing boxes, which find a local market. The home woods are eminently sulted to this purpose.

Western yellow pine constitutes 98.49 per cent of the wood actually manufactured into boxes and all of the wood used for this purpose grows in Idaho. Western white pine furnishes a little less than 1 per cent and cottonwood and western larch the balance. No wood is imported by box manufacturers. The light weight and strength of western yellow pine make it most desirable for fruit boxes. Its value prohibits its use for rough packing boxes, which demand is met mostly by western

In addition to the boxes manufactured in the state, large quantities of box lumber are produced in planing mills and subsequently manufactured into the finished form outside the state. The large areas of Idaho and contiguous states devoted to horticulture and the suitability of western yellow pine and other native woods for boxes indicate an expansion of this industry.

The requirements of a good box wood are strength, light weight, ability to nail without splitting, and ability to hold nails. Strength rather than light weight is a requisite of boxes used for shipping apples and other fruit, and western yellow pine is better suited than other available species. Lumber for box manufacture is obtained in rough form or surfaced on one or two sides. Widths vary up to 12 inches, and the box lumber is usually one inch thick before surfacing.

of the local woods of Idaho are well adapted. Such woods should be straight grained, fairly hard, easily worked, and capable of taking a good fin-lsh. Western yellow pine, which leads all other species in the amount consumed, must be thoroughly dried before using in order to remove the small amount of pitch in the wood and at the same time prevent swelling or warping after manufacture. White plne, which takes second place among the woods used, works more easily than yellow pine, and is well adapted for this purpose. The somewhat higher price which white pine brings and the fact that yellow pine serves equally as well, prevents the former from coming more into use for this purpose.

Douglas fir obtained from the coast is used for the higher class of doors where the beauty of its grain can be exhibited to the best advantage by staining. Douglas fir is harder than either western yellow or western white pine and does not work as easily.

All of the yellow pine and about three-fourths of the white plne used for sash and doors is obtained from Idaho mills. The remaining white pine is brought in from the state of Washington. The brought in from the state of Washington. The coast fir is somewhat softer and better for sash and doors than that grown in Idaho, and the entire amount used is brought in from Western Oregon and Washington.

While sash and doors are manufactured in quantities in this state, vast amounts of western yellow pine and western white pine are shipped from the state in the form of sher and feature.

from the state in the form of shop and factory lumber for consumption by sash and door fac-tories in Eastern states and Middle Western

uniform and attractive grain. For window and door frames its strength, comparative hardness and working properties commend it.

The grain of Douglas fir commends it especially and the non-warping and shrinking properties of white pine give it preference where enamel paints are to be used.

Western larch is the cheapest wood used for this purpose. It serves as a substitute for coast fir where natural finish and staining is desired. fir where natural finish and staining is desired. It supplies framing material principally. The lumber is obtained rough, except that it is surfaced one or two sides, and sometimes surfaced two sides and one edge. For framing, thick stock to 2 inches, and 6 inches or wider, is employed. Clear surfaced lumber 1 inch thick is required for window and door casing. This is obtained in various lengths up to 16 feet, and in widths not less than 4 inches.

Fixtures.

The line of distinction between industries using material in the manufacture of planing mill products, such as finish and siding, and industries that use material classed as fixtures, must be drawn more or less arbitrarily. Many planing mills produce forms which are made into fixtures by house builders and carpenters. These are not included in the table for this industry, which represents only the manufacture of fixtures by wood-working plants.

This industry ranks third in the amount of This industry ranks third in the amount of material consumed, and manufacturers report six different woods. The three principal ones, Douglas fir, redwood and eastern oak, are not grown in this state. These constitute 85 per cent of all the wood used for fixtures. Douglas fir is employed the wood used for fixtures. in much greater amounts than any other wood. The high price paid for it indicates that the best grades alone are serviceable. The heauty of the grain of Douglas fir, especially when finished by staining; its hardness, and the fact that it works fairly well and takes varnish, paint and stains well, make it a very desirable wood for this purpose. Where a wood cheaper than eastern hardwood is required for flush or flutures. Douglas for woods is required for finish or fixtures, Douglas fir finds preference.

California redwood is rapidly coming into favor in the state and ranks second in the amount used for fixtures. Where a dark, rich wood, similar to mahogany, is desired, redwood is utilized and is generally employed for bar and store fixtures. It is soft and works easily and when seasoned before shaping holds its form proper extensions.

fore shaping, holds its form permanently.

Eastern oak is used to a large extent where high-class work is wanted. Oak has always been

Table III—Sash	i, Doors, Bin	ius anu c	teneral M	mwork		
Kinds of Wood.	Quantity Annua Feet, B. M.	lly	Average Cost per 1000 Feet	Cost f. o. b.	Grown in Idaho Feet, B. M.	Grown out of 1daho Feet, B. M.
Western yellow pine Western white pine Douglas fir Western larch	541,500 203,000	85.04 10.81 4.05 .10	\$17.62 26.99 22.86 10.00	\$ 75,061 14,615 4,640 50	4,260,000 410,000 5,000 5,000	131,500 198,000
Totals	5,009,500	100.00	\$18.84	\$94.366	4,680,000	329,500

Sash and door stock is usually received at the Sash and door stock is usually received at the factory in rough form of any length, but not less than 6 inches wide. The thickness varies from 1 to 2½ inches and the stock must be clear in lengths suitable for rails, mullions and stiles. The grade of the stock is judged by the door or sash cuttings it will yield. Shop or factory lumber is some times obtained surfaced on two sides.

For door and window casings and framing, local woods and Douglas fir from the west coast are employed. The use is very similar to planing mill products used for sash and doors. Practically the same species and grades are employed. Western

been considered a superior material for this purpose and where a modest, rich and very attractive grain is desired, it is hard to find a more desirable material.

Western white pine finds service for the cheaper grades of fixtures and in parts that are not easily seen. Western yellow plne is used in lesser quantities, especially where a cheap but attractive

wood is wanted.

The state has no native woods which can supply the demand for high-class fixtures and finish, although western larch will undoubtedly meet favor for this purpose when better understood. No

Kinds of Wood.	Quantity Annua Feet, B. M.	lly	Average Cost per 1000 Feet	Total Cost f. o. b. Factory	Grown in Idaho Feet, B. M.	Grown out of Idaho Feet, B. M.
Douglas fir Western white pine Redwood White oak Western yellow pine Philippine mahogany	100,000 65,900 48,000	71.11 9.84 8.87 5.84 4.25 09	\$32.98 46.67 70.00 127.09 29.48 150.00	\$26,450 5,180 7,000 8,375 1,415	111,000	802,000 100,000 65,900 3,000 1,000
Totals	1,127,900	100.00	\$43.06	\$48,570	156,000	971,900

hardwoods are available for replacing those now

imported from the East.

Rough and surfaced lumber is employed by manufacturers of fixtures. Practically all boards and pieces are surfaced before final placing. Most of the lumber is obtained in the form of boards 1 inch thick, of various lengths. Only high-grade stock is purchased.

Fixture woods are obtained in plank form genrally surfaced on two sides. Various widths up to 20 or .24 inches are employed and these are from 34 to 2 inches thick. Clear lumber, or lumber yielding large quantities of clear cuttings, is demanded by the industry.

Boats.

In the manufacture and repair of boats in this state as large a variety of woods is used as in more important industries. The center of consumption of wood for boats is at Coeur d'Alene on Lake Coeur d'Alene, which is one of the largest bodies of water in Idaho and carries a large amount of traffic. Farther to the north along the Pend d'Oreille River and on the Priest and Pend d'Oreille Lakes a few small boats are needed for towing logs to the saw mills from logging opera-tions in that vicinity. Douglas fir leads the list in the amount consumed and serves for frames and ribs, planking and for keels and decking

where cheap but strong, tough wood is needed.

Larch is used for the same purpose as fir, and compares favorably with it for these purposes.

Wagons.

The use of wood for wagons in Idaho is confined to repair work rather than to actual construction. It is cheaper to ship in the finished product than to import from Eastern states the raw material necessary in wagon construction. Woods suitable for the principal parts of wagons do not grow in the state.

Washington being the source of supply.

material is obtained out of the state, Eastern

Apportionment of Consumption by Industries.

Table IX gives the quantity of wood used by each industry, and cost data which indicate the quality of material required by each. Boxes consume 52.57 per cent of the wood employed by the industries of Idaho, and the average cost of box

	Table VII-	-Wagons.				
Kinds of Wood.	Quantity Annus		Average Cost per	Total Cost f. o. b.	Grown in	Grown out
	Feet, B. M.	Per Cent		Factory	Feet, B. M.	Feet, B. M.
White oak	3,000	60.00 20.00	\$121.67 50.00	\$365		3,000
Douglas fir Black ash	500	10.00	174.00	50 87		1,000 500
Hickory	500	10.00	140.00	70		500
Totals	5,000	100.00	\$114.40	\$572		5,000

In repairing vehicles oak, Douglas fir, ash and hickory are employed and all are imported into the state. The hardwoods are obtained in the Mississippi Valley and the Douglas fir from the west coast of Oregon and Washington. The eastwest coast of Oregon and Washington. ern hardwoods average \$130 per thousand feet de-livered to Idaho vehicle repairers, but as they are essential in specific parts, they cannot be replaced by any of the cheaper local woods. The entire amount of wood consumed for wagons in Idaho,

5,000 feet, is not of great importance.

Hickory, ash and oak used for vehicle repair
work are received either in the manufactured

lumber is \$13.40. Wagon repairs require the most expensive woods at an average price of \$114.40,

although they use only .03 of one per cent of all.

The average cost of material for industries grouped under miscellaneous is \$19.07 per thousand feet and material for this purpose constitutes 15.49 per cent of the wood consumed by industries in the state

Apportionment of the Kinds of Wood.
The bullding of boats in Idaho affords utilization for eight different woods, as shown in Table X. However, the total consumption for hoat building is only .32 of one per cent of all the woods used. This industry employs a greater variety of woods than any other. Four species are used for boxes, and western yellow plne supplies 70 per cent of it. Black cottonwood, the only hardwood used for boxes, is not reported used by any other industry. Only 2.6 per cent of the western white pine is employed in the manufacture of boxes. Western cedar is used only for boat bullding, ash and hickory for wagons alone, and applewood in small amounts for pipe plugs. Fixtures consume 89.05 per cent of the eastern oak reported, while oak also supplies material for cabinet work, boats, furniture and wagons.

Western white pine serves a larger number of industries than any other wood and is the only wood used for match blocks. Douglas fir furnishes raw material for five industries, and 77.19 per cent of it goes into fixtures. Practically all of the Douglas fir used by Idaho industries is imported from west of the Cascade Mountains in Oregon and Washington. Western larch, the native softwood most closely approximating Douglas fir in its properties, finds a very limited use for boxes, casing and framing, and for boats. The properties of this wood should make it suitable for substitu-tion for imported Douglas fir for fixtures, cabinet

work and other purposes. Summary of Average Prices.
The summary reported in Table XI gives the average f. o. b. cost of the woods apportioned to

Table V—Boats.											
Kinds of Wood.	Quantity Annua Feet, B. M.	lly	Average Cost per 1000 Feet		Grown in Idaho Feet, B. M.	Grown out of Idaho Feet, B. M.					
Oouglas fir Vestern larch Vestern red cedar Vestern white pine Vhite oak vhilippine mahogany Vestern yellow pine itka spruce	15,000 8,000 5,000 4,000 3,000 2,500	39.68 23,81 12.70 7.94 6.35 4.76 3.97 .79	\$21.80 16.00 35.00 50.00 161.00 200.00 52.40 40.00	\$ 545 240 280 250 644 600 131 20	20,000 15,000 8,000 5,000						

63,000 100.00 \$43.02 \$2,710

The western red cedar and Sitka spruce are used for small row boats where light weight is an important factor, and for this reason these woods are employed almost entirely for the llning of such boats. They are likewise employed for interlor work and finish on larger boats. Sitka spruce is also used for spars.

Totals

Western white pine and western yellow pine are used in small amounts for planking, lining and decking. The higher priced imported woods, such as eastern oak and mahogany, go into finish for the better boats. Some of the oak is used for keels and strakes where a strong, tough, bendable wood serves best.

While the manufacture of boats will never be extensive because of the very local demand, the industry will continue to be an outlet for some part of the local woods.

Rough and surfaced lumber in dimension and plank form, and in large and small sizes, is employed in boat building. Dimension sizes are used in framing, and thin boards for finish.

Furniture.

No factories manufacturing furniture are repre sented in Idaho and the consumption of wood for furniture is confined mostly to repair work. For this purpose only 20,100 board feet of lumber are consumed annually and of this amount one-half is grown outside the state.

Douglas fir brought from Oregon and Washing

ton is the principal furniture wood, while the native western yellow pine is second in importance. Of the higher priced eastern woods oak is the only species used and this is employed sparingly. Western white pine is approximately equal to the western yellow pine in the amount consumed for furniture.

Due to the lack of suitable woods for high-class furniture, the future of this industry in the state must depend on the manufacture of a cheaper class of goods in which western larch, Douglas fir, western yellow pine and western white pine can be used to advantage.

Only clear lumber, rough or surfaced one or two sides, is employed for furniture repairs. Turning squares of Douglas fir 1 by 1 inch, 2 by 2 inches, and 3 by 3 inches, in short lengths are used in small quantities. Lumber with defects but allowing reasonable amounts of short clear pieces can be used.

form or rough. Only rough lumber which is later shaped for final use is reported in the table. This is obtained in the form of thick plank of various widths and lengths. Oak is used for reaches, axles and gears: ash for wagon tongues and felloes, and hickory serves general purposes. Douglas fir is obtained in the form of dressed boards and is employed for wagon beds, racks and as thick stock for tongues.

50,500

Miscellaneous.

Under this heading are grouped the small industries that cannot conveniently be placed under the major wood-using industries. Also in case only one or two firms reported being engaged in the manufacture of some commodity, it was necessary to place them under this industry.

-Miscellaneous. Average Cost per 1000 Feet Quantity Used Annually Grown in Grown out of Idaho Feet, B. M. Idaho Feet, B. M. Kinds of Wood. Feet, B. M. Per Cent \$19.03 26.29 26.67 3,005,000 99.53 \$57,200 1,502,500 1,502,500 .46 14,000 14,000 100.00 \$19.07 \$57,576 1,516,800 Totals 3,019,300 1,502,500

In the amount of wood consumed, this group is well to the front, standing fourth on the list. Western white pine and western yellow pine are the two principal species used, white pine furnishing 99.5 per cent and yellow pine the remainder. A negligible amount of applewood is used for novelties.

industries given in Table X. The most costly wood used in Idaho is the white oak employed for furniture repairs at \$203.30 per thousand feet. Mahogany used in boat building costs \$200 per thousand, while eastern oak for mlllwork costs \$180, and for wagons \$121.65. Eastern ash used only for wagons costs \$175, and hickory, likewise

Table IX-Summary of Woods Used by Idaho Industries.

Turkuna			Cost per	Cost f. o. b.	Grown in Idaho	Grown out
Industry	Feet, B. M.	Per Cent		Factory	Per Cent	Per Cent
Boxes and crates, packing Sash, doors blinds and general millwork Miscellaneous Fixtures Boats Furniture Wagons	3,019,300 1,127,900 63,000 20,100	52.57 25.70 15.49 5.79 .32 .10	\$13.40 18.84 19.07 43.06 43.02 42.79 114.40	\$137,247 94,366 57,576 48,570 2,710 860 572	100.00 93.42 50.24 13.83 80.16 54.73	6,58 49,76 86,17 19,84 45,27 100,00
Totals	19,489,800	100.00	\$17.54	\$341,901	85.48	14.52

The low price per thousand pald for the material used can be accounted for by the fact that the material is purchased in log form and only par-tially manufactured. About one-half of the

Table VI-Furniture Total Cost f. o. b. Factory Quantity Used Annually Average Grown in Idaho Feet, B. M. Grown out of 1daho Feet, B. M. Cost per 1000 Feet Kinds of Wood. Per Cent Feet, B. M. 8,000 6,000 8,000 39.80 5,000 1,10030.00 203.64 1,100 \$860 9,100 100.00 \$42.79 11,000 20,100 Totals

employed only in wagon repair, costs the manufacturer \$140 per thousand feet. The cheapest wood reported by any industry is western larch employed both in boat building and as sash and employed both in hoat building and as sash and doors and mill work, which is reported at \$10 per thousand feet. Western yellow pine ranges from \$13.31 for boxes to \$52.40 per thousand feet for boat building. The highest price paid for western white pine by the industries of the state is \$50 per thousand feet by cabinet makers. The black cottonwood employed in box manufacture coests \$22 per thousand feet delivered at the fee costs \$22 per thousand feet delivered at the factory. Douglas fir for wagon beds costs \$50 per thousand feet delivered, while for boat building

the delivered price of this wood is \$21.80, and for millwork \$21.34 per thousand feet.

Uses of Wood.

Applewood—Gate ornaments, pipe plugs.

Black ash—Wagon felloes, wagon tongues.

Black cottonwood—Crates, packing boxes.

Douglas fir—Blinds, boat decking, boat frames, boat keels, boat planking, boat ribs, bookcases, cabinet work, cases, cupboards, door casing, door framing, doors, fixtures, general millwork, household fixtures, office fixtures, panels, sash, store fixtures, table legs, table tops, wagon beds, wagon

casing, door framing, doors, fixtures, fruit boxes, general boat finish, general fixtures, incubators, lawn swings, match blocks, sash, shelving, table drawers, window casing, window framing.

Western yellow pine—Boat decking, boat flooring, boat planking, boat moulds, counters, crates, door casing, door framing, doors, fixtures, fruit boxes, incubators, packing boxes, porch posts, sash, shelving, store fixtures, surveyors' stakes, table drawers, window casing, window framing.

White oak—Boat combings, boat finish, boat keels, boat ribs, boat strakes, cabinet work, counters,

Table K-Per Cent of the Different Kinds of Wood Used by Each Industry.

Kinds of Wood	Boats	Boxes and Crates, Packing	Fixtures	Furni- ture	Miscel- laneous	Sash, Door s, Blinds and Gen- eral Millwork	Wagons
Applewood							
Black cottonwood							
Douglas fir	2.40					19.54	.10
Hickory							
Philippine mahogany							
Redwood							
Sitka spruce							
Western larch		20.00				20.00	
Western red cedar							
Western white pine	.13	2.66	2.95	.13	79.76	14.37	
Western yellow pine	.02	69.97	.33	.04	.10	29.54	
White oak			89.05	1.49			4.05
	.32	52.57	5.79	.10	15.49	25.70	.03

racks, wagon tongues, window casing, window

Hickory—Wagon running gears.
Phillppine mahogany—Bar fixtures, boat finish, boat trim, cabinet work, fixtures, store fixtures.

Redwood—Counters, fixtures.
Sitka spruce—Boat finish, boat lining, row boats,

Western larch—Boat decking, boat frames, boat keels, boat planking, boat ribs, butter boxes, crates, door casing, door framing, fruit boxes, window casing, window framing.
Western red cedar—Boat finish, boat lining, boat

planking, row boats.

Western white pine—Boat decking, boat lining, boat planking, cabinet work, cases, crates, door

desks, fixtures, show cases, stands, wagon axles, wagon gears, wagon reaches, wagon trees.

Directory.

The following is a list of wood-using manufacturers in Idaho who contributed data on which this report is based. Manufacturers producing several of the classified products appear In the list, with their addresses, under each industry in which their product is classified.

Boats.

Coeur d'Alene & St. Joe Transportation Company, Coeur d'Alene.

I Sash. Doors.

Kremkau Boat Company, Hope. C. A. Rosenholz, Wardner. Westlake & Co., Coeur d'Alene.

1

Table XI-Average Cost of the Different Kinds of Wood Used by Each Industry.

| Boxes and |

Kinds of Wood	Boats	Crates, Packing	Fixtures	Furni- ture	Miscel- laneous	Blinds and Gen- eral Millwork	Wagons
Applewood					\$26.67		\$174.00
Black cottonwood							
Douglas fir	\$21.80		\$32.98	\$33.75		\$22.86	50.00
Hickory							140.00
Philippine mahogany							
Redwood							
Sitka spruce							
Western larch							
Western red cedar							
Western white pine		18.00	46.67	30.00	19.03	26.99	
Western yellow pine	52.40	13.31	29.48	36.00	26.29	17.62	
White oak			127.09	203.64			

Boxes and Crates, Packing.

Adams-Pilgerrim Lumber Company, Twin Falls.

Coblentz Lumber Company, Payette.

Independent Lumber Company, Weiser.

J. B. Krieger, Keuterville. Lapwai Lumber Company, Chesley. Lewiston Box Company, Lewiston. M. R. Rawson Lumber Company, Kamiah. Roseberry Lumber Company, Roseberry. M. A. Snyder, Culdesac. St. Marles Box & Manufacturing Company, St.

Troy Lumber Co., Troy.

Fixtures.

Adams-Pilgerrim Lumber Company, Twin Falls.

Barnum Lumber Company, Kendrick.

Bisbee & Taylor, Coeur d'Alene.

Capital Sash & Door Factory, Boise.

Coast Lumber Company, Payette.

Coeur d'Alene Sash & Door Company, Coeur Coeur d'Alene Sash & Door Company, Coeur

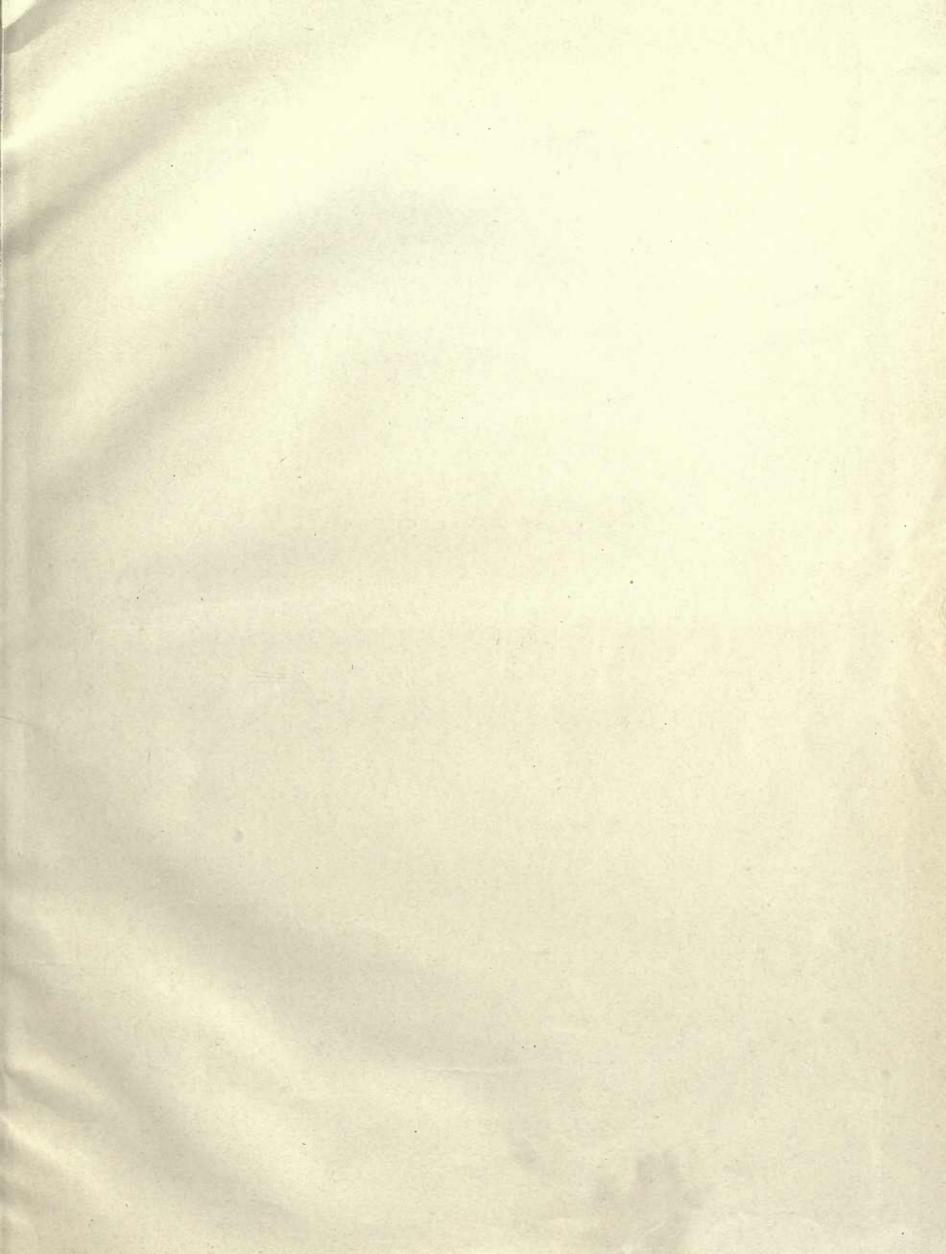
Independent Lumber Company, Weiser. M. & B. Carpenter Shop, Bonners Ferry. Oakley Planing Mill Company, Oakley. Renshaw & Berray, Kamlah.
Roseberry Lumber Company, Roseberry.
Snake River Valley Planing Mills, Idaho Falls.
L. Zachara, Sandpoint.

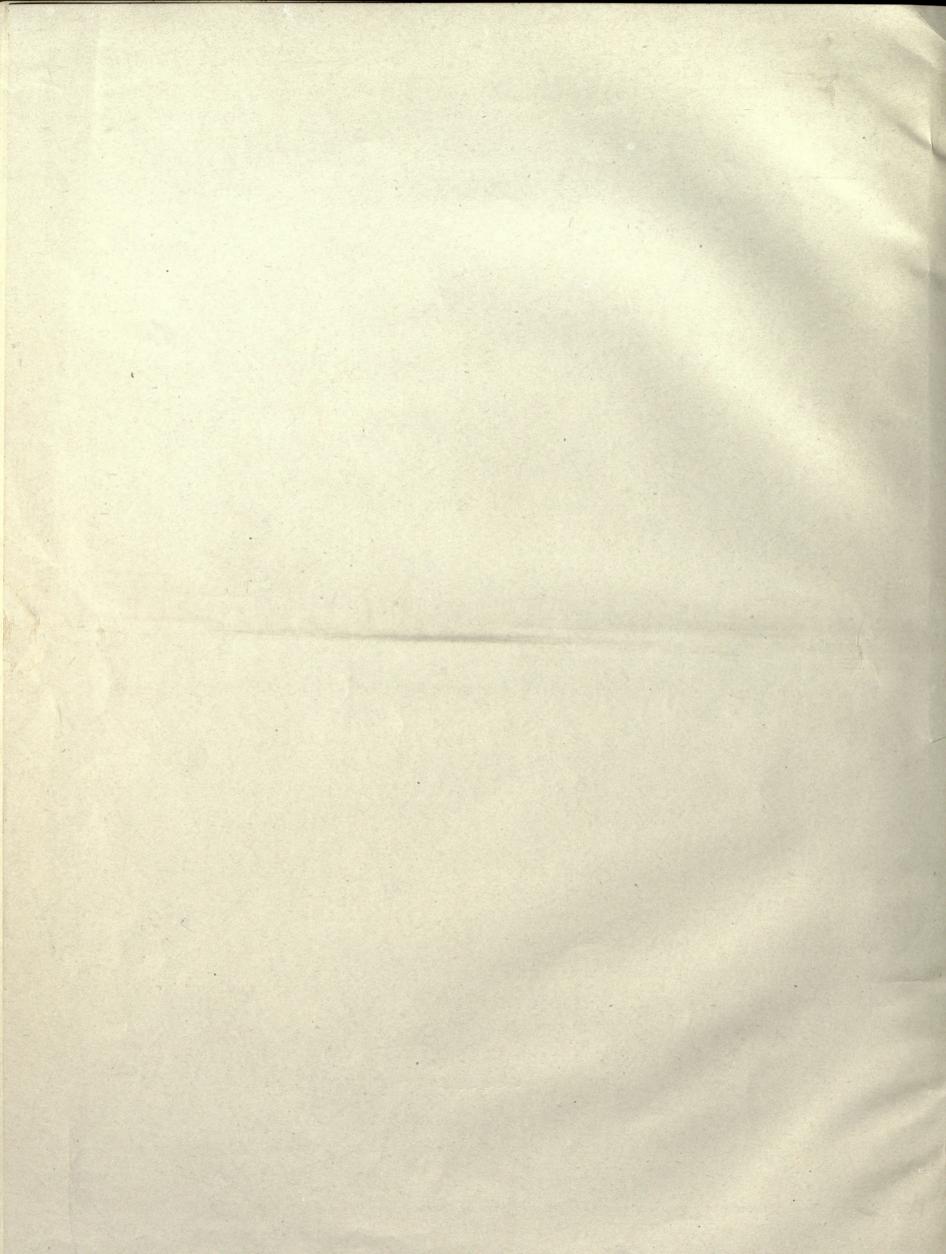
Furniture. Campbell & Berry, Emmett. Coblentz Lumber Company, Payette. J. A. Hammock, American Falls. H. J. Linke, Jerome. H. W. Titus, Emmett.

L. Zachara, Sandpoint. Miscellaneous. Coblentz Lumber Company, Payette.
Sommers Brothers Match Company, Sandpoint.
Standard Incubator Company, Boise.
Sash and Doors, Blinds and General Millwork. Adams-Pilgerrim Lumber Company, Twin Falls. Bisbee & Taylor, Coeur d'Alene. Capital Sash & Door Company, Boise. Coast Lumber Company, Boise Coblentz Lumber Company, Payette. Coeur d'Alene Sash & Door Company, Coeur

d'Alene. William Gramkow, Boise. Ilo Lumber Company, Ilo. Independent Lumber Company, Weiser. H. J. Linke, Jerome. M. & B. Carpenter Shop, Bonners Ferry.
Robert Price, Paris.
Rlgby Hardware & Lumber Company, Rigby.
Troy Lumber & Manufacturing Company, Troy.
Western Cablnet Works, American Falls.
A C. White Laclede A. C. White, Laclede. L. Zachara, Sandpoint.

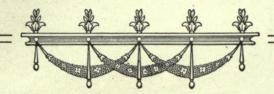








The Wood-Using Industries of Tennessee



By CLARK W. GOULD FOREST AGENT and HU MAXWELL EXPERT

Forest Service

United States Department of Agriculture

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Wood-Using Industries of Tennessee

By CLARK W. GOULD, Forest Agent, and HU MAXWELL, Expert, Forest Service, United States Department of Agriculture

The investigation upon which this report is based was undertaken by the Forest Service, United States Department of Agriculture, in the spring of 1911, the data collected covering a period of one year, from January 1 to December 31, 1911, inclusive. The work was done under the direction of H. S. Sackett, Chief, Office of Wood Utilization, Forest Service; and the statistics were compiled and the report written by Clark W. Gould, Forest Agent, and Hu Maxweli, Expert. Much assistance was also given in the collection of data by John T. Harris, Statistician in Forest Products.

PREFACE.

Tennessee is 432 miles long, 109 miles wide, and has a total area of 42,050 square miles, of which 300 miles are water surface. The streams within the state, or forming part of its boundary, afford 2,000 miles of navigation, but not during all the year. The surface of the state is mountainous in the east, hilly in much of the central portion, and fairly level in the west. The highest mountains are more than 6,000 feet above sea level, while the western border of the state has an elevation of only a few hundred. Nearly all conditions of surface exist: steep, stony, and precipitous mountains; hills of thin soil, fertile slopes, rich valleys. The rain fail is abundant in all parts; the summers generally are pleasant, the winters mild. Altitude alone produces much difference in climate. The high mountains receive abundance of snow, the low valleys little. Drainage from all of the state is toward the Gulf of Mexico, though some of the rivers flow far to reach their destination. Tennessee is 432 miles long, 109 miles wide, and

high mountains receive abundance of snow, the low valleys little. Drainage from all of the state is toward the Gulf of Mexico, though some of the rivers flow far to reach their destination.

Tennessee was originally one of the heavy forested regions of this country, and it yet has a large amount of timber. The best was cut when the farms were cleared, and the remnants are still being cut, and will continue for a long time to come to supply lumber to its own people and to the distant markets. In its primitive condition, there was little of Tennessee which was not heavily timbered. There were a few canebrakes along the rivers, but with that exception, the region was an unbroken expanse of timber from the Mississippi River to the summits of the eastern mountains. Some of the finest kinds and the largest trees of the Eastern United States were there. More than three hundred and fifty years ago De Soto, with his army that bad marched from Florida, cut his way through woods and reached the Mississippi River near Memphis. Nearly two centuries later a company of French adventurers felled a few trees and built cabins where Nashville now stands. Forty years later the real settlement of the region began along the fertile valleys in the northeastern part of the state, and the forest resources were soon recognized. It was a third of a century before Perry launched his fleet on Lake Erie and reported, "We have met the enemy and they are ours;" that Isaac Shelby constructed a fleet of canoes hewed from enormous yellow poplar trees, and launched them in the Holston River, manned by seven hundred and fifty Tennessee backwoodsmen, and captured the British powder magazines at the mouth of Chicamaugua Creek, and by that bold stroke destroyed the power of England's Indian allies to fall upon the rear of the Carolina settlements in the most perilous period of the Revolution.* Another remarkable fleet was launched in the same region a year later, and under John Donelson conveyed more than 200 settlers to the site of Nashville, a dist

*Without boats that remarkable feat would have been impossible, as the army could not have marched the long distance through the woods in time to make a successful attack. In three days Shelby's men rowed down stream three hundred miles, defeated 1,000 Indians, captured the powder, 150 horses, 100 cattle, destroyed 20,000 bushels of corn, and were upon the return, having destroyed their own canoes, which were no longer needed.

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sessed by the state, and, though it is not the greatsessed by the state, and, though it is not the greatest, it is of supreme importance. This report is based on statistics collected by the United States Forest Service in 1912, and undertakes to show the condition and scope of the wood-using industries. A year's business is shown; and, in presenting the figures in a series of tables, attempts are frequently reads to make along the discussion the civil flagure. figures in a series of tables, attempts are frequently made to make clear by discussion the significance of the data. It has not been a part of the plan to give a history of wood utilization in Tennessee. If allusion is occasionally made to isolated Instances in past years (as in the above paragraphs regarding the boats built in 1779), the purpose is solely to show that the use of wood in the region is not a new thing, but has a foundation resting on long periods of experience. The real lessons to be taught by studies such as this concern the future rather than the past; for if anything practical comes from such studies it must bear its fruit in years to come. That which manufacturers are now doing should serve as a guide—a starting place, as it were—for the future. They are the teachers, the experimenters, the pioneers whose successes and failures will inspire or warn those who shall follow the same calling in years to come. Important problems are being worked out, and others will demand solution in the future. We are now trying to master the immediate problems, and thereby throw light, if possible, upon questions which will come later. It is not possible to foretell all that wood utilization in the future will attempt and accomplish, but certain lines are indicated by present tendencies. A hundred years ago few considered it seriously; but now it is present in the thought and plans of all successful workers in wood. ers in wood.

Another matter which is now attracting more serious attention than ever before is the study of the best uses for each wood. The properties and qualities of woods are considered—strength, and qualities of woods are considered—strength, elasticity, hardness, color, odor, grain, figure, seasoning qualities. Much of this may be discovered by scientific methods, but some of it is learned only in the school of experience. The tables and discussions in a report like this are really a record of the experiences of men who are working on the problems. Investigation, backed by necessity, is bringing into use many species of wood not usually listed in reports of sawmili output. They are sometimes known as minor species. Every region has a few, and the workers in wood are experimenting with them and finding out what they are good ing with them and finding out what they are good for. Reliable information on the subject, when it is secured, is given in the reports prepared by the Forest Service. In many instances these minor species are meeting part of the demand and iessening the drain upon well-known woods.

The planting and growing of commercial woods

are subjects which do not properly fall within the scope of wood-using studies, and for that reason little space is given to them in this report. It is deemed sufficient to point out tendencies and facts which are now apparent and which must speedily affect the available supply on which wood-using industries depend.

industries depend.

Investigation similar to this in Tennessee have already been made by the Forest Service in a number of states, and the results have been published. The class of manufacturing done and the kinds of The class of manufacturing done and the kinds of woods used vary in different regions; but certain prominent and encouraging features stand out prominently in all of them. Wood is being saved, and cheap woods are taking the places of expensive. The Forest Service adheres to one plan in all of this work and attempts to reach every important user of wood. Lists are compiled, letters are written, and blanks to be filled are mailed to all. To those who fail to respond within a reasonable time a second request for information is sent. There are usually a considerable number of manufacturers in a state who fail to respond to both the first and second requests, and they are visited in person. The data secured by correspondvisited in person. The data secured by correspondence and by the personal interviews with manufacturers are supplemented by studies of various phases of the business in the region, and with this phases of the business in the region, and with this material in hand the report is compiled for publication. It shows the kinds of wood used, the industries which demand the different woods, the cost at the factories, what commodities are made of each and all of the woods, and various other matters. Some attention is paid to markets, though the compilations are not intended to be market reports. Special consideration is given to supply of raw material on which the various wood-using industries depend. The tables are made up to show how much of each species of wood is procured in the state which uses it, and what part comes from other states and countries. As much relative weight is given to the small manufacturer

comes from other states and countries. As much relative weight is given to the small manufacturer as to the large. In fact, some of the most interesting and valuable experiments in the uses of woods come from small shops.

The Bureau of Census compiles yearly reports of the sawmill output in all the states. Species are separately shown, except that in some instances several are grouped as one. The annual census report should not be confused with the special reports by the Forest Service. The former deals with sawed lumber and rough mill products; the latter takes rough lumber where the census report leaves it and follows it through other processes of manufacture until it reaches its final form in some finished product. Thus the two reports, while dealing with the same material in part or wholly, do not show the same results, and part or wholly, do not show the same results, and are not meant to do so. For example, the census report takes a maple log as raw material and car-

ries it through the sawmill, and leaves it as rough ries it through the sawmill, and leaves it as rough lumber. The Forest Service report begins with the rough lumber, carries it through planing machines, and leaves it in the form of flooring, which is a finished product, ready for use. Much lumber goes directly from the mili yard into use without any further manufacture. This report has nothing to do with lumber used in that way; and it is apparent that in states with large outputs of rough lumber the total cut is much above the total quantity further manufactured. For example: tity further manufactured. For example:

State	No. ft. rough lumber produced for year 1909	Mnfd. prod- ucts. No. of feet 1910-1911
Louisiana	860,712,000 3,551,918,000	409,633,800 *1,354,954,000
Mississippi Missouri North Carolina .	660,159,000	618,270,030 442,272,993 676,166,250
Tennessee		413,878,169

*Including large quantity which was simply planed.

States with little timber and large manufactures may work much more into finished products than their sawmill cut. What the state can not furnish in the way of rough lumber the factories draw from the outside. Illinois is such a state. Its lumber cut in 1909 was 170,181,000 feet; its factory output 1,781,536,120,000 feet, or more than ten times as much.

The manufacturers in Tennessee are favorably situated in regard to markets. Rajiroads are ample, and distances to the best markets are moderate. Some of the largest shippers figure that ten or more states, extending from Texas to Virginia, lie so convenient as to make them peculiarly suited to trade with Tennessee; and, of course, a much wider territory lies only a little further away.

The output of sawmilis in Tennessee according to the Federal census was:

894,968,000 feet in 1907 790,642,000 feet in 1908 1,223,849,000 feet in 1909 1,016,475,000 feet in 1910

must be. Some woods possess qualities fitting them for many purposes, though they have not yet been much used. The size of a tree is not a sure guide by which to judge its place as a commercial wood. Occasionally, species which are scarcely more than shrubs, as the mountain lauret or the nannyberry, are quite useful for certain purposes, while others though of good size, as the planer. while others though of good size, as the planer tree, are seldom reported in use for any purpose. tree, are seidom reported in use for any purpose. Manufacturers in Tennessee reported 46 woods in use. The number is disappointing, but its smallness is apparent rather than real. Doubtless twice that many are in use. The custom prevails in Tennessee as in many other parts of this country of giving a single name to many closely-related species. The hickories are an example. Half a dozen hickories grow in Tennessee and all are in use giving a single name to many closely-related spectes. The hickories are an example. Half a dozen hickories grow in Tennessee, and all are in use, yet the common name hickory is applied to all because it is not easy to distinguish one from another in the lumber yard or the shop, though the woodsmen generally know the species apart. The forests of Tennessee contain the following species of hickory: of hickory:

Pecan—Hicoria pecan.
Bitternut—Hicoria minima.
Nutmeg hickory—Hicoria myristicaeformis.
Water hickory—Hicoria aquatica.
Shagbark hickory—Hicoria ovata.
Shellbark—Hicoria lasiniosa.
Mockernut—Hicoria alba.
Pignut—Hicoria glabra.
Paleleaf—Hicoria villosa.

The list of oaks native to Tennessee is double that of the hickories. Two or more pines not menthat of the nickories. Two or inore pines not meationed in the reported species are doubtless in use. At least a score of minor species—that is, woods not usually considered in sawmili output—grow in Tennessee in amounts sufficient to give them value, and not one is listed in reports by manufacturers, though there can be little ques-tion that all are in use. They are either not reported at all, or they are grouped under other names. If all of them were duly considered they would not add greatly to the total quantity, but they would probably double the number of species reported.

Quantity used annually feet B. M. per o Average cost per 1,000 ft Total cost f. o b. factory \$1,569,836 882,349 1,097,094 1,182,170 691,683 740,668 618,617 388,364 665,689 156,798 194,346 76,525 118,515 101,297 48,827 53,149 36,713 37,627 Grown in nessee Tennessee per per cent cent Kinds of Wood Common name Botanical name percent 100 B. M. 61,877,787 54,545,245 51,137,820 50,156,500 50,027,428 32,485,976 28,760,747 \$ 25.37 16.18 21.45 23.57 13.83 22.80 21.51 20.23 83.01 43.16 89.79 72.14 62.07 27.86 37.93 18.53 52.52 100.00 64.57 51.39 100.00 21.43 48.07 2.64 16.92 6.37 30.79 81.47 47.48 78.57 84.21 51.93 97.36 83.08 93.63 69.21 1.58 1.46 1.41 .69 .66 .55 $16.27 \\ 22.07$ 48,850 10,959 10,327 9,980 18,350 7,305 5,711 13,136 8,250 35.84 10.61 14.26 26.99 13.45 10.90 25.26 16.50 16.50 24.74 17.47 12.50 22.11 18.49 14.94 76.67 18.92 97.90 73.53 26.70 79.00 76.15 81.08 2.10 26.47 73.30 21.00 21.00 23.85 100.00 15.45 72.22 87.06 99.11 100.00 50.00 36.71 425,000 336,000 291,308 250,000 237,000 211,056 183,000 50.00 63.29 100.00 100.00 100.00 100.00 100.00 170,000 125,000 115,000 10.00 15.19 1,250 1,747100.00 100.00 100.00

100.00

SUMMARY OF KINDS OF WOOD USED IN TENNESSEE. Table 1.

Commercial Woods of Tennessee.

Commercial Woods of Tennessee.

The state's vertical range of more than 6,000 feet from the flood plains of the Mississippi River in the west to the highest mountains of the east is responsible for the extraordinary number of tree species in Tennessee. Those of the swamps and lowlands, such as the cypress, tupelo, and evergreen magnolia, are found in the flat regions of the west. The oaks, maples, beech, birches, and some of the pines grow in the elevated valleys and among the hills in the central and eastern regions; and white pine, table mountain pine, the hemlocks, several oaks, and other hardwoods are found among the mountains. Some, as the hickories and yellow

several oaks, and other hardwoods are found among the mountains. Some, as the hickories and yellow poplar, grow in practically all parts of the state.

The total number of commercial woods indiginous to the region can not be definitely stated for the reason that there is no exact definition or agreement as to what a commercial wood is. To fall in that class, it must be in use, but there may be difference of opinion as to how general that use

A report issued in 1910 by the Tennessee State Geological Survey and compiled by R. Clifford Hali of the United States Forest Service, listed tree species native to Tennessee as follows:

\$20.73

 $\frac{323}{1,600}$

\$8,580,440

 $^{100.00}_{100.00}$

100.00

100.00

36.39

Pines 6	
Spruces 2	
Hemlocks 2	
Fir 1	
Cypress 2	
Cedars 2	
Walnuts 2	
Hickories 10	
Willows 4	
Cottonwoods 3	
Birches 3	
Oaks 19	
Hackberries 4	
Ashes 6	
Magnolias 5	
Maples 10	
All others 63	
PN- 1 ·	
Total species	

Tennessee is thus shown to have nearly one-third of all the species of trees in the United States. It would be difficult to find a similar area in this country possessing an equal number, though the total quantity of timber in some other regions of equal size is much greater.

The Pines.

Though six pines are native to Tennessee, only four were reported in use in the States, and one of these, longleaf pine, came wholly from without. Table I lists the pines in use and shows the annual amounts demanded and how much grew in the state and how much came from elsewhere. The detailed statistics of woods in use, which are shown in that table are not reported by the detailed statistics. In that table, are not repeated in this discussion, but certain facts or conclusions not included in the table are presented here.

SHORTLEAF PINE-This grows in Central and Western Tennessee, but is rare or totally wanting in the mountains of the east. In the region where it grows it is not equally dispersed, but is found in some localities and is wanting in others. No large some localities and is wanting in others. No large areas in Tennessee are heavily timbered with this species, as some parts of Missouri, Arkansas, Louisspecies, as some parts of Missouri, Arkansas, Louisiana, and Mississippi are, or were once. It reproduces vigorously, however, and where other timbers have been removed and space is given it the shortleaf pine spreads rapidly and holds its place well. No iobioly pine was reported by manufacturers, but it grows in the southern part of the state, and there is little doubt that a considerable amount is in use. It has been perhaps reported as longleaf or shortleaf. The wood is more like the latter than the former.

WHITE PINE—This valuable timber is found in

WHITE PINE—This valuable timber is found in the mountains of Eastern Tennessee and in rather targe amounts. In 1910 the sawmills of that region cut more than 39,000,000 feet of it. The white pine is hardly ever mistaken for any other. It is an imposing forest tree, with an individuality so marked that it may be recognized by its form alone at distances so great that the usual hotonical charat distances so great that the usual botanical characteristics cannot be distinguished. Nor is any lumthe distinguished. Nor is any lumberman disposed to call it by any name but its own. It never sails under false colors as some other woods occasionally do, though other woods frequently take the white pine's name and thus gain easy access to markets which would be hard to break into winder their own pages. This white pine's easy access to markets which would be hard to break into under their own names. This white pine is the same species as that which so long supplied markets in New England, Pennsylvania and the Lake States. It is officially called white pine, and no other goes by that name. In Tennessee the white pine approaches the Southern limit of its range. It is a Northern tree, but it has followed the cool mountain ranges southward from New York, across Pennsylvania, West Virginia and Virginia, to the highlands of Tennessee and Western North Carolina. As is the case with most species as they approach the limits of their range, the white pine of the Southern mountains is not quite equal to the best of New England and the Lake States. The wood is generally considered a little harder and the knots darker in color in the South. Neither does it grow as large as in the North, nor does it reproduce as vigorously. In spite of this, however, reproduce as vigorously. In spite of this, however, it is a valuable timber, though the manufacturers in Tennessee seem to have used less than six per cent of the state's sawmill cut of this species. per cent of the state's sawmill cut of this species. The records do not show what became of the balance, though it is likely that most of it went to manufacturers in other states. The average cost of that bought in Tennessee was low, \$16.27. The mili yard value in 1909, according to the census report, was \$18.21. Over 40 per cent of the white pine reported by manufacturers in Tennessee was hought by boughters who use low grades. That bought by boxmakers who use low grades. That helps to explain why the price of this wood at the factory was lower than the average value at the sawmill—Tennesseans do not use the best grades of their white pine.

TABLE MOUNTAIN PINE-This scarce and little known tree reaches its best development in the mountains of Eastern Tennessee, though its range extends northward in certain restricted localities, through West Virginia, Maryland, and Pennsylvania. So restricted was its range once believed to be that its discoverer, the younger Michaux, a to be that its discoverer, the younger Michaux, a French botanist, wrote more than a hundred years ago that he believed the only place where this tree existed was on a certain flat-topped mountain in North Carolina; hence he called it table-mountain pine. It is now known that he greatly underestimated the extent of its range. On some of the mountains of Eastern Tennessee it is the most abundant pine. The amount put to use in Tennessee is moderate, but it is interesting because no other state, as far as shown by reports to the Forest Service, has made any use of the wood except that a little has been burned for charcoal in cept that a little has been burned for charcoal in Pennsylvania.

PITCH PINE (PINUS RIGIDA)—No manufacturer in the state reported the use of this pine, though there is no doubt that many have been using it for a number of purposes, but have listed it under some other name, or failed to include it. It is generally called black pine in Eastern Tennessee, particularly in the regions of white pine, the purpose being to distinguish between the two species

by calling one white and the other black. It is fairly abundant in an area of some thousands of square miles in the eastern part of the state. Most of the trees are small and short, but where conditions are favorable saw-logs are cut. The lumber is used more in the rough than in the finished condition, but some goes through wood-working machines and is made into frames and flooring. Box and vehicle makers use some of it. The wood is of rather low grade compared with most other pines. It is 64 per cent as strong and 39 per cent as stiff as longleaf and about three-fourths as heavy. Few other trees withstand forest fires as well as pitch pine, and it can maintain itself on very poor land. The stand is generally thin.

SCRUB PINE. (PINUS VIRGINIANA)—This is another tree not reported by any manufacturer in Tennessee, though some of it is used. It is one of the poorest of the pines, small in size, unpromising in form, with characterless wood. It makes good boxes and crates.

The Oaks.

Users of wood usually separate oaks into two classes, white and red. That classification holds only in a general way, for the rule is subject to many exceptions. The color of the wood determines the class, as understood by actual users. Sometimes the classification includes the chestuut oaks, thus making three classes instead of two. This is not a botanical division, and takes little account of leaves and acorus, but is intended for convenience only among users of wood. In Tennessee the manufacturers reported five oaks by name, and perhaps used a dozen others which they included under one or another of the five names.

THE WHITE OAKS—Speaking in a general way, the oaks used in Tennessee under the name of white oak are post oak (Quercus minor), bur oak (Quercus macrocarpa), overcup oak (Quercus lyrata), and white oak (Quercus alba). The last named is the true white oak, the type of the group, the most abundant, and the best of all when all things are considered.

THE RED OAKS—There are more species in the red oak group as classified by users of the wood in Tennessee. The type of the group, and therefore the genuine red oak, if one of the group can be more genuine than another, is the Quercus rubra, which is the only tree called red oak in the Forest Service's official check list. It is best developed in regions north of Tennessee, but extends into that state where much good timber is cut. Table 1 credits this species with 50 million feet, as reported by Tennessee manufacturers; but this is partly made up by counting a number of other oaks. Those so included are probably the following: Texan oak (Quercus texana), yellow oak (Quercus velutina), Spanish oak (Quercus digitata), pin oak (Quercus palustris), blackjack oak (Quercus marilandica), water oak (Quercus nigra), shingle oak (Quercus imbricaria), and willow oak (Quercus phelios).

THE CHESTNUT OAKS—Only half a million feet was reported under this name and it may all have been the true chestnut oak (Quercus prinus), but three other species belonging to this group grow in Tennessee and some of each may be included. They are: Chinquapin oak (Quercus acuminata) cow oak (Quercus michauxii) and swamp white oak (Quercus platanoides). These oaks have leaves resembling those of the chestnut, hence the name; but the oaks of the other groups, white and red are so called from the color of the wood and not from the shape of the leaves.

The Hemiocks.

A little more than half a million feet of hemlock was reported in the state, and most of that came from other states. It is not, therefore, of a great deal of importance in Tennessee from the manufacturer's standpoint. In 1910 not a single mill reported hemlock in its output in the state. Nevertheless, some of it was cut. Two species grow among the mountains of Eastern Tennessee. The Northern hemlock follows the mountains that far southward and is found along the water courses and on steep, damp slopes on the upper tributaries of the Tennessee River. The other species, the Carolina hemlock, is scarce.

The Cedars.

Though manufacturers report the use of two species of cedar in Tennessee, the correctness of the reports may be questioned with regard to Northern white cedar (Thuja occidentalis), yet it is not impossible that some of it was cut on the high mountains of Eastern Tennessee and made into penholders, as stated. The species there approaches the extreme Southern limit of its range and grows, on high and rugged mountains, the trunks being small, crooked, and difficult to procure. More likely the white cedar listed was the white sapwood of red cedar.

RED CEDAR—Tennessee is the home of this fine wood. The state has produced great quantities in past years, and it is generally considered that the species is more highly developed there than anywhere else. It has a wide range, and, if closely related species are included, it is found in all

regions of the United States. Its form is more like a park tree than an uncared-for inhabitant of the forest. Its tall, sharp, conical crown looks as if the gardener's pruning shears might lately have been at work upon it. The trunk is occasionally fluted and not of best form, but the top is almost faultless, unless the tree has met with some accident or is very old. It grows in every part of Tennessee, but is now most conspicuous on thin land and dry ridges. That is because it has been cut from the best land. It is so tenacious of life, and ekes out a living under circumstances so adverse, that in many parts of the state it is nearly the only tree to be seen on rocky bluffs, gravelly flats, and sterile ridges. Other species have starved out and have given up the ground to the red cedar. It has entered into possession and is making good. It is one of the most valuable forest trees of Tennessee. In 1910 the sawmill cut was 31,000,000 feet, and that did not represent haif of the output. Millions of posts and poles were cut and were shipped to many parts of the country. The drain has been enormous, and it looks as if the end must be near; but in spite of appearances the red cedars keep on coming, new thickets spread into cut-over land and untoid thousands of young trees take the places of those cut for the markets.

It is a tree of slow growth, but it keeps at lt. Specimens as large as those in the original forests need not be looked for again, for centuries would be needed to produce them. Early settlers found it the most available farm timber in many localities, and cedar rails fenced the farms, cedar logs built the barns, cabius and mills, and in many cases cedar fuel warmed the houses, and cedar furniture fitted them for occupation. It became the greatest pencil wood because it is soft, light, odorous and handsome. Pencil manufacturers in this country and in Europe have ransacked the state for suitable timbers and have taken most that is fit. The small trees escape that search because they are too knotty for pencils and do not contain enough red heartwood, nor are they of the desired whittling qualities.

Cottonwood.

Two woods are reported in Tennessee belonging in the cottonwood group: the common cottonwood and the large-toothed aspen. Only 100,000 feet of the latter was used and 28,000,000 of the former.

Some peculiarities are found in the reports of the uses of cottonwood in Tennessee. The total quantity is shown above. The total saw mill cut, including the veneer output in the state, according to the latest available statistics, is less than what the manufacturers use of state-grown wood. The discrepancy may be accounted for on the assumption that much of the cottonwood going to the factories was in the log, and was not counted in the census returns of mill output. The country's cut of cottonwood is declining. In 1899 it was 415,000,000 feet, and fell off 36 per cent by 1907, and declined 45,000,000 feet further by 1910. The mill output for Tennessee in 1909 was over 18,000,000 feet, and in 1910 had falien below 9,000,000. The conclusion is that this wood is approaching practical exhaustion.

The Ashes.

Four or more species are used in Tennessee, but only two are reported. The wood in all is much alike and the user frequently cannot tell the exact species he has in hand, so he gives it the name of the species he knows best, usually the white, but if not that, the black. The species makes little difference to the man who manufactures some commodity, so long as the wood is satisfactory, and most of the ashes give satisfaction. The two species reported are: White ash (Fraxinus americana), and black (Fraxinus nigra); while the two most plentifui of the unreported species are red ash (Fraxinus pennsylvanicum), and green ash (Fraxinus lanceolata). It may be noted that these woods are designated by colors—white, black, red and green.

The Elms.

White elm and slippery elm were reported in small quantities. The former is the most common elm in this country and is native in nearly all the states east of the Rocky Mountains. The slippery elm is not so common, but where it exists it is best known on account of its mucilaginous inner bark which was formerly a household remedy for most external injuries. The bark is soid in nearly all drug stores. The wood of this tree is rather deeper in color than that of the white elm, and for that reason is known in some localities as red elm. Two other trees of the elm genus are common in Tennessee and are in general use, but chiefly under the name of white elm, or some other of the multitude of names with which most of the elms are burdened in the regions where they are in commercial use. The cork elm (Ulmus racemosa) is so named because of thickenings, ridges and excressences of the bark, resembling cork. The wood is of good quality and is suitable for many purposes, but like all the other elms it has no grain or figure of a kind to give it attractive appearance. Wing elm (Ulmus alata) also owes its name to peculiarities of its bark. Flat keels on the opposite sides of small twigs resemble wings.

They are about as thick as heavy paper, and range from one-fourth to one inch in width, measured from the center of the twig outward. They sometimes occur on larger limbs and on the trunks of small trees. When the branches are bare of leaves, the peculiar appearance of winged branches and trunks seldom fails to arrest attention. Rock elm is a name often applied to trees of this genus. There is no such species. It is simply a name which in different regions is applied to whatever elm happens to grow of best quality there. Sometimes it means the white elm, sometimes slippery elm, and again some one of the others. "Rock oak" is a name applied in much the same way to the oaks, and "rosemary" to some of the Southern yellow pines. The custom of the community must be understood before one can determine what trees these names are meant to designate.

The planertree (Planera aquatica) resembles the elms so closely that distinctions are often not made by users of the wood. None was reported in Tennessee, though it is well known that lumbermen cut the planertree when they come to it in course of their logging operations, and the saw mills convert the logs into lumber. In most places it goes into the eim lumber piles and loses its correct name.

The Gums

Three woods in Tennessee belong to this group and the common name "gum" is frequently applied to each and ail, but at other times they are considered separately. They have some characters in common, but they have differences also.

RED GUM—In 1910 Tennessee sawmills cut 62,000,000 feet of this wood, which was about onetenth of the cut in the United States. The largest output was in Arkansas, next in Mississippi, Missouri was third, and Tennessee stood fourth. A large amount was made into veneer in addition to the sawmill product of lumber. In Tennessee the veneer output of red gum is about one-fourth of the lumber, or 15,000,000 feet. Practically all of the veneer is rotary cut and the quantity given is based on log measurement. Much of the veneer is used by manufacturers of boxes and crates, but a large amount is demanded by furniture makers. Some of it is finished to imitate more costly woods. The seasoning problem is a serious one with red gum intended for fine work. The wood contains an oil which makes gluing difficult, unless the wood is thoroughly dried. It has been mastered by many manufacturers who now produce excellent furniture and finish made wholly or partly of the wood. Its beauty is widely known. In fact, its beauty is known by many who do not know the name of the wood they admire, but who suppose it is black wal nut, white oak, sweet birch, cherry or Circassiau walnut. Men well acquainted with the lumber industry predict that red gum has not yet reached the position which it is destined to attain in this and other countries.

TUPELO—This wood is not very important in Tennessee, but some of it is cut there, usually associated with cypress in swamps and near water courses. It is often known commercially as bay poplar—a term which it is claimed was originally employed to convey the impression that it was yellow poplar (Liriodendron tulipifera). The "bay" referred to the fact that the trees grew close to water, particularly the southern part of Chesapeake Bay. The bark of the tupelo bears rather close resemblance of that of yellow poplar, and the wood of certain trees looks much like the yellow poplar's wood. Botanlcally, the trees are quite different.

BLACK GUM—Manufacturers in Tennessee used more than a million feet of this wood last year, all of which was grown in the state. The Bureau of the Census, in returns for 1910, included black gum with tupelo and separate figures were not given. It grows in all parts of Tennessee, not ir thick stands like some other species, but here and there through the forests. It is one of the most unwedgeable woods of this country. The fibers sc cross and interlock that no line of cleavage can be found. For that reason, it has been much used for mauls. They can be beaten into splinters before they will split. The black gum mauls of early times pounded out many millions of fence rails for farm fences. In very cold weather, however, such mauls could not be used, for whe frozen they burst under the impact of heavy blows.

Birch.

Several species of birch contribute to the lumber supply of this country, and when the wood reaches the manufacturer who makes furniture, finish and other commodities of it, it is not always possible to determine what species is used. Any one or all of three species may be used in Tennessee. Forty-five milis cut birch in this state in 1910. Sweet birch (Betula ienta) grows in the mountains, and with it occurs the yellow birch (Betula iutea). Both species contribute to the commercial birch lumber of the markets. It can not be stated what proportion of each was reported by manufacturers in Tennessee who used 1,363,000 feet. Three-fourths of it came from outside the state. That brought from the Lake States was chiefly yellow birch, while Pennsylvania and West Virginia

contributed sweet birch, and most of what was cut in Tennessee was sweet birch. The most abundant birch in the state is neither of these, but the river birch (Betula nigra). It is not much sought after because it lacks grain and figure to make it attractive. Moderate success has attended efforts to stain it in imitation of other woods. The tree grows along river banks and is easily recognized by the ragged appearance of its trunk, covered with hanging rolls and tatters of light brown bark, which the tree seems to be always in the act of shedding.

The Hackberries.

Two species of hackberry occur in Tennessee both passing by that name. They are much alike and while botanists recognize both, the lumberman does not. In fact, as often as not, hackberry is classed as ash at the mill yards and is sold as such. Hackberry (Celtis occidentalis) and sugarberry (Celtis mississippiensis) may grow side by slde, but in most regions where both occur the former is most abundant.

The Maples.

Two species of maple are reported by manufacturers in Tennessee, aggregating about three and a quarter million feet. In 1910 there were 229 mills in the state cutting maple, but In small amounts for the total product was little more than the tota' used by manufacturers. In all parts of the maple region east of the Rocky Mountains it is the custom of users to recognize two kinds of maple gen-erally termed "hard" and "soft." These names do not conform very closely to species, for half a dozen are called by the former name and occasionally more than one by the latter, though usually soft maple means the silver maple (Acer saccharinum). Hard maple, or sugar maple, (Acer saccharinum) is the most abundant of the maples in Tennessee. It is the tree which produces sugar in early spring. Others which are found in the state, and which are commonly classed as hard maple, are mountain maple (Acer spicatum) a small tree called low maple in Tennessee because it is apt to grow near maple in Tennessee because it is apt to grow near mountain water courses; the striped maple (Acer pennsylvanicum); black maple (Acer saccharunlgrum); red maple (Acer rubrum); and Drymmond maple (Acer drummondii) in Southwestern Tennessee. This tree is scarce and is generally small. To these should be added the box elder (Acer negundo) which in spite of its name belongs with the maples. It is not an important timber tree in the state, nor anywhere else, but is sometimes used. The black maple may be recognized by the dark color of the bark which characteristic is more noticeable in winter than in summer, but the bark noticeable in winter than in summer, but the bark alone is not an unerring criterion in determining the species. The red maple is so called from the bright color of its winged seeds which make a fine display in early spring. In Tennessee this tree occupies swamps and in the western part of the state closely resembles the Drummond maple.

The Walnuts.

Black walnut and butternut are both reported by Tennessee manufacturers, the former in larger quantity than the latter, though most of the black walnut came from outside the state, while all of the butternut was home grown. Butternut is known also as white walnut a prome which in the time. also as white walnut, a name which in early times was often applied to hickory. The heartwood of butternut is lighter in color than the heart of black walnut, but otherwise the woods hear close resemblance. The black walnut is generally regarded as more handsome. Neither of them should be counted on for a large part of the future lumber supply. The butternut never contributed much. hut twenty-five years ago and longer ago than that black walnut was in great demand for furniture. black walnut was in great usmand is.

It is not now in fashion in this country, and, besides, it has become scarce and high priced. The best wood comes from large trees because they have comparatively more heart than small trees and it is blacker and of finer grain. Black walnut has long been, and still is, the choice wood for gun stocks and pistol grips. Some prefer the softer toned wood from the planted walnut trees of Eu-Tennessee produces good walnut, but the best was long ago cut and not much young growth is coming on. Trees in the open may be worth more for their annual crops of nuts than for lum-In some of the northern states the butternut pays better if left to bear nuts when other forest trees are cut from around lt. It might be more profitable to let the Tennessee butternut stand. The average value of the wood at the factories was only

Other Hardwoods.

A number of other hardwoods went to the factories in Tennessee, some in a small way, others in large amounts. The particular commodities made wholly or in part from each are shown in the various industry tables in this report; but the importance of the several species as a resource in Tennessee is not always apparent in these tables. A wood must be fairly abundant and must be fit for something in particular to make it a commercial resource. The extent of its present use is not a correct measure of its value. Some species are not now in much demand, but they

possess properties which will give them a higher place in the future. On the other hand, some are passing down the scale from their former high position to minor places because of increasing scarcity. Instances of that kind should be carefully considered, and if an increase of supply seems practicable it ought to be encouraged. The extirpation of valuable species is not necessary in this country. The people of Massachusetts cut all their original white pine forests long ago, but they are growing young forests to take the place of the old. Other states can with profit follow the example of Massachusetts, each devoting its care to the forest trees which pay best.

YELLOW POPLAR—This is one of the finest trees of the American forest. It is generally considered the largest hardwood of this country and none exceed it in well-balanced proportion of trunk. The fertile valleys and slopes of Tennessee have furnished some of the largest poplars on record. Reference has already been made to the five-foot poplar trunks, felled in 17.79 on the Holston River by Isaac Shelby, to be hewed into canoes to carry his army of 750 men down the river to attack the Indians who were assembling near Chattanooga to march against the Carolina frontiers. This tree has been the greatest canoe wood of America, next to the paper birch. In some regions the name canoe wood has been given it. A list of uses for which it has been found suitable would include almost every commodity of wood from the earliest settlement of this country to the present time. Only where great strength, hardness and toughness are essential is it unfitted.

The maximum annual cut of yellow poplar in this country seems to have been passed, and the future supply must come from a rather small region which Tennessee, Kentucky and West Virginia are the center. More than half of the country's west Virginia, next from Tennessee, and third from Kentucky. Estimates have been made that the remaining yellow poplar on the stump in this country does not much exceed 6,000,000,000 feet, which will be exhausted in nine or ten years at the present rate of cutting. Definite conclusions and great weight should not be given estimates of this While they are based on the best obtainable data, no one knows how much poplar remains in the forests, and most of the general estimates of this kind have proved too low when the time comes to check them by exact information. It is certain that most of this wood in the original forests of this country has been cut, and that no large amount remains. The yearly output must for that reason remains. The yearly output must, for that reason, soon decline with no hope that it can ever again high figures; but some yellow poplar reach the markets for a long time to come. It requires many years to grow a good sized tree as poplars are usually rated, though it is a rather fast grower. The long time required will stand in the way of extensive planting. People who set apart wood-lots will choose loblolly pine or some other fast grower. A further fact against planting the poplar is that it wants the richest soil. It had the richest slopes and coves when it had choice of the whole country. Farmers of the future will not give up their best land to any forest tree, but will plant food and provender crops there and put their wood lots on poor or rocky corners. That will give the yellow poplar no chance in competition with other less choice species in the forests of the future. If it is compelled to exist on thin soil it degenerates so quickly that it becomes a "white poplar." That is the name usually applied to a runt yellow poplar-a poor soll specimen. It has little or no heart-wood, is hard and tough, and being nearly all sap. which is white, a quite common belief has devel-oped that it is not the same species as yellow poplar. It is the same, however, for there is only one species of this tree in America, and one in China; and, in fact, both might be considered as one, though separated by ten thousand miles.

Though not exactly on the subject of wood uses in Tennessee, the evidence of geology is interesting, because it warrants the belief that the yellow poplar was growing in the Appalachian region covering Eastern Tennessee in the cretaceous age—a time so remote that no geologist will venture to measure it in years. The yellow poplar's peculiar notched leaf is among the fossils in the strata beyond the Mississippi, which rocks, it is believed, were laid down as sands in the sea which then covered the Mississippi Valley; and the sands, and doubtless the poplar leaves also, were carried from the Appalachian highlands to that sea by rivers which then flowed westward, as they still do. If that view is correct, the yellow poplar is one of the very oldest broad-leaf species on earth, having come down to us through almost measureless ages. The character of the rocks in which the fossil leaves are embedded indicates that the tree then grew in soil of great fertility, as it does today, and leads to the conclusion that the mountain regions of Eastern Tennessee had deep, rich soil at a time when the Gulf of Mexico extended at least as far north as Nebraska. A tree so ancient, so splendid and so vigorous does not deserve to perish by the hand of man in the very region where it has held its ground during millions of years. There are

sentimental as well as sound business reasons why steps ought to be taken to perpetuate the yellow poplar in protected woodlots, since it cannot much longer hold its place as a wild tree of the forests.

DOGWOOD—In 1910 Tennessee led in saw mill output of dogwood. That for the whole country was 1,469,000 feet. This quantity is so small as to place dogwood among the minor species; yet in the saw mill reports dogwood is not given justice. The total is certainly too small. Tennessee alone last year manufactured more dogwood into shuttle blocks than the whole reported output of saw mills in the United States. The explanation is that most of the dogwood does not go through saw mills, but is shipped in rough blank form to the shuttle factories. The trees are small and logs one foot in diameter are unusual, and a length of a few feet is the average. Two species grow in Tennessee, flowering dogwood (Cornus florida) which is most common, and blue dogwood (Cornus alternifolia). It is doubtful if the latter is a commercial commodity in Tennessee.

SYCAMORE—Tennessee is the fourth state in the production of sycamore, it being exceeded by Indiana, Missouri and Arkansas. In 1910 the saw mill cut in Tennessee was 5,000,000 feet and the manufacturers reported less than three-quarters of a million feet. It is apparent that most of the state's output of this wood is taken by manufacturers not operating in Tennessee. Twenty-six states contribute to the saw mill supply, and, contrary to general belief, the total yearly output has not decreased in the past ten years, though it was not the same from year to year. In 1909 the cut of sycamore in the United States was twice as great as in 1899. For the most part it is a waste land tree, and it should be encouraged. It takes possession of gravel bars along rivers, steep banks of ponds and streams and land subject to frequent overflow. The best lumber comes from trees of moderate size, for the very large are usually hollow. Sometimes trunks of great dimensions are mere shells and of no value, though formerly they were made into gums for the barn and granary, and wheat and corn were stored in them in place of barrels. There is only one species of sycamore in the eastern part of the United States, but California and Arizona each has one.

PERSIMMON—The entire reported saw mill output of persimmon in the United States does not exceed one million feet, yet manufacturers in Tennessee alone used 680,000 feet. Many other states produce it, and the total cut must amount to several million feet. The same custom prevails with persimmon as with dogwood, that much is sold in the log or bolt, and the saw mills never handle it.

The wood goes to the shuttle factories or Is made Into golf heads. Statistics are too meager to determine whether the cut of this wood is increasing or diminishing; but complaint is made by shuttle people that they frequently find the wood hard to procure. They use the sapwood only, which is white, and in appearance somewhat resembles hickory. The persimmon tree is a good fighter in the contest for ground, and it spreads rapidly into open spaces. The seeds are widely dispersed, and a vigorous growth springs up from stoloniferous roots. It is not probable, therefore, that this valuable tree will disappear from Tennessee in the near future, but whether it will produce enough wood to meet demand is doubtful.

BLACK CHERRY—In the annual report of saw mill output by the Bureau of Census, black cherry is classed among the minor species, not because it is of small value, but that it is scarce. The whole reported cut in 1910 was a little over 18,000,000 feet, and Tennessee's part of it is not stated. Manufacturers in the state used less than half a million feet. The species grows slowly, and it is doubtful if much of it will ever be planted for use. A tolerably good imitation of this wood can be produced by staining red gum and tupelo; but the real luster, the characteristic tone, of cherry is due to the bright lining of the wood cells, and this has not yet been successfully imitated by staining any other wood.

BLACK WILLOW—This is one of the most rapid growing of Tennessee's native trees, and it is worth considering in plans of future forestry and conservation. The wood is plain and can never have a wide range of uses, but it is suitable for boxes and is worth growing for that purpose alone. A mud flat, too wet for cultivation, has been known to grow more than two thousand feet of lumber yearly per acre, for forty years. That is doubtless above the average growth of willow, but it shows the possibilities. Willow plants itself and cares for ltself when ground is available. Tennessee has much wet land, too much subject to overflow to be profitable for field crops, and in such places willow ought to be encouraged. It protects the land against washing, collects sediment, gradually builds the surface higher and ultimately may convert it into dry land for farming. The wet situation in which willow grows affords protection against fire, and gives the young trees an advantage which is denied to many species on dry land. The willow produces a fence post or a small saw-log in a few years; and old trees two or more feet in diameter

Grown

Grown

are not unusual, and some attain three or four times that size.

sassafras in the future will be for oil and not lumber. The oil is manufactured from the wood and bark, chiefly from the roots, and is used to perfume soap. It has long been so used, but of late years synthetic oils, of which one of the ingredients is camphor, have somewhat lessened the demand for sassafras oil. The whoie reported output of sassafras lumber in 1909, according to census returns, was only 24,000 feet, and yet Tennessee alone last year used fourteen times that much in its factories. If the wood were more abundant, it would be a valuable commodity, for it is of good color, attractive grain, and is hard, strong and durable. Its tendency to season without checking was recognized generations ago by early settiers who for that reason selected it for dugout canoes on the Mississippi River and elsewhere. It is of historical interest that sassafras was once (for a brief period) the most valuable wood in the United brief period) the most valuable wood in the United States, due to a belief that it was a cure-all for diseases. Sassafras is in no danger of becoming extinct. It spreads so rapidly into open ground that in some localities it becomes a nuisance; but large trees, suitable for lumber, are apt to become scarcer than they now are.

BUCKEYE—This wood is of considerable importance in Tennessee and manufacturers last year used nearly 3,000,000 feet of it, which was almost one-fourth of the entire cut of the wood in the United States. Three species of buckeye are cut in Tennessee, Ohlo buckeye (Aesculus glabra), yellow buckeye (Aesculus octandra), and purple buckeye (Aesculus octandra hybrida). The yellow buckeye is most abundant and of largest size. The box-makers, trunkmakers and coffin manufacturers used nearly all the buckeye reported in Tennessee, and practically all of it was state grown. It is especially valued by manufacturers of candies and chocolates. The seasoned wood is white, clean and odorless, and when made into boxes imports no taint to articles of food. When green it is one of the softest woods, but it hardens and toughen as it becomes dry. It is among the lightest of the broad leaf trees, lighter even than basswood, which in some respects it closely resembles.

MAHOGANY—This is a foreign wood and comes

MAHOGANY—This is a foreign wood and comes from Mexico, the West Indies and other parts of tropical America. Other woods commercially known as mahogany are brought from Africa. Next to osage orange, mahogany is the most costly wood reported by manufacturers in Tennessee. Sixty thousand of the 183,000 feet reported was the African species (Khaya senegalensis).

CHESTNUT-Tennessee ranked fifth among the chestnut producing states in 1909, with a cut of 58,000,000 feet. That was four times as much as 58,000,000 feet. That was four times as much as its factories worked into commodities, and it shows that the state is sending most of its chestnut beyond its borders. In fact, nearly two-thirds of what was used in the state was imported. Home-grown chestnut was sold out of the state, while Tennessee factories were sending away from home for what they needed. Chestnut is perhaps the most important wood of this country for coffins and case. factories were sending away from home for what they needed. Chestnut is perhaps the most important wood of this country for coffins and caskets, and it goes to large cities where these commodities are manufactured on an extensive scale. The owners of chestnut timber are concerned lest a blight affecting the species in some of the Northeastern States shall spread into other regions.

Northeastern States shall spread into other regions. OSAGE ORANGE—Only 8,000 feet of the wood was used last year in Tennessee, but it cost more per thousand than any other. It came wholly from Texas and Oklahoma, which is its natural range. It has been planted for hedges and ornament in nearly every state, and is known by many names. In Tennessee some call it osage apple tree, and others yellow wood. The last is the proper name of another Tennessee wood (Cledrastis lutea), which is not closely related to the osage orange. Manufacturers of wagons use all the osage reported. It is a very hard wood and shrinks and swells little under climatic changes. The very high swells little under climatic changes. The very high price is accounted for by the fact that it was already manufactured into felloes when received at the wagon factories.

BASSWOOD-Tennessee finished 8,500,000 feet BASSWOOD—Tennessee finished 8,500.000 feet of basswood in 1910. That was three million feet under the reported output of the preceding year. There has been a general decline during the past five years in the cut of this wood in the United States. In Tennessee it is occasionally called linn and black limetree. Two or more species are cut in the state, but they are considered one by most lumbermen. The white basswood (Tillia heterophylia) is often known in Tennessee as largeleaved limetree, or linn.

leaved limetree, or linn.

CUCUMBER—This wood resembles basswood, but if leaves and fruit are observed, it is not likely but if leaves and fruit are observed, it is not likely to be mistaken for basswood or any other tree. It is scarce and not very important. In early times it was much sought for by pioneers who hewed dough trays and woodenware from solid blocks but that use has passed away and it now goes to mills to be made into doors and other millwork. The tree is conspicuous in the forest after the first severe frost in the autumn, for the leaves

take on strange and mottled colors and all come down within a day or two. As they lie on the ground they resemble, in color, a heap of owl feath-ers. This may be classed as one of the trees that ers. This may be classed as one of the trees that will disappear with the cutting of the original forests; for no one will plant it except as a curiosity and a relic in parks. It is named for its fruit, two or three inches long. When green, the fruit resembles a stunted, misshapen cucumber, but when ripe it is bright scarlet. It yields abundance of seeds and ought to reproduce vigorously, but it does not appear to do so. Trees are found only here and there scatered through forests of other woods. woods.

BEECH—Tennessee produces three times as much beech as its factories use. Only one species of beech grows in the United States, except in parks where others have been planted. A tree bearing some resemblance to it is known as blue beech (Carpinus caroliniana). Though the blue beech (Carpinus caroliniana). Though the blue beech was not reported by any manufacturer in Tennessee, it is probably used in a small way for handles and for other purposes. The common beech has been classed as a food tree for centuries; and in some parts of this country the nuts constitute an article of diet, but in Tennessee they are reliable only as most for boxs. they are valuable only as mast for hogs.

Planing Mill Products.

This is the largest wood-using industry in Tennessee, and the chief commodities manufactured are flooring, ceiling and siding. These products are made and are offered for sale in the gen4 eral market, it not being essential that they be of cypress and sassafras in the table was procured in the state.

Packing Boxes and Crates.

This is the second largest wood-using industry in Tennessee. In some other states it is the largest. Since this product is employed in shipping mer-Since this product is employed in shipping merchandise and the commodities of truck patch and garden to market, the quantity of such boxes and crates made in a state is a fair index to the state's position as a manufacturing district. Tennessee ranks high, though not as high as some of the states north of it. This business in Kentucky demands 109,000,000 feet of lumber, Wisconsin 119,000,000, Maryiand 136,000,000, and Illinois 372,000,000. No satisfactory reason has been found why Tennessee with its abundance of cheap wood should pay a higher average price for box material why Tennessee with its abundance of cheap wood should pay a higher average price for box material than is paid by any of the states named. Boxmakers in Wisconsin buy theirs for \$13.09, in Maryland for \$13.31, in Illinois for \$15.31, in Kentucky for \$15.36, while in Tennessee the average for the whole state is \$16.26. Cottonwood is Tennessee's leading box material, and it is high in price. It possesses almost every requisite for a good box. It is strong, tough, hard to split, holds nails well, has no disagreeable odor or colored sap that will stain the contents. It is white in color, which is a quality greatly desired by certain shippers who wish to stencil their advertisements on the packages. The wood suits so many other purposes that box-makers must bid high for it or it will not come to them. That they got it is pritted each and in to them. That they get it in spite of cost and in amounts larger than any other wood, is the best-

PLANING MILL PRODUCTS. Table 2.

			Average	Total	Grown in	out of
BEAUTIFUL TO THE PARTY OF THE P	Quantity used	annually	cost per	cost f. o. b.	Tennessee	Tennessee
Kinds of wood	feet B. M.	per cent	1,000 ft.	factory	feet B. M.	feet B. M.
Red oak	30,399,000	20.65	\$24.88	\$ 756.200		
White oak	27.887.825	18.94	24.27	676,939	22,133,000	8,266,000
Yellow poplar	25,470,825	17.30	24.08		23,022,000	4,865,825
Shortleaf pine	16,404,000	11.14	17.41	613,287	22,620,000	2,850,825
Red gum	12,500,000	8.49	12.92	285,629	10,819,000	5,585,000
Longleaf pine	9,154,000	6.22		161,491	7,536,000	4,964,000
Chestnut	5,681,825	3.86	20.97	191,932	*********	9,154,000
_	4,543,000		27.59	156,771	993,000	4,688,825
White ash	9,040,000	3.09	18.12	82,337	1,843,000	2,700,000
Basswood		1.98	18.71	54,600	2,148,000	770,000
Cottongrand	2,426,825	1.65	18.87	45,788	2,113,000	313,825
Cottonwood	2,000,000	1.36	17.50	35,000	1,000,000	1,000,000
Cypress	1,880,000	1.28	27.47	51,650	*******	1,880,000
Sugar maple	1,500,000	1.02	19.97	29,950	1,125,000	375,000
Birch	915,000	.62	37.60	34,400	170,000	745,000
White plne	478,825	.32	16.53	7,914	365,000	113,825
Black walnut	388,000	.26	20.43	7,926	55,000	333,000
Cherry	376,000	.26	20.00	7,520	43,000	333,000
Sassafras	333,000	.23	20.00	6,660		333.000
Sycamore	282,000	.19	13.67	3,854	157,000	125,000
Silver maple	275,000	.19	12.78	3,515	150,000	125,000
Black willow	250,000	.17	12.50	3,125	125,000	125,000
Hackberry	250,000	.17	12.50	3,125	125,000	125,000
Buckeye	243,000	.16	13.72	3,335	243,000	
Hemlock	223,825	.15	9.43	2.111	110,000	113.825
Tupelo	130,000	.09	24.23	3,150	80.000	50,000
Yellow oak	100,000	.07	15.00	1.500	100,000	
Mahogany	100,000	.07	116.00	11,600		100,000
Butternut	42,000	.03	18.95	796	42,000	200,000
White elm	30,000	.02	16.33	490	30,000	
Black gum	18,000	.01	12.72	229	18,000	
Black ash	15,000	.01	12.00	180	15,000	
					20,000	
Totals	147,214,950	100.00	\$22.03	\$3,243,004	97,180,000	50,034,950

special sizes and patterns. The planing machines which turn them out are generally adjuncts of the saw mills that cut the lumber. Red oak, which doubtless includes a number of species under that name, heads, for quantity, the fist of thirty-one species. The rather large amount of black walnut in this industry is unexpected, since the wood is never used as siding and seldom as flooring except for parquetry which is not included in Table 2. Black walnut's low price may be accounted for by assuming that the material was purchased in the log. The cost of white pine is lower than would be expected for grades acceptable at a planing mill. The Massachusetts box-makers pay that much for what passes through their hands. Mahogany's price is rather low, but the prevailing grades may account for it. Thirty-one species in all is a good showing when it is considered that twenty-nine of them grow in Tennessee, though no part of the

evidence that it is looked upon as the box material

evidence that it is looked upon as the box material par excellence of Tennessee.

Red gum, yellow popiar and shortleaf pine are extensively demanded for boxes and possess most of the essential features required. Medium welght is one requisite that should not be overlooked. Though a few pounds more for a single box might be a small thing to consider, it is not small if hundreds or thousands of boxes are shipped by freight, and the weight would be still more important were shipments to go by express. Buckeye and basswood, both present in large amounts in Table 3, are light in weight. They are likewise light in color which puts them, as far as stenciling qualities are concerned, in the class with cottonwood. It is worthy of note that these two woods which are nearest to cottonwood in color are nearest to it in cost. Except cottonwood, they are the costliest in Table 3.

BOXES AND CRATES, PACKING.

			Average	Total	Grown in	out of
	Quantity used	annually	cost per	cost f. o. b.	Tennessee	Tennessee
Kinds of wood	feet B. M.	per cent	1,000 ft.	factory	feet B. M.	feet B. M.
Cottonwood	22,550,000	28.92	\$21.99	\$ 495,900	12,550,000	10,000,000
Red gum		21.47	12.92	216,243	15,543,000	1,200,000
Yellow poplar		20.76	15.23	246,444	15,286,510	900.000
Shortleaf pine	13,158,820	16.87	12:45	163,773	4,658,820	8,500,000
Buckeye	2,116,617	2.71	17.29	36,590	2,116,617	
Basswood	1,796,470	2.30	17.35	31,163	1,796,470	
Chestnut	1.030.000	1.32	15.02	15,471	1,000,000	30.000
White pine	934,785	1.20	16.11	15,064	934,785	
White oak	925.000	1.19	16.83	15,570	925,000	
Black gum	865,000	1.11	9.69	8,380	865,000	
Beech	490,000	.63	15.21	7,455	490,000	
Sugar maple	210,000	.27	15.00	3,150	210,000	
Silver maple	198,000	.25	13.33	2,640	198,000	
Cucumber tree	125,000	.16	10.00	1,250	125,000	
White elm	125,000	.16	14.88	1,860	125,000	
Sycamore	117,000	.15	11.65	1,363	113,000	4,000
Slippery elm	115,000	.15	15.19	1,747	115,000	
Shittimwood	91,308	.12	14.11	1,288	91,308	
White ash	88,000	.11	13.00	1,144	14,000	74,000
Butternut	52,000	.07	9.00	468	52,000	*******
Table mountain pine	30,000	.04	12.00	360	30,000	
Yellow oak	20,000	.03	12.00	240	20,000	
Tupelo	6,000		12.00	72	6.000	
River birch	6,000	•	12.00	72	6,000	
Totals	77,979,510	100.00	\$16.26	\$1,267,707	57,271,510	20,708,000
*Less than 1-100 of 1 p		200.00	410.20	41,201,101	01,211,010	20,108,000

The oaks are seldom used for boxes, except where extra strength is wanted, and weight is of minor consideration. It is true that nearly a million feet of white and yellow oak are listed in the table, but most of it was crates. Oak's strength creates a demand for it; but it is heavy and it nalls poorly. A study of each wood separately in the table would probably fail to show reasons why all are there, except that some are cheap and convenient, but others have special properties which give them a place whether they are convenient or not.

About one-fourth of the box material comes from

about one-fourth of the box material comes from other states, and cottonwood is imported in largest amounts and shortleaf pine next. No wood comes wholly from other states, and that which is brought in comes solely because it is more convenient to procure it there than in Tennessee. Most of the imports come from Arkansas and Missouri.

Furniture.

The manufacturers of Tennessee have entered into the furniture business in a serious way. They are competing successfully with all comers and their product reaches markets far from the places of manufacture. The state is still below North Carolina in the total quantity made, but it produces nearly three times as much as Kentucky. The abundance of good furniture material in the forests of the state, and in those within reach, give advantages which the Tennessee manufacturers are making the most of. They procure about two-thirds of their furniture wood in the state, and it costs them on an average \$22.34 per thousand feet. North Carolina furniture makers buy their raw material cheaper than that (\$18.23), but most other states pay more—Massachusetts, \$28.36; Illinois, \$39.09; Maryland, \$29.32; Wisconsin, \$25.22, and Kentucky, \$30.73. More than nine-tenths of Tennessee's furniture material shown in Table 4 is hardwood. The number of species used is large, and only two, longleaf and mahogany, come wholly from without the state, and mahogany is the only foreign wood in the table. The extraordinarily high cost of this wood was doubtless due to the small amount purchased and its high grade. Mahogany lumber usually costs about half the figure given in the table, but sometimes double or three-fold that for extra fine figured wood.

A rather large quantity of red cedar is listed in Table 4. This wood has been used for furniture in this country since the first settlements on

A rather large quantity of red cedar is listed in Table 4. This wood has been used for furniture in this country since the first settlements on the Virginia coast. Some of the earliest records speak of the odor of the wood and of the favor in which it was held on that account. One of the important uses for it has always been for clothes chests and wardrobes. The belief has long prevailed that its odor drives moths and other insects away from clothing and prevents injury from that source. Large numbers of clothes chests are still sold every year to persons who believe the odor is offensive to insects. It is not known that any carefully conducted investigation has been made to determine red cedar's value in that respect. The most that can be said for it is that for three hundred years the belief has been common among people acquainted with the wood that clothes stored in cedar boxes and wardrobes are immune from insect attacks. Some of the Western cedars, particularly Port Orford and incense cedar, have the same reputation, and sassafras is not much behind them in reputed efficiency. It does not appear that any sassafras was used for furniture last year in Tennessee. It was once highly esteemed for bedsteads because of the belief that it contributed to the soundness of sleep by keeping trouble-some nocturnal insects away.

Many kinds and patterns of sash are demanded by the building trades, and an establishment may turn out but one or two kinds. Millwork is so broad a term that it covers a miscellaneous group of commodities that cannot be designated by any name more appropriate. Among the principal things included may be named stairwork, including balusters, railing, steps and newel posts; interior trim or finish, consisting in part of picture molding, baseboards, chair boards, panels, brackets, capitals, ornaments and shelving in niches and cubbyholes; porch columns and railing with spindles and lattice work, and many other kinds of dressed building material. The differences between the output represented in Table 5 and that classed as planing mill products and included in Table 2 are clear enough in general outline, but in details there must be more or less overlapping. The flooring, ceiling and siding of Table 2 is made according to general patterns, and is not usually manufactured for particular persons or markets; while much of the class of millwork belonging in Table 5 is made to order. A man may want finish of a special kind, wood or design for a house and gives the order for it, and the mill turns it out. A stair of unusual design or a portico, hallway, or suite of rooms requires millwork out of the ordinary, and such cannot be bought in the open market and must be made to order. General planing mills which produce flooring, siding and ceiling are usually, though not always, run in connection with a saw mill. The door and sash factory is not, but procures its raw material in the open market or has it sawed under contract. The machine in a plant of that kind must be designed for a greater varlety of work than the simple ones in a planing mill which make only a few staple articles.

from outside the state and was cheaper than chestnut. Red gum does not occupy a high place to
judge by the small quantity and the low price.
It is in less demand for interior finish in Tennessee, where it grows abundantly, than in states
farther north where it does not grow at all. As
much red gum is made into interior finish in Wisconsin as in Tennessee, and it costs nearly \$4 a
thousand more there. Illinois manufacturers
bought twenty times as much and paid \$30.13 for
it. The use of only 20,000 feet of red cedar for
interior finish in Tennessee emphasizes the great
change in the use of this wood for houses in that
region. It has been said that half of the pioneer
cabins of Tennessee were of red cedar, but that
estimate probably applied to certain regions only.
The whole quantity employed in house building last
year in Tennessee, as shown by data compiled for
this report, was hardly enough to make one modest
cottage.

White pine's place seems very insignificant in this industry, only 10,000 feet, or about what a small factory can work up in a day. It is among the best woods in this country for sash, doors and blinds; and its cost as shown in the table does not indicate that high price cut it out. Millions of feet of chestnut, cypress and yellow poplar were bought at higher prices. It would not seem that door and sash manufacturers in Tennessee are getting the most out of their opportunities as long as they fail to make a specialty of white pine in producing their commodities. The saw mills of Tennessee turned out 39,000,000 feet of white pine lumber in 1910, and a little more than one foot to 4,000 found its way to the door and blind factories which ought to have had a large part of it.

Grown

SASH, DOORS, BLINDS, AND GENERAL MILLWOHK.
Table 5.

			Average	Total	Grown in	out of
	Quantity used	annually	cost per	cost f. o. b.	Tennessee	Tennessee
Kinds of wood	feet B. M.	per cent	1,000 ft	factory	feet B. M.	feet B. M.
Shortleaf pine	15,208,500	39.80	\$17.88	\$ 271,906	4,886,500	10,322,000
Chestnut	4,410,000	11.54	35.06	154,600	1,360,000	3,050,000
Cypress	3,635,000	9.51	33.42	121,465		3,635,000
Yellow poplar	3,601,500	9.42	30.28	109,055	2,851,500	750,000
White oak	3,216,500	8.42	25.78	82,936	2,617,500	599,000
Longleaf pine	3,049,000	7.98	16.35	49,862	2,011,000	3,049,000
Red oak	2,881,500	7.54	21.66	62,425	1,956,500	925,000
Basswood	660,000	1.73	25,68	16,950	285,000	375,000
White ash	605,000	1.58	31.74	19,200	230,000	375,000
Shittimwood	200,000	.52	19.00	3,800	200,000	
	198,000	.52	31.06	6.150	98,000	100,000
Birch	161,000	.42	17.86	2.875		
Red gum	100,000	.26	15.00	1.500	161,000	
Sycamore	68,000	.18	39.49		100,000	
Black walnut		.18		2,685	8,000	60,000
Cherry	67,000		53.21	3,565	17,000	50,000
Beech	60,000	.16	14.83	890	60,000	
Chestnut oak	50,000	.13	15.00	750	50,000	
Red cedar	20,000	.05	33.75	675	20,000	
White pine	10,000	.03	20.00	200	10,000	
White clm	10,000	.02	14.00	140	10,000	
Sassafras	3,000		24.67	74	3,000	
Mahogany	2,500		188.00	470		2,500
Totals*Less than 1-100 of 1 p	38,216,500 er cent.	100.00	\$23.87	\$ 912,173	14,924,000	23,292,500

Shortleaf pine leads all others by long odds in millwork and constitutes nearly 40 per cent of all, though twenty-two woods are in use. Ten of the 15,000,000 feet are imported, chiefly from Arkansas and Missouri. It comes from that region because it is convenient. Some preference is shown the plne from those states because it is of excellent quality. The wood is white, soft and of good figure. Most of it goes to manufacturers in Western Tennessee because of their proximity to the source of supply; while the eastern part of the state depends on home-grown shortleaf, or procures it from states further south.

FURNITURE. Table 4.

						Grown
			Average	Total	Grown in	out of
	Quantity used	annually	cost per	cost f. o. b.	Tennessee	Tennessac
Kinds of wood	feet B. M.	per cent	1,000 ft.	factory	feet B. M.	feet B. M.
Red gum	13,510,000	34,40	\$14.55	\$ 196,595	6,000,000	7,510,000
White oak	12,044,000	30.67	29.92	360,375	9.385,000	2,659,000
Red oak	9,143,000	23.28	24.03	219,720	7,243,000	1,900,000
Yellow poplar	1.037.000	2.64	25.25	26,184	1,017,000	20,000
White ash	655,000	1.67	24.27	15,895	280,000	375,000
Longleaf pine	650,000	1.66	18.77	12,200		650,000
Shortleaf pine	610,000	1.55	16.61	10,130	310,000	300,000
Sugar maple	474,000	1.21	25.19	11,939	474.000	
Chestnut	269,000	.68	13.57	3,651	269,000	
Cottonwood	150,000	.38	25.00	3.750	50,000	100,000
Basswood	107,000	.27	24.60	2,632	107,000	
Tupelo	101,000	.26	19.97	2.017	1,000	100,000
Largetooth aspen	100,000	.25	25.00	2,500	100,000	
White elm	92,000	.23	18.05	1,661	62,000	30,000
Red cedar	80,000	.20	36.88	2,950	80,000	
Buckeye	50,000	.13	20.00	1.000	50,000	
Black gum	50,000	.13	15.00	750	50,000	
Yellow oak	50,000	.13	16.00	800	50,000	
Beech	25,000	.06	18.48	462	25,000	
Hickory	20,000	.05	19.50	390	20,000	
Birch	20,000	.05	18.00	360	20,000	
Black walnut	15,000	.04	36.67	550	15,000	
Sycamore	10,000	.03	16.00	160	10,000	
Cherry	10,000	.03	40.00	400	10,000	
Mahogany	500		300.00	1'50		500
Totals*Less than 1-100 of 1 p	39,272,500 er cent.	100.00	\$22.34	\$ 877,221	25,628,000	13,644,500

Sash, Doors, Blinds and General Millwork.

The articles manufactured from woods listed in Table 5 are too many to be enumerated separately, but they belong to groups and are shown in that way. It seldom happens that one factory makes all of them. It may devote all its energies to doors, and probably to a single grade or class of doors.

Kentucky, Virginia and North Carolina grow most of the chestnut used in Tennesse and shown in Table 5. The state forests meet about one-third of the demand, yet Tennessee is not surpassed by any state in the annual cut of chestnut or in the quality. The average high cost of the wood is proof that grades are high. Cypress came wholly

Vehicles and Vehicle Parts.

This industry is large in the aggregate, but it is made up of many small shops in all parts of the state and a few large factories. Almost every village has a shop which makes or repairs wagons though the number of such vehicles in a year is small for each. In collecting statistics for this report it was not practicable to include all blacksmith shops in rural districts, though some of them occasionally make or mend vehicles, but the larger shops and factories were included. Constant care was necessary to avoid counting the same material more than once. Vehicle making is peculiar in that some of the wood passes through two or more factories before it appears in finished form. One may rough-turn the spokes, and another finish them; hubs may be partly made in one factory and completed in another. The same comment applies to different parts of vehicles, both wagons and buggies. Carriage bodies may be made in a shop which turns out bodies only. Sometimes parts made in various places are assembled by a factory, and a complete vehicle is turned out, though the work was done in several places. Conditions like these do not exist in many industries, and vehicle making is peculiar in that respect. Hickory is the most important wood in the quantity used, but several others are higher in cost. The most costly is osage orange, which is used for farm wagon felloes. The price is figured on the finished pieces, ready for use, after all work has been done and all waste eliminated. Wagons with felloes of that wood give best service on sandy roads in dry regions. For very strong, large felloes beech is preferred to nearly all other woods. Yellow poplar, which is third highest in price in this industry, is made into carriage bodles. It finishes very well, takes high polish, and it holds paint. The small lot of black walnut was made into fine carriage filish.

Car Construction.

Nine woods make up the material employed in car construction and repair in Tennessee, according to Table 7. The number of woods is small, but the total quantity of lumber is fairly large. The car factories of Illinois reported the use of thirty-three woods, and a total amount of 407, 333,000 feet, at an average cost of \$30.44 a thousand.

VEHICLES AND VEHICLE PARTS.

Kinds of wood	Quantity used feet B. M.	annually per cent	Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Tennessee feet B. M.	out of Tennessee feet B. M.
Hickory	19,760,200	59.00	\$23.94	\$ 473,112 275.097	18,479,200 9,084,800	1,281,000 1,420,000
White oak	10,504,800 777,000	31.36 2.32	26.19 31.33	24,345	452,000	325,000
Red gum	718,000	2.14	25.15	18,059 11,739	164,000 427,000	554,000 221,000
White ash	648,000 487,000	1.93 1.45	18.12 20.05	9,762		487,000
Yellow poplar	481,000	1.44	43.07 20.52	20,715 1,580	321,000 2,000	160,000 75,000
Beech	77,000 20,000	.23	18.00	360	20,000	
Osage orange	8,000	$.02 \\ .02$	200.00 31.09	1,600 171	5,500	8,000
White pine		:02	28.00	140	5,000	
Black walnut ,	4 000		175.00	. 175		1,000
Totals*Less than 1-100 of 1 p	33,492,500 per cent.	100.00	\$24.99	\$ 836,855	28,960,500	4,532,000

*Less than 1-100 of 1 per cent.

Tennessee's nine woods aggregate 14,164,918 feet at an average cost of \$19.41 a thousand. Illinois is the leading state in this country in car manufacture, and the comparison with Tennessee may be of interest. Car makers in Tennessee pay little more than half as much per thousand as is paid in Illinois; but the important difference should be recognized, that in Illinois a number of expensive foreign woods are used in large amounts, while Tennessee builders used no foreign material. The proportion of high-grade work, such as sleeping and dining cars, is higher in Illinois than in Tennessee, where mining cars constitute a leading item. Cars of that kind operate underground to bring coal to the surface, or on switches and top lines in bringing coal and ore to the standard rallroads.

Seventy-seven per cent of all the wood entering the car shops in Tennessee is longleaf and shortleaf pine, and the proportion of these two species in Illinois is 62 per cent. Longleaf pine in the latter state costs \$29.28, and shortleaf \$27.52. while in Tennessee they cost, respectively, \$21.32 and \$18. In matter of cost the advantage is with Tennessee. Yellow poplar costs Illinois manufacturers \$51.59, and Tennessee has the advantage over Illinois. Other comparisons might be made, and in almost every instance concerning the cost of wood the advantage is with Tennessee. Nevertheless, conclusions should not be drawn from that showing alone, for the grades used may not be the same. It is none the less evident that Tennessee possesses the resources and occupies the geographical position to warrant a trial at making it one of the greatest car building centers of the country. The industry is not yet developed to compare with Illinois, but the field is ready for development. It has the wood, coal, iron and the water power. The latter has not yet been much thought of, but its development is destined to become one of the surprises which the future has in store. The water power is in the mountains of the east w stream flow may be regular and not subject to alternate destructive floods and withering drought.

Car manufacture is only one of many industries which may become great in years to come if resources are wisely husbanded. Five oaks appear in the list of material in Table 7. That many more might be included, for they are obtainable.

cles as in parts of the same tree. Some buyers cies as in parts of the same tree. Some buyers, with special purposes in view, buy the butts of medium-sized trees and use only the white sapwood. The tops, which by some are considered more brash, and the red heartwood of the butts are disposed of to ther buyers. As much of this discrimination may be based on sentiment and tradition as on characteristics of the wood. The red heartwood is more used now than formerly. Much of it goes into pick handles, which demand strength more than resiliency.

ished work these holes are not usually visible. Sometimes casket manufacturers use wormy mahogany in the same way. The holes in the mahogany are made by teredoes while the logs are nogany are made by teredoes while the logs are floating in brackish water; but the perforating of the chestnut is done on land. In Tennessee the cost of the chestnut reported in this industry was low, there being only two beneath it in the list of twelve woods. The average cost of all the woods may be compared with similar figures in certain other states, as follows:

North Car	0	11	n	a					 	 			 				 	 		\$	1	7.	0	9	
Missouri										 			 						 		1	9,	9	9	
Wisconsin						 				٠.				٠					 		2	4.	4	2	
lilinois .												 			 				 	,	2	6.	6	0	
Kentucky											٠								 		4	0.	1	9	

The Kentucky average is greatly raised above what it otherwise would have been because considerable quantity of very high-priced black walnut siderable quantity of very high-priced black walnut was used and a larger quantity of white pine. The Kentucky coffin makers paid \$50 for yellow poplar, the Tennessee makers paid only \$22.63; chestnut in Kentucky cost \$20, in Tennessee \$13.94; red cedar \$40 in Kentucky, and \$45 in Tennessee; oak \$44.07 in Kentucky, and \$18 in Tennessee; white pine \$24 in Kentucky, and \$16.01 in Tennessee. The striking differences in most of these prices, with only a state line separating the two regions, should be attributed to grades more than to any-

HANDLES. Table 8.

Grown

Kinds of wood	Quantity used feet B. M.	annually per cent	Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown In Tennessee feet B. M.	Grown out of Tennessee feet B. M.
Hickory		88.69	\$22.80	\$ 196,586	7,361,276	1,262,500
White oak		6.68 3.60	29.23 10.00	19,000 3,500	650,000 350,000	
White ash		1.03	10.00	1,000	100,000	
Totals	9,723,776	100.00	\$22.63	\$ 220,086	8,461,276	1,262,500

Though hickory far surpasses all other woods in Table 8, it is not the only one. A small quantity of white oak competes with hickory for handles. Some assert that by boiling the oak handle in oil it is rendered much tougher than when in its natural state; but further experiments and additional ural state: but further experiments and additional

thing else. It is impossible that so much difference can be due to freight rates. Some manufacturers specialize on high-class commodities and buy expensive wood; others cater to a different trade, and their raw material costs less. The rough shipping boxes are included as one of the commodities of

Grown

CASKETS AND COFFINS. Table 9.

			Average	Total	Grown In	out of
	Quantity used	annually	cost per	cost f. o. b.	Tennessee	Tennessee
Kinds of wood	feet B. M.	per cent	1,000 ft.	factory	feet B. M.	feet B. M.
Chestnut	1,772,730	18.67	\$13.94	\$ 24,716	725,000	1,047,730
Shortleaf pine	1.600,000	16.85	12.97	20,750	1,250,000	350,000
Yellow poplar		16.31	22.63	35,043	1,060,000	488,685
Red gum		15,96	14.96	22,668	5,000	1,509,800
Cypress		10.68	15.96	16,186		1,014,339
White pine		8.64	16.01	13,125	795,000	25,000
Basswood		5.35	20.82	10,576	350,000	158,038
Hemlock	300,000	3.16	12.00	3,600		300,000
Buckeye	200,000	2.11	18.00	3,600	200,000	
Red oak		1.05	18.00	1,800	100,000	
Red cedar		1.01	42.01	4,012	95,493	
Black walnut	20,000	.21	45.00	900	20,000	
Totals	9,494,085	100.00	\$16.53	\$ 156,976	4,600,493	4,893,592

Grown

reports seem necessary to establish that claim. The ash listed in the table represents handles for hoes, rakes, shovels and pitchforks. Strength and stiffness fit that wood for the place it occupies as the most important handle material for agricultural tools. Red gum occurs in this table. It is made into certain tool handles and into a class known as

Kinds of wood	Quantity used feet B. M.	annually per cent	Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Tennessee feet B. M.	out of Tennessee feet B. M.
Longleaf pine	5,755,096	40.63	\$21.32	\$ 122,708		5,755,096
Shortleaf pine	5,163,925	36.46	18.00	92,952		5,163,925
White oak	2,402,662	16.96	18.65	44,814	2,360,662	42,000
Red oak	400,000	2.82	16.25	6,500	250,000	150,000
Texan oak	211,056	1.49	18,49	3,903	,	211,056
Chestnut oak	200,000	1.41	16.00	3,200	200,000	
Bur oak		.12	20.02	323	16,132	
Yellow poplar	11,300	.08	42.12	476	11,300	
Cottonwood	4,747	.03	20.64	98		4,747
Totals	14,164,918	100.00	\$19.41	\$ 274,974	2,838,094	11,326,824

Handles.

Almost 90 per cent of the handles made in Tennessee are of hickory, several species being included under that name and not distinguished in cluded under that name and not distinguished in trade, though they may be when trees yet stand in the forest. This is the best known material in the world for two important classes of wares—light vehicles and handles. It has been said with much truth that the hickory handles sell American hammers the world over. Substitutes for hickory have been sought in all markets of civilized countries; and the little known forests of barbarous islands and remote mountains have been ransacked tries; and the little known forests of barbarous islands and remote mountains have been ransacked in the search, but no satisfactory substitute has yet come to light. There is a rare toughness and elasticity in hickory which nature has denied to all other known woods. Some are stronger, many are harder, but the rare quality is lacking in all of them, and the fact has come to be generally recognized, so that the handle sells the hammer.

Hammers are not the only tools with handles.

ognized, so that the handle sells the hammer.

Hammers are not the only tools with handles.

Axes are almost as important, but the handle is more frequently sold separately than in the case of hammers. There is a recognized difference in value between bickories, not so much between spe-

D-handles, because the shape suggests that letter. Such handles are equipped with a wire for fastening them to such packages as tailors, milliners and other trades people deliver to their customers. The very low cost of the gum and ash in this industry indicates that purchases were made in log form.

Caskets and Coffins.

The average cost of material used for coffins and caskets in Tennessee is low. The cost of the wood employed varies greatly in different parts of the country, and customs vary as to the kinds of wood used. In Louisiana more mahogany is reported than any other wood, while in Tennessee no mahogany is listed. In most regions in the eastern half of the United States chestnut is prominent as a material for caskets, coffins and burial boxes. The latter are the rough boxes enclosing the caskets. Manufacturers assign no special reason why chestnut should hold so prominent a place, except that custom demands it, and the demand is met. In most instances the grade of chestnut known to the trade as "sound wormy" is unobjectionable. Such wood has been perforated by small boring insects whose galleries are about the size of large pin holes, but otherwise the wood is sound. In the finthe casket and coffin industry, and most of the cheap lumber is used in their manufacture. In Tennessee some of the red cedar, which is next to the highest priced wood in the industry list, is made into outer boxes because it is a long-lasting wood. Another reason for the use of cedar for burial boxes is that custom so long demanded them when the wood was abundant and cheap that the demand continues though red celar is now scarce. With pencil makers paying \$7.50 per ton for cedar logs, the casket makers must pay a correspondingly high price to procure this wood for burial boxes.

Chairs.

Chairs.

The reason for treating the manufacture of chairs separate from furniture is that the makers of chairs frequently confine their operations to that branch of the furniture business. Wood for chair making is usually cheaper than that demanded by manufacturers of other furniture. The same kinds of wood are used by both, but chair material is in smaller pieces, permitting of a closer utilization of waste through the working up of scraps. In some localities there are mills which saw nothing but chair material. Small and crooked logs are acceptable, and can be used for dimension stock down to one inch square and a foot or more in length. A general furniture factory could make small use of such material. There are standard sizes for chair stock, such as rounds, backs, seats, legs. but other kinds of furniture are made in such various patterns, and the fashions and styles change so often, that standards in sawed stock are not often practhat standards in sawed stock are not often practicable. Red oak is the principal chair wood in Tennessee as shown in Table 10. This wood, as was explained in a preceding paragraph of this report, is not a single species, but includes several oaks under one name. The chair stock mill makes a pretty clean sweep of the various oaks on a tract of land where it is operating, and after culling out some of the white oaks, the rest goes in as red

The white oak may not be cuiled out, but all may go to the chair factory. Table 10 shows a remarkably even run of average costs of the different kinds of wood. The highest is \$15.53, the lowest \$10, and the average \$15.01. The quantity of sawdust and shavings in a chair factory is large because much

of the material is reduced to small dimensions; but considering the unpromising character of the bulk of the logs that go to the mills, and the large proportion of small pieces worked out, the waste at a chair factory is small. which deals with the woods used rather than the particular uses of the commodities produced. Woodenware may be a little more definitely defined, but here, too, there is often room for uncertainty regarding the exact limits of the industry. It is gen-

		J. M.	016 10'			
Kinds of wood	Quantity used feet B. M.	annually per cent	Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Tennessee feet B. M.	Grown out of Tennessee feet B. M.
Red oak White oak Sugar maple Hlckory Beech Birch	1,100,000 400,000 130,000 125,000 100,000	72.53 16.28 5.92 1.92 1.85 1.48	\$15.53 14.55 12.38 12.62 12.30 12.00	\$ 76,110 16,000 4,950 1,640 1,538 1,200	2,901,000 1,100,000 400,000 130,000 125,000	2,000,000
Totals		100.00	\$15.01	\$ 101,448	4,657,000	2,100,000

Pencil Stock.

Table 11 lists two woods for lead pencil stock Table 11 lists two woods for lead pencil stock in Tennessee—red and white cedar. Though reported in that way, it is probable that only red cedar is used, and what is called white cedar is the white sapwood of red cedar. The white cedar or arbor vitae in the mountains of Eastern Tennessee is a different species. The average cost of pencil cedar as shown in the table is misleading unless explained. It might seem unreasonable that cedar suitable for pencils should be nurchased for \$2.20 suitable for pencils should be purchased for \$8.30 a thousand feet, when other manufacturers pay \$25 and \$30 for what they convert into furniture. The difference in cost is due to the different forms in which the stock is purchased. The furniture people buy theirs as sawed lumber, after the slabs and sawdust have been removed; but the pencil wood is beauty with all the most of the slabs and sawdust have been removed; but the pencil wood sawdust have been removed; but the pencil wood is bought with all the waste. Not only are logs purchased, but also old stumps, fence rails, gate posts, barn logs, bridge cribs and cedar in all shapes, sizes and conditions, some of it half rotten, other wheather checked, and all piled together, loaded on cars and sold by weight to the makers of pencil slats. This is the material which costs \$8.30 per 1.000 feet, when the weight has been reduced to board feet. It is evident that most of the collection of all cedar wood thus brought together collection of all cedar wood thus brought together is waste. By the time the slat maker has worked out such of it as he can use, he has thrown away perhaps four-fifths of all he bought. Though the mass of wood in the rough may have cost him \$8.30 per 1,000 feet, the slats will cost several times that per 1,000 feet, the slats will cost several times that much if estimated by the thousand feet. The factory which reduces the rough material to slats does not make the finished lead pencils. Other factories, some in New York, New Jersey or other states, and some in Europe, buy the slats and convert them into pencils ready for use. The slats are one-quarter of an inch thick, seven inches long and two and one-half inches in width. A slat of that kind makes slx half pencils. Formerly when cedar was abundant pencil makers bought wide slats only; but cedar that can be worked into slats only; but cedar that can be worked into wide slats is becoming so scarce that narrow stock now finds ready sale. Other woods have been tried for pencils, and some have been fairly successful, particularly for the cheap grades; but the unremitting search that still goes on for red cedar is proof that no available and wholly satisfactory substitute has been found. Several qualities are demanded of a pencil wood. It must be soft and must whittle easily. To meet that requirement, it must be brittle so that the shavings will fall away as the knife cuts. The wood must be moderately light to keep transportation charges down away as the knife cuts. The wood must be moderately light to keep transportation charges down when shipments are large or go long distances. It must be moderately dark in color, such as will not soil easily in handling. The wood must have a pleasing odor when freshly cut. It must not be cross-grained, for that lessens its good whittling qualitles. Some of these qualities seem trifling, yet the buying public has learned to expect them in a pencil and is disappointed if any one of them is absent. The extensive search for substitutes is absent. The extensve search for substitutes among the many woods of this and other countries has demonstrated how hard it is to find a wood combining all the desirable qualities of red cedar.

erally understood that woodenware overlaps on cooperage in certain directions. Small vessels made of staves are the work of the cooper, yet some of such belong with woodenware. Among that sort are such belong with woodenware. Among that sort are firkins, keelers, piggins and small buckets and tubs, found principally in kitchen and pantry. Stavemade receptacles for salt, pepper, spices and other condiments used in cooking, are in this class. Water pails and candy buckets are within the limits class. its also. A large part of the red cedar shown in Table 12 was manufactured into ware of this kind. Tennessee has long been noted for the excellency of its cedarware. A red cedar bucket with brass

desired size and pressed into shape. It is bought in the log, and for that reason is cheaper than the other woods in Table 12.

Trunks and Valises.

One of the most noticeable features of Table 13 is the difference in cost of woods used in manufacturing an article as simple as a trunk. Nevertheless, there is need of woods of different properties turing an article as simple as a trunk. Nevertheless, there is need of woods of different properties and grades, and this accounts for part but not all of the difference in cost. Next to the highest in price is elm, which is generally a cheap wood. Its high cost to trunk makers in Tennessee is due to the fact that many of the users buy it after it is cut to the exact sizes needed. It is thus a manufactured article when bought and all waste has been removed. It is made into slats to strengthen the tops, sides and bottoms. Trunk makers in some other regions buy this material in the rough and work out the slats in their own factories, and, of course, they huy it cheaper. Prices paid for elm by trunk makers in four states, including Tennessee and ranging northward, are, Tennessee \$37.87; Kentucky, \$17.82; Illinols, \$25.60; Wisconsin. \$24.23.

What is true of the prices of elm is true of other woods employed, by trunk manufacturers. Where a marked difference in cost exists for the same kind of wood, it is due to the form in which the manufacturers bought it. In Wisconsin cottonwood costs \$27; in Kentucky, \$37.50, and in Tennessee. \$41.36. This wood is purchased as veneer, either in large single sheets or glued together in three or more

WOODENWARE AND NOVELTIES. Table 12.

Kinds of wood	Quantity used feet B. M.	annually per cent	Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown In Tennessee feet B. M.	out of Tennessee feet B. M.
Red cedar Cottonwood Red gum Cypress Beech Basswood	1,000,000 750,000 250,000 165,000	31.79 30.66 22.99 7.66 5.06 1.84	$$24.00 \\ 20.00 \\ 20.00 \\ 20.00 \\ 10.36 \\ 22.00$	\$ 24,888 20,000 15,000 5,000 1,710 1,320	1,036,800 165,000 60,000	1,000,000 750,000 250,000
Totals	3,261,800	100.00	\$20.82	\$ 67,918	1,261,800	2,000,000

hoops, made in Tennessee in 1767, was exhibited at hoops, made in Tennessee in 1767, was exhibited at the World's Fair held in St. Louis in 1904. The wood was sound and the hoops were bright after the lapse of 137 years. Factory-made ware of this kind has taken the place of the hand-made articles of former times. Not only is the red cedar more largely used than any other wood in this industry in Tennessee, but it is higher in price than any other. The entire quantity used grew in the state other. The entire quantity used grew in the state.

Other articles than staveware belong in this in-

dustry, and other woods furnish large amounts of material in Tennessee. Cottonwood follows cedar in amount, but all of the raw material comes from

ply and cut to the exact sizes needed, and in some instances it is bent in the form desired. Tennessee trunk makers bought yellow poplar for trays and compartments at \$17.33; in Kentucky it cost \$10 a thousand more. In Tennessee buckeye costs \$21.33, in Kentucky \$22. Similar comparisons might be made for other woods, and as great differences and as close agreements may be shown. The short-leaf nine reported second in quantity in Tennessee. and as close agreements may be shown. The short-leaf pine reported second in quantity in Tennessee is so low in price that it can be no other than low-grade lumber employed in making very cheap trunks. The hickory and ash listed in this in-dustry are used for slats. Woods made into veneer

TRUNKS AND VALISES. Table 13.

Kinds of wood	Quantity used feet B. M.	annually per cent	Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Tennessee feet B. M.	out of Tennessee feet B. M.
Yellow poplar Shortleaf pine	700,000	40.86 24.22	\$17.33 9.00	\$ 20,470 6,300	1,181,000 700,000	
Basswood	200,000	10.78 6.92 6.23	$24.56 \\ 16.00 \\ 21.33$	7,614 3,200 3,840	205,000 100,000 105,000	$\begin{array}{c} 105,000 \\ 100,000 \\ 75,000 \end{array}$
White elm	168,000 75,000	5.81 2.60	37.87 13.27	6,362 995	143,000 40,000	25,000 35,000
Red gum	15,000	1.73 .52 .38	20,00 32.00	1,000 480	25,000 15,000	25,000
Totals		100.00	\$17.55	\$ 50,716	$\frac{11,000}{2,525,000}$	365,000

without the state. It is made into washboards, ironing boards, bread boards, cutting boards, drying racks and numerous articles found in kitchen, pantry and laundry. Cottonwood's white color is one of its good qualities. This makes it particularly serviceable where stenciling and printing are to be done on it. Makers of washboards value cottonwood highly because it stonells so well. Base. tonwood highly because it stencils so well. Bass-wood closely resembles cottonwood in color and character of the wood, is used for the same purposes and is a little higher in price. It has some uses for which cottonwood is not suitable. One of these is pyrography, where pictures, ornaments and dec-

PENCIL STOCK, Table 11.

Kinds of wood Red cedar White cedar	Quantity used feet B. M. 5,300,000 25,000		
Totals	5,325,000	100.00	

Woodenware and Novelties.

Novelties and woodenware include a considerable but indefinite number of commodities. Novelties but indefinite number of commodities. Novelties are small articles of various kinds and are either useful or ornamental. Some of the most common are paper knives, pen racks, rulers, small trays, boxes and receptacles for buttons, thread, jewelry and the like; two-piece boxes produced by the lathe, in which ink bottles, paints, pills, powders and other similar articles are shipped and sold. The line between novelties and toys on the one hand and woodenware on the other cannot be very clearly drawn. Whole groups of articles may fall in doubtful classes. Exact definitions and strict classifications are not necessary in a report such as this,

			Grown	
Average	Total	Grown in	out of	
cost per 1,000 ft.	cost f. o. b. factory	Tennessee feet B. M.	Tennessee feet B. M.	
\$ 8,30 7.48	\$ 44,000 187	3,900,000 25,000	1,400,000	
\$ 8.30	\$ 44,187	3,925,000	1,400,000	

orations are burned in wooden panels and platters with a hot needle. Some articles of this kind should classed as novelties, some as woodenware and still others are so well executed that they might be

classed as works of art.

Red gum and cypress in the table aggregate a million feet. They are all-round woods for this industry and are made into some of the commodities named above and into some of the commodities named above and into many others, such as rolling pins, chopping bowls, wooden dishes, vegetable cutters, bread boxes, etc. Beech is one of the best woods of which to manufacture the class of ware represented by thin veneer picnic plates and pie platters. It is produced in sheets of veneer one-twentieth of an inch thick, or less, and is cut to the

and used in several thicknesses are yellow poplar, basswood, buckeye and cottonwood. These are generally cut by the rotary process and may be had erally cut by the rotary process and may be had in sheets of any size wanted. This is an important consideration, for when a sufficient number of sheets have been glued one upon another to give the desired strength they may be cut to size, and by bending, a single piece will make the bottom and two sides of a trunk. It was formerly the custom to construct the box of a trunk of lumber and cover it with leather. That was before the days of the railroads, when the trunk that traveled at all went by boat and stage coach, and was handled with due consideration of the feelings of the owner, who was usually standing by and watching it go aboard or come off. But when trunks began to go by rail and chute-the-chutes in modern stations, stronger material than boards and calf skin had to be found for their construction; and sheets of vebe found for their construction; and sheets of veneer with an abundance of brass reinforcement and

sheet iron overlay were brought into use.

The average cost of all wood used by trunk makers in Tennessee is \$17.55; in Wisconsin, \$23.11; Illinois, \$30.01; and Kentucky, \$44.81.

Agricultural Implements.

The line between a tool and an implement is not very definite when it concerns agricultural ma-chinery. In a general way tools are small and implements large; tools are operated by hand and lmplements by horses or some other power. These are not hard-and-fast definitions, and it would not be difficult to find exceptions. The commodities be difficult to find exceptions. The commodities represented in Table 14 belong chiefly to the implement class, if a difference is to be drawn between implements and tools. The sickle, scythe, cradle, hoe, flail and pitchfork are tools; the mowing ma-

chine, thresher, plow and cultivator are implements.

About half of all the wood reported was white oak, which includes a number of species. This wood possesses most of the properties demanded in this industry, the chief one being strength and the next hardness. Where hardness alone will suffice, beech answers well. It is suited for slides where one part of the machine must work back and forth, the surfaces sliding upon each other. The high cost of the beech in Table 14 indicates that the best grades were in demand. The wood is liked well for the felloes of very heavy wheels. Red oak and chestnut oak are utilized for strong frames. A large amount of yellow poplar appears, frames. and much of it was made into hoppers, seed hoxes, chutes, drawers and compartments in fanning mills, cleaners, drills and threshers. The shortleaf pine was used for the same purposes. It might be expected that ash would appear in this industry, and its qualities make it suitable for many purposes; but it is identified with the tool industry rather than wth the manufacture of implements. If such tools as pitchforks, rakes, hoes, shovels and scythes were included in Table 14, ash would appear in large amounts, for it is the usual handle wood for such

The manufacturer of agricultural implements is not yet as important in Tennessee as in some other states, but the abundance of raw material in other states, but the abundance of raw material in the region and the accessibility of many markets justify the prediction that before many years Ten-nessee will attain a high place among the states in the manufacture of machinery for the farms. The fertility of the land, the diversified surface which calls for crops of various kinds and the mildness of the climate and abundance of rainfall assure great and permanent prosperity for Tennessee farmers. They will buy more farm implements in the future than in the past, for scientific methods are replacing the poor makeshifts of yesterday. Up-to-date farming calls for better machines and more of them. The forests of Tennessee contain an abundance of the woods needed in that line of manufacture, and the people have made a beginning in putting it to use. It is only a beginning, however. Tennessee ships twice as much implement wood to Illinois, there to be manufactured, as is worked up at home; and in many instances the finworked up at home; and in many instances the finished machines are shipped to the region where the woods grew and are sold there. Full development of home resources will demand the manufacture of this word of the solutions. this wood at home. The state may become a manufacturing center along that line, instead of a feeder ufacturing center along that line, instead of a feeder for other manufacturing centers. A comparison of what Tennessee is doing and what some of its neighboring states are doing is worth consideration. The state annually uses 2,890,000 feet of wood in producing agricultural implements, and pays an average of \$22.58 per thousand for it. North Carolina uses 3.391,000 feet and pays \$11.95; Kentucky, 6,610,000 feet at a cost of \$32.54; while Illinois, which has a comparatively small supply of homegrown wood and buys from other states 99.9 per cent of what it makes into implements, uses 103,649,000 feet, and pays \$34.54 a thousand for it.

AGRICULTURAL IMPLEMENTS.
Table 14.

Average cost per 1,000 ft.

\$23,28 18.44 29.65 20.00 17.20 25.00

\$22.58

	Quantity used	
Kinds of wood	feet B. M.	per cent
White oak	1,425,000	49.31
Yellow poplar	450,000	15.57
Red oak	425,000	14.71
Shortleaf pine	325,000	11.24
Chestnut oak	250,000	8.65
Beech	15,000	.52
Totals	2,890,000	100.00

Sporting and Athletic Goods.

Table 15 represents, in Tennessee, what is properly termed a one-wood industry. That wood is erly termed a one-wood industry. That wood is hickory. Two others are listed, but they constitute less than three per cent of the whole. Golf sticks are the principal commodity. The shaft is hickory and the head persimmon. No explanation has been offered why dogwood is absent from Table 15, for it is one of the best materials for golf heads, and it is abundant in Tennessee. The head of a golf club must fulfill exacting requirements. It must be elastic and of sufficient hardness and toughness to wear smooth. Some woods which possess part to wear smooth. Some woods which possess part of the requisite qualities lack the essential—they burst under the impact of the blow. That is the fault of hickory as the head of a golf stick, though as a shaft it has no equal. The two parts—head and shaft—call for different properties, and no and shaft—call for different properties, and no wood, as far as present knowledge goes, possesses both of them in a high degree. That is why a golf stick is always of two kinds of wood. English beech, which differs somewhat from the American tree, was once the favorite wood for golf heads in this country as well as abroad; but it has lost its place to dogwood and persimmen.

More use is made of persimmen's white sapwood

than of the heart which is dark. Shuttlemakers also want the sapwood, and the combined demand is met at the expense of the persimmon's dark heartwood which must find a market elsewhere.

The white ash listed in Table 15 was bought by makers of ball bats. The low price of hickory is

due to its purchase in the log or bolt form. The average value of hickory lumber in the mill yards of Tennessee in 1909, which are the latest available figures, was \$37.13, more than double the cost of the wood as listed in Table 15. Though in 1909 and again in 1910 Tennessee led all the other states in the quantity of hickory lumber produced, yet the makers of athletic goods in the state are sending outside for 98 per cent of their supply of this wood. outside for 98 per cent of their supply of this wood. The reason for it is that some of the largest users are near the state line, and it happens that the most convenient supply of the wood is across the border.

cut dogwood in small lots and haul it to the towns swhere it is sold to dealers who in turn ship and sell to manufacturers when the collection amounts to a carload or more. The getting together of the wood in this manner is usually done by negroes who are willing to handle small quantities and are content with medarate returns. Often a few sticks tent with moderate returns. Often a few sticks, maybe only two or three, are carried to town in small wagons along with farm articles for sale. This custom prevails also in Southern States other than Tennessee. It is not possible to obtain sta-tistics of amounts so many and small, except in

SPORTING AND ATHLETIC GOODS. Table 15.

Kinds of wood	Quantity used feet B. M.	annually per cent	Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Tennessee feet B. M.	out of Tennessee feet B. M.
Hickory White ash Perslmmon	60,000	97.14 2.29 .57	\$17.25 22.50 35.00	\$ 44,000 1,350 525	50,000 60,000 15,000	2,500,000
Totals	2,625,000	100.00	\$17.48	\$ 45,875	125,000	2,500,000

Shuttles, Spools and Bobbins.

The three classes of commodities heading Table 16 are usually grouped as one industry because they are purchased by factories which spin and weave; but as far as Tennessee is concerned, shutweave, but as far as remeased is concerned, saturates constitute nearly the whole output of the industry. Two woods are employed, dogwood and persimmon. These have long been considered the best available material in this country for shutbest available material in this country for shuttles, though search for others has been wide and thorough since the advance in cost of Turkish boxwood took it from the American shuttlewood market. Dogwood and persimmon possess all the desired properties, though some of them in a less degree than boxwood. But when the Tennessee woods can be bought at less than three cents a foot, and boxwood costs nearly a dollar a foot, it is evident that the supply will be met by woods from Tennessee and surrounding regions. The the aggregate after they reach the manufacturers. The table shows that most of the persimmon used

grew outside the state.

Shuttle blocks are about 17 inches long and somewhat more than two and a quarter inches square. The blocks from which golf stick heads are made are not as long, but are larger in cross section. Dogwood and persimmon are used for both articles. Their hardness and the small liability of the wood to become abraded are their most important properties.

Boat and Ship Building.

Without an explanation the heading for this industry would be misleading because no ships and few boats are built in Tennessee. This heading is used for uniformity's sake in all state wood-using reports such as this, and all material employed in the industry is listed in the accompanying table.

SHUTTLES, SPOOLS, AND BOBBINS. Table 16.

Kinds of wood	Quantity used feet B. M.	annually per cent	Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Tennessee feet B. M.	Grown out of Tennessee feet B. M.
Dogwood Persimmon		71.94 28.06	\$22.07 26.80	\$ 37,627 17,825	1,180,000 165,000	$525,000 \\ 500,000$
. Totals	2,370,000	100.00	\$23.40	\$ 55,452	1,345,000	1,025,000

Grown out of Tennessee feet B. M.

700,000 50,000 350,000

......

1,100,000

preceding industry, Table 15, shows the use of persimmon for gold heads. The heartwood is resimmon for gold heads. The heartwood is rejected as it is in shuttle making. The waste of the dark-colored heart would be complete were it not so well adapted to other uses. The persimmon is a species of ebony, and the heart is the portion which shows the color. It is bought by manufacturers of parquet flooring and by some furniture

The persimmon tree grows to large size and passes through saw mills like other saw-logs. Statistics have not been compiled in a way to show the quantity of persimmon cut, nor the states which lead in production. It is known, however, that the amount is not large, and the persimmon is justly

Grown in

Tennessee feet B. M.

725,000 400,000 75,000 325,000 250,000 15,000

1.790.000

Total cost f. o. b. factory

33,175 8,300 12,600

6,500 4,300 375

\$ 65,250

is white ash, and it is manufactured into oars. The white oak was used for boat repairs, and the cypress is so small in quantity as to be negligible No other wood is equal to ash in the amount going into oars in the Southern and Middle States, and the product is sold in all parts of this country and in some foreign countries. In certain regions ash in some foreign countries. In certain regions ash comes in competition with other woods for some kinds of oars. Paddles for canoes are of spruce oftener than of ash, for spruce is lighter and is strong enough. The yew tree that grows on the Pacific Coast might compete successfully with ash for ears if it were as abundant and accessible.

in Tennessee practically all of the wood reported

for oars if it were as abundant and accessible.

Table 17 probably does not do Tennessee justice as an exhibit of its hoat building. Large numbers of skiffs and other small boats are made there and of skiffs and other small boats are made there and are found by thousands on the rivers and creeks; but they are not turned out of large factories and are not shown in the table. They are the output of small shops and of individual workmen in all regions of the state. The fact that they are so made is well known, but it has been impossible to compile figures to be used as statistics. This condition obtains in many regions of the United States. A wagonload of lumber and a few tools suffice for manufacturing small boats, and it is done everywhere and no report is made of it. This explanation is made to correct any wrong impression that might follow from an examination of Table 17. On the face of it Tennessee makes no boats. yet the fact is large numbers are made along the rivers of the state, but not in boat factories. Canoes hewn from trunks of yellow pop'ar are still occasionally seen on the rivers, though the high value of this wood in the market in recent years has diminished its use for dugouts. Historically yellow poplar has been the greatest boat wood of Tennessee. Reference has already been made to its early use for canoes in war and peace. That use continued for a century or more and has not wholly ceased. The wood was employed in a wasteful manner, for a trunk measuring from two to four thousand feet was often hewed into a single canoe; but yellow poplars of that dimension were plentiful then and it was right that the people should cut them for canoes if they needed them.

listed among the minor species. It is well known, that the principal supply comes from North also, that the principal supply comes from North Carolina, Tennessee, Arkansas and the regions immediately north and south of those states. The tree reproduces vigorously and grows with fair rapidity, but a long time is required to produce a trunk large enough to be of much value to the manufacturer. For that reason, the thickets of young persimmon trees which have made their appearance in abandoned fields have not yet contributed much wood for shuttles, golf stick heads or parquet flooring. They may influence the market in years to come. in years to come.

Dogwood is a more important shuttle wood than persimmon, but the tree is smaller. A trunk as much as a foot in diameter and six or eight feet in length is an exception to the rule. The trunk is usually nearly all sapwood of light color, the small core of heartwood being brown. It is not a timber tree and is never cut as saw-logs for the mills. It is too small. For that reason it does not figure in ordinary lumber operations, but is handled in special ways. It is customary for country people to

Fixtures.

Fixtures, as the term is considered in Table 18. are close akin to furniture, but differ in several

Grown

HOAT AND SHIP BUILDING. Table 17.

Kinds of wood	Quantity used feet B. M.	annually per cent	Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Tennessee feet B. M.	out of Tennessee feet B. M.
White ash	25,000	98.53 1.41 .06	\$27.00 23.00 45.00	\$ 47,250 575 45	25,000	1,750,000
Totals	1,776,00%	100.00	\$26.95	\$ 47,870	25,00 .	1,751,006

particulars. Furniture is moved from place to place and is not designed for any particular room or space. Fixtures are intended to remain in the positions where the maker places them, and they cannot be moved without more or less injury. They are divided into three classes, based on the uses intended—office, store and bar. Office fixtures include desks and tables bullt in certain spaces and intended to be left there; partitions between differen parts of the same room, and benches and seats which are made fast to the walls or the floor. Bar fixtures consist of racks and cabinets for glasses, frames in which to exhibit commodities for sale, and the bar itself. The fixtures for stores include counters, showcases, cabinets, shelves and benches and seats made to fit certain places. Banks use the same class of fixtures as offices. No attempt is here made to name or enumerate all articles classed as fixtures. That would not be possible, for special kinds and odd articles are constantly demanded. Sometimes the line separating fixtures from furniture cannot be exactly defined, nor the separating line between fixtures and finish, but after due allowance is made for exceptions the fixture industry is adequately defined in its scope.

sible, for special kinds and odd articles are constantly demanded. Sometimes the line separating fixtures from furniture cannot be exactly defined, nor the separating line between fixtures and finish, but after due allowance is made for exceptions the fixture industry is adequately defined in its scope.

No other industry in Tennessee buys wood of so high average price. The material is expensive because much of it is of high class and must he had in large sizes. Cabinets and counter tops require broad panels, and they are expensive. If extra wide, they are built up, usually of several ply veneer. An examination of Table 18 reveals the fact that a number of woods which are cheap in other industries are costiy in this. That is due to high grade and large prices. Sycamore is \$30, white ash over \$40, red oak, \$42, white oak still higher and so on. The cheapest is shortleaf pine. The whole quantity of that wood listed was used by a single manufacturer who was able to buy it cheap. Fixture manufacturers in Kentucky pay an average price of \$26.20 for their wood; it costs \$34.52 in North Carolina. \$41.44 in Illinois, \$40.40 in Maryland, \$44.12 in Wisconsin, and \$38.28 in Tennessee.

It should be borne in mind in this instance as in so many others that a mere ratio between prices for woods employed in a given industry in a number of states is not always a safe ground for the conclusion that the material is cheaper or dearer in one state than in another. A difference in price for a certain wood may be due to difference in grade; or a large amount of a costly wood increases the general average of all; or one cheap wood in large quantity lowers the general average of all. Mahogany in Table 18 cost \$155 a thousand, and 80,000 feet were reported. Suppose it had been 800,000 instead of 80,000. The average cost of all woods reported for the industry would be raised above \$75 a thousand.

above \$75 a thousand.

The woods in Table 18 which were largely employed as cores or backing for veneers or as Inside frames or shelves are red gum, shortleaf pine chestnut and black gum. The others possess figure, grain or color fitting them for outside places.

is that the wood must he fairly light, moderately cheap, not too dark in color, and it must produce elastic excelsior. The article has uses other than as packing material. Upholsterers make mattresses, cushions and filling for seats and backs of parlor furniture of it; but the amount going into commodities of that kind is much smaller than that employed for packing. Excelsior, even of the finest grades, is not in the same class with halr of Spanish moss for upholstery. It is packed in hales like hay and is sold by weight. It is not usually shipped far from the place of manufacture, hut each industrial

a facsimile of the casting to be molded. It is buried in damp sand which is tamped about it. The pattern is then removed in a way provided for, and the hollow space, the shape of the pattern, remains. The metal is poured in and the casting is formed. The flask is the box which holds the sand into which the casting is run. High-class wood is not essential for flask making as it is for patterns. The foundry is not the only user of patterns. They are necessary in shops of many kinds, and a certain class of patterns are called models.

Most of the sycamore and some of the maple in the miscellaneous table were converted into butcher

EXCELSIOR

Kinds of wood	Quantity used feet B. M.	annually per cent	Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown In Tennessee feet B. M.	out of Tennessee feet B. M.
Yellow poplar Black willow Shortleaf pine Basswood Buckeye Cottonwood	200,000 175,000 55,000 50,000	52.27 18.18 15.91 5.00 4.55 4.09	\$ 9.58 8.15 8.05 9.11 9.24 9.20	\$ 5,510 1,630 - 1,409 501 462 414	575,000 200,000 175,000 55,000 45,000	
Totals	1,100,000	100.00	\$ 9.02	\$ 9,926	1,100,000	

region has factories which supply the markets within reach.

Miscellaneous.

Much wood is used for manufacturing purposes in Tennessee which does not go to any of the industries represented in Tables 2 to 19 inclusive. It is made into various articles, so different in character and purpose that they cannot be iogically grouped in amounts large enough to be properly called industries. All such are represented in Table 20 as "Miscellaneous." Eighteen woods are included, all of them American, and all but one—long-leaf pine—native of Tennessee. It is not practicable to list all the kinds of articles made from the woods shown in the miscellaneous table; but some of the most important follow.

of the most important follow.

Some of the black walnut is bought by manufacturers of firearms, and is made into gunstocks and pistol grips. This has always been the leading gunstock wood of Tennessee, as well as of the country generally, and it holds the place in spite of advancing price. It does not appear, however, that the price paid for the walnut in Tahle 20 was very high. In former times a good many gunstocks were made in Tennessee which never saw a factory. They were cut out by hand for old-fashioned rifles, and were usually of maple. At the present day a few gunstocks are so made in the state, though no report of them was compiled in a way to render the data available for Table 20. Yellow wood (Cladrastis lutea) is used. This wood is known also as yellow ash, yellow locust and gopher wood. It takes a good polish and is serviceable.

White pine is the best wood for patterns because it cuts easily and holds its shape well, provided it has been thoroughly seasoned. Choice pattern

blocks. The old-style block, which was simply a piece of a log the proper length and stood on end, is not holding the ground it once had. Health boards and sanitary committees have discouraged its use on the ground that it is not conducive to health. The piece of a log checks and the opening cracks form lodging places for bacteria and other impurities where the scruhbing brush cannot reach them. The huilt-up meat block is less objectionable because it checks less. Thoroughly seasoned pieces are fitted together and held with dowels and glue. Blocks of that sort wear as well as the one-piece kind and are replacing them.

some of the hickory in the table was converted into skewers, a meat shop article, consisting of a small peg for preparing certain cuts of meat for the pet or over

the pot or oven.

A number of woods figure in the manufacture of play-ground equipments which are rapidly gaining in favor in all parts of the country. Among the articles are swings, slides, teeter boards, flying Dutchmen, toboggans and the like.

Brooms at wholesale are sold by weight, and if the handle is heavy a little less broomcorn may be used without resulting in an underweight broom.

The manufacturers of pumps draw for supplies upon the woods listed in Table 20. The sucker rods are of ash and hickory; the handles of beech, maple, hickory or ash; and the logs yeilow poplar, maple and basswood. The well sweep of early times and the old oaken and cedar buckets that hung in the wells are passing away and the pump is taking their place, but the change is by no means complete in Tennessee. Though the manufacture of pumps has reached respectable proportions, the bucket and sweep linger among the bills and valleys.

Laundry methods and appliances are likewise undergoing change, and a considerable part of the wood listed in the miscellaneous table is converted into washing machines, stationary tubs, wringers, dryers and other modern conveniences which are driving from use the old-time back-breaking tubs made by sawing whiskey barrels in two. The old tub and its worthy mate, the home-made rubbing board, have not disappeared, nor will they soon disappear entirely; but machinery to run by steam or some other power than muscle has entered the field and has lifted from feminine shoulders part of the burden that has oppressed since the days when

Table 18.

Kinds of wood	Quantity used feet B. M.	annually per cent
White oak	510,000 350,000	33.27 22.83
Red gum	130,000	8.48 6.52
Shortleaf pine	100,000	6.52
Mahogany	80,000	5.22 5.22
Chestnut	60,000 55,000	3.91 3.59
Yellow poplar	30,000 20,000	1.96 1.30
Sycamore	15,000 3,00°	.98
Black welnut		
Totaie	1,533,000	100.00

Excelsior.

The low average cost of wood bought by excelsion manufacturers is due to purchase in log form. Logs smaller than ordinary saw timber are suitable; but there, should not he too many knots. Excelsior is nothing more than narrow shavings cut by machinery adapted to that purpose; and if these shavings are broken into short lengths, as is likely to be the case if the wood is knotty, the product becomes little better than sawdust, and, of course, depreciates in value. The principal use for it is packing breakable articles of merchandise for shipping. If the excelsior is not soft, yielding and some what elastic as a mass, its worth is reduced. The machines that make it are equipped with knifelike points for slitting the bolt of wood lengthwise, and another blade that shaves off the scored surface and makes the narrow, thin ribbons of wood constituting the manufactured article. There are different qualities, depending upon the fineness of the ribbons and the quality of the wood used as raw material. Yellow poplar is the leading wood for this industry in Tennessee, and costs \$9.58 per thousand feet; in Wisconsin the principal excelsior wood is aspen and costs \$11.37; in North Carolina white pine and yellow poplar are reported in equal amounts, the former costing \$6.34, the latter \$10. Most regions have one or more available woods; some have many. The most essential requirement

ble 18.			
			Grown
Average	Total	Grown in	out of
cost per	cost f. o. b.	Tennessee	Tennessee
1,000 ft.	factory	feet B. M.	feet B. M.
\$43.33	\$ 22,100	285,000	225,000
16.00	5,600	225,000	125,000
51.85	6.740	30,000	100.000
12.00	1,200	100,000	
16.00	1,600	100,000	
155.00	12,400		80.000
42.44	3,395	80,000	
21.33	1,280	50,000	10.000
40.45	2,225	30,000	25,000
35.00	1,050	30,000	
25.00	500		20,000
30.00	450	7.000	8,000
50.04	150	1,000	2,050
\$38,28	\$ 58,690	. 938,000	595,000

woods come from old trees such as are seldom found in forests now. Material of that class is often called pumpkin pine or cork pine. Foundries use some of the best obtainable wood for patterns. Other species have taken the place of white pine for certain kinds of patterns; cypress is one and sugar pine of California is another, but neither of them was reported by pattern makers in Tennessee. Foundry flasks go with patterns. The pattern is

MISCELLANEOUS.

		18	Die 20.			
						Grown
			Average	Total	Grown in	out of
	Quantity used	annually	cost per	cost f. o. b.	Tennessee	Tennessee
Kinds of wood	feet B. M.	per cent	1.000 ft.	factory	feet B. M.	feet B. M.
Red gum	3,414,628	24.76	\$14.40	\$ 49,162	1,050,000	2,364,628
Cottonwood	3,000,000	21.75	21.00	63,000		3,000,000
Hickory	1,352,000	9.80	17.71	23,940	402,000	950,000
White oak	1,187,000	8.61	19.59	23,255	1,187,000	
Shortleaf pine	1,080,000	7.83	19.85	21,440	300,000	780,000
Red oak	1,050,000	7.61	1.8.17	19,075	990,000	60,000
Black ash	700,000	5.07	14.00	9,800		700,000
Yellow poplar	565.000	4.10	18.69	10,560	565,000	
Chestnut	400,000	2.90	15.00	6,000	400,000	
Beech	325,000	2.36	15.23	4,950	300,000	25,000
Sycamore	200,000	1,45	15.00	3,000	200,000	
Sugar maple	115,000	.83	23.13	2,660	50,000	65,000
White ash	100,000	.73	14.00	1,400	100,000	
Basswood	100,000	.72	18.00	1,800	100,000	*******
Longleaf plne	100,000	.73	19.00	1,900		100.000
Silver maple	70,000	.51	16.43	1,150	50,000	20,000
Black walnut	25,000	.18	30.00	750	25,000	*******
White pine	8,000	.06	33.75	270	, 3,000	5,000
Totals	13,791,628	100.00	\$17.70	\$ 244,112	5,722,000	8,069,628

Homer sang the praises of the washerwoman,

Supplies for dairymen and poulterers are manufactured on a small scale in Tennessee and employ most of the species shown in Table 20, though none of them in large amounts. Makers of refrigerators draw material from these woods also, and kitchen cabinets belong in the same class. Curtain poles of chestnut are produced in quantity worthy of mention. Well-boring machines are constructed of white and red oak and of ash. Cotton picking baskets are woven of thin strips of white oak.

Summary of Industries.

Table 21 brings together some of the essential features of the preceding tables and affords a brief review of all and a convenient means of comparing

industry. If not, the material goes into the miscellaneous table. No fixed rule has been set for the laneous table. No fixed rule has been set for the minimum quantity of wood for a separate industry. Each case is decided on its merits. In the Missouri Each case is decided on its merits. In the Missouri report a separate table was given to airship manufacture, though the amount of wood was very small. The reason for doing so was that the line was distinct from all others, and was of special interest. This explanation is offered to remove misunderstanding if such may exist, as to just what is meant by the term "wood-using industry" as it is employed in state reports like this. It is nothing more than a convenient and somewhat arbitrary separation into groups of the woods manufactured in a state, the separation heing based not on the kinds of wood, but on the products made. With this kinds of wood, but on the products made. With this explanation, a comparison of Tennessee's wood-

SUMMARY OF WOODS USED BY INDUSTRIES IN TENNESSEE.

						Grown
			Average	Total	Grown in	out of
	Quantity used	annually	cost per	cost f. o. b.	Tennessee	Tennessee
Industries	feet B. M.	per cent	1,000 ft.	factory	per cent	per cent
Planing mill products	147,214,950	35.57	\$22.03	\$3,243,004	66.01	33.99
Boxes and crates (pack-	111,411,000		4==	40,220,000		
ing)	77,979,510	18.84	16.26	1,267,707	73,44	26.56
Furniture	39,272,500	9.49	22.34	877,221	65.26	34.74
Sash, doors, blinds, and	00,21-,000					
general millwork	38,216,500	9.23	23.87	912,173	39.05	60.95
Vehicles and vehicle parts	33,492,500	8.09	24.99	836,855	86.47	13.53
Car construction	14,164,918	3.42	19.41	274,974	20.04	79.96
Miscellaneous	13,791,628	3.33	17.70	244,112	41.49	58.51
Handles	9,723,776	2.35	22.63	220,086	87.02	12.98
Caskets and coffins	9,494,085	2,29	16.53	156,976	48.46	51.54
Chairs	6,757,000	1.63	15.01	101,448	68.92	31.08
Pencil stock	5,325,000	1.29	8.30	44,187	73.71	26,29
Woodenware and novel-						
ties	3,261,800	.79	20.82	67,918	38.68	61.32
Trunks and valises	2,890,000	.70	17.55	50,716	87.37	12.63
Agricultural implements.	2,890,000	.70	22.58	65,250	61.94	38.06
Sporting and athletic					4.00	05.04
goods	2,625,000	.64	17.48	45,875	4.76	95.24
Shuttles, spools and					-0	40.05
bobbins	2,370,000	.57	23.40	55,452	56.75	43.25
Boat and ship building	1,776,000	.43	26.95	47,870	1.41	98.59
Fixtures	1,533,000	.37	38.28	58,690	61.19	38.81
Excelsior	1,100,000	.27	9.02	9,926	100.00	
Totals	413,878,167	100.00	\$20.73	\$8,580,440	63.61	36.39

them. The term industry as employed in reports such as this is general rather than exact. It is not the same everywhere. Some regions have industries which others have not. For example, Tennestries which others have not. For example, Tennessee produces playground equipment, but not in amount sufficient to be called an industry. It is an industry of much importance in Illinois. Tennessee supports a lead pencil stock industry. Illinois has nothing of the kind. What in Tennessee is grouped as a single industry under the name furniture is sufficiently large and diversified to make several industries in Illinois. Thus it goes all the way through the list. In preparing such a report as this, a decision must be arrived at whether the making of a distinct class of commodities in the state is of enough importance to be considered an state is of enough importance to be considered an

using industries with those of a few other states

Will be of interest.		
		Average Cost
State.	Industries.	of Wood.
Tennessee	19	\$20 73
Louisiana	9	11 63
Mississippi	9	12 22
Maryland	13	20 67
Kentucky	19	23 07
Massachusetts	20	21 29
North Carolina	21	14 16
Missourl		24 12
Illinois	51	28 76

If the number of woods listed in the state were compared, the differences would be as marked as in cost of material and the number of industries.

Apportionment of Woods Among Industries.

Apportionment of Woods Among Industries.

Some industries make use of certain woods only, though others may be available, while other industries take what is cheapest and most convenient. Generally, however, manufacturers choose woods carefully and select those possessing in the highest degree the properties desired. Some manufacturers who specialize on a single commodity use few woods. The maker of pencil slats is an example. He has few species to choose from, for most woods are totally unsuited to his purpose, and he depends upon red cedar in Tennessee. But red cedar is good for many things, and Table 22 shows that five industries use it, though pencil stock takes most. White oak has no place in six of the tables. most. White oak has no place in six of the tables. Makers of pencil slats, shuttles and of excelsior can do nothing with white oak, though other manufacturers could scarcely carry on business without it. It is evident, therefore, that there is no such thing as an all-round wood. More species are good for nothing than are good for everything. Black willow appears in only two columns of Table 22. That is not because it was not fit for any of the other places, but because it was not convenient. The cucumber tree was all used by box and crate makers, and yet it is good material for manufacture makers, and yet it is good material for manufacture into the products of every industry in Tennessee except pencil slats. Scarcity and inconvenience kept it out, although it was probably made use of by a number of factories that did not report it separately because they thought it was basswood.

Cost of Species by Industries.

Table 23 is a companion of 22. The species are the same in both, but the former table showed how the material was apportioned among the industries, the material was apportioned among the industries, and this gives the average cost of each one of the woods to the factories that used them. The first feature to attract attention in studying Table 23 is the remarkable differences in prices paid for the same species. Some paid two or three times as much as others; some of the red cedar and white oak varied as one to five, and black wainut as seven to one. These differences are so great that it becomes necessary to find reasons for them, or the value of the table as statistics will be lessened. No general statement will cover all. Each price must be investigated for itself, for what applies to one may have nothing to do with another. The nearest approach to a general statement that can be made to apply in most instances is that cost of wood is controlled by three factors—grade, supply wood is controlled by three factors—grade, supply and convenience. When unexpected differences in cost occur for the same species when bought by several manufacturers, an explanation is usually possible when the three factors—grade, supply and convenience—are analyzed. Sometimes the facts essential to an intelligent analysis are not available, and then the figures lose some of their value.

PERCENTAGE OF THE DIFFEBENT KINDS OF WOOD USED BY EACH INDUSTRY.

Table 22.																			
Kinds of Wood	Agricultural Implements	Boat and ship building	Boxes and crates, packing	Car construction	Caskets and coffins	Chairs	Excelsior	Flxtures	Furniture	Handles	Miscellaneous	Pencil stock	Planing mill products	Sash, doors, blinds and general millwork	Shuttles, spools, and bobbins	Sporting and athletic goods	Trunks and vallses	Vehicles and vehicle parts	Woodenware and novelties
Basswood Beech Birch Black ash Black gum Black gum Black willow Buckeye Bur oak Butternut Cherry Chestnut Chestnut oak Cottonwood Cucumber tree Cypress Dogwood Hackberry Hemlock Hickory Largetooth aspen Longleaf pine Mahogany Osage orange Persimmon	50.00	,01	29.80 8.41 	100.00	3.84 7.04 12.82 14.96	2.15 7.33	.91 	9.54 9.68 ,58	1.77 .43 1.47 4.84 2.88 1.76 2.21 1.95 	26.55	1.66 5.58 97.90 4.81 2.89 10.43 4.16		40.25 77.99 67.13 2.10 1.74 74.62 55.56 8.56 6.95 27.73 100.00 42.73 47.69 54.64	10.95 1.03 14.53 13.08 13.09 31.90 10.00 53.61 15.88 1.37	100.00	7.85	5.14 6.34 1.45 .04	.09 1.32 .19 60.83 2.54	1.00 2.83 3.48 3.69
Persimmon Red cedar Red gum Red oak River birch Sassafras Shittimwood Shortleaf pine Silver maple Silpery elm Sugar maple Sycamore Table Mt. plue Texan oak Tupelo White ash White cedar White oak White olm White oak White plne Yellow oak Yellow poplar *Less than 1-100	.85	24.81	33.47 100.00 31.34 24.13 36.46 100.00 7.72 16.16 100.00 9.53 1.25 29.41 1.50 41.43 11.77 31.65	9.47	1.46 3.03 .20 	9.77			1.22 27.00 18.23 1.12 17.43 1.38 42.62 9.28 21.65 19.46 29.41 2.03	1.42	1.98 1.23 2.7.63 1.92 3.5 1.11	81.14	24.99 60.61 99.11 30.07 50.65 55.17 38.95 54.85 41.36 7.06 45.07 21.22 25.8.82 49.81	31 32 5.74 .89 68.66 27.88 13.81 8.58 2.35 5.20 .44 7.04	97.79	2.21	1.28 1.06 39.53	1.43 1.55 	15.87

An example from actual statistics compiled in course of the preparation of this series of state course of the preparation of this series of state wood-using reports will llustrate this better than it can be done by laying down general rules. A maker of fine furniture in Massachusetts paid \$750 a thousand for exquisitely figured mahogany; a coffin maker in Louisiana bought toredo-bored mahogany from Honduras for one-twentieth of that price. These figures for mahogany placed side by side with no explanation of grade or condition would raise doubt in most minds concerning the correctness of the statistics. The difference is so great as to appear unreasonable. It would seem great as to appear unreasonable. It would seem more unreasonable if both purchases were made in the same state, instead of fifteen hundred miles apart; yet both might have occurred in the same city. Each manufacturer hought the kind and grade to made the price paid by each was reasonable. he needed, and the price paid by each was reasonable.

Table 23 shows many costs of woods in which

differences for some species are great, though none in quite such marked contrast as in the case of feather mahogany in Massachusetts and the perforated grade in Louisiana. There is a reason in practically every instance where large difference oractically every instance where large universelved in cost is shown, but to seek out and present all conditions and circumstances for so many prices would swell the report to a size that would discourage rather than stimulate careful study.

larly desirable that a paying by-product be made from the dust. A slat man in Tennessee sells his dust to chemists who make "moth medicine." Another cedar mill converts its scraps into cedar oil. A porch column manufacturer sells the blocks from his establishment to a maker of large two-piece boxes, such as powders and lubricants are sometimes packed in.

These are a few of the rather large number of larger where what seemed to be hopeless waster.

Instances where what seemed to be hopeless waste was converted into profit by simply finding the men who wanted it. If a thing is fit for use, there is nearly always some one somewhere who wants it. nearly always some one somewhere who wants it. Some wastes go on, and at present no practicable remedy has been found. Large quantities of very small, odd-sized blocks accumulate about woodworking factories, and efforts to find some use other than fuel for them have thus far been unavalling. Cheaper distillation plants than are now in use may at some future time convert such waste, including shavings and saydust into salable by including shavings and sawdust, into salable byproducts.

Appendix.

The foregoing parts of this report were compiled from data collected by the Forest Service in the winter of 1911-12. The state has forest resources not fully shown in the figures thus far presented which deal only with manufactured products, with wood

614,000 feet were softwoods. The quantities by species follow:

Oak	421.925,000
Yellow poplar	138,705,000
Tellow popial	
Yellow pine	89,296,000
Red gum	62,461,000
Chestnut	58,049,000
Theleaner	45.151.000
Hickory	
White pine	39,387,000
Hemlock	36,744,000
Red cedar	31,683,000
Dooch	
Beech	16,385,000
Ash	15,043,000
Cypress	10,333,000
Cottonwood	8,954,000
Basswood	8,500,000
Maple	8,289,000
Elm	7.225,000
Sycamore	5.026.000
Walnut	3,432,000
Tupelo	2,670,000
Birch	807.000
Spruce	171,000
All others	6,239,000
CITED TO MAKE THE PARTY OF THE	

The above table shows the cut of lumber in the state. About 260,000,000 feet of this was further manufactured, and Is represented in Tables 1 to 23. inclusive, in this report. The remaining 756,000,000 feet were used in the rough or were shipped out of the state.

Total1,016,475,000

AVERAGE COST OF THE DIFFERENT KINDS OF WOOD USED BY EACH INDUSTRY, Table 23.																		
Agricultural Implements	Boat and ship building	Boxes and crates, packing	Car construction	Caskets and coffins	Chairs	Excelsior	Flxtures	Furniture	Handies	Miscellaneous	Pencil stock	Planing mill products	Sash, doors, blinds, and general millwork	Shuttles, spools, and bobbins	Sporting and athletic goods	Trunks and valises	Vehicles and vehicle parts	Woodenware and novelties
Basswood		15.21		\$20.82	\$12.30 12.00	\$ 9.11	51.85	\$24.60 18.48 18.00		\$18.00 15.23		\$18.87 18.12 37.60 12.00	\$25.68 14.83 31.06			\$24.56	\$31.09 20.52	\$22.00 10.36
Black gum Black walnut Black willow		9.69		45.00 18.00		8.15	16.00 50.00	15.00 36.67		30.00		12.72 20.43 12.50	39.49				175.00	• • • • • • • • • • • • • • • • • • • •
Buckeye Bur oak Butternut Cherry		9.00	20.02			9.24		40.00		*****	• • • • • • • • • • • • • • • • • • • •	13.72 18.95 20.00	53.21			21.33		
Chestnut 17.20 Chestnut oak 17.20 Cottonwood Cucumber tree		21.99 10.00	16.00 20.64	13.94		9.20	21.33	13.57 25.00		21.00		27.59 17.50	35.06 15.00			16.00	• • • • •	20.00
Cypress Dogwood Hackberry Hemlock				12.00		*****					*****	27.47 12.50 9.43	33.42	22.07	1000		*****	20.00
Largetooth aspen Longleaf pine Mahogany			21.32		12.62		155.00	19.50 25.00 18.77 300.00	22.80	17.71		20.97 116.00	16.35 188.00		17.25	20.00	23.94	• • • • • • • • • • • • • • • • • • • •
Osage orange Perslmmon Red cedar Red gum		12,92	16.25	42.00 14.96 18.00	10.00		16.00	36.88 14.55	10.00	14.40	8.30	12.92	33.75 17.86 21.66	26.80	35.00	32.00	200.00 25.15 31.33	24.00 20.00
Red oak 29.65 River birch Sassafras Shittlmwood		12.00	18.00	12.97	15.53	2.05	12.00	24.03		18.17	• • • • • • • • • • • • • • • • • • • •	24:88	24.67 19.00			9.00	18.00	
Shortleaf pine 20.00 Silver maple Slippery elm Sugar maple Sycamore		13.33 15.19 15.00	16.00	12.51	12.38	8.05	12.00 25.00 30.00	16.61 25.19 16.00		16.43 23.13 15.00	• • • • • • • • • • • • • • • • • • • •	17.41 12.78 19.97 13.67	17.88			3.00	13.00	*****
Table Mt. plne Texan oak Tupelo		12.00	18.49				40,45	19.97	10.00	14.00		24.23	31.74		22.50	13.27	18.12	
White ash White cedar White elm White oak White pine	23.00	14.88 16.83	18.65	16.01	14.55		43.33	18.05 29.92	29.23	19.59	7.48	16.33 24.27 16.53	14.00 25.78 20.00			37.87	26.19	• • • • • • • • • • • • • • • • • • • •
Yellow oak 18.44		12.00	42.12	22.63	\$15.01	9.58	35.00 \$38.28	16.00 25.25 \$22.34	\$22.63	18.69	\$ 8.30	15.00 24.08 \$22.03	30.28 \$23.87	\$23.40	\$17.48	17.33 \$17.55	43.07 \$24.99	\$20.82

Saving Waste.

Saving Waste.

The waste problem is ever present in wood-working establishments. There are few manufacturers who do not carefully study it. The day has passed when valuable lumber is wilfully thrown away. Some of it still goes to the furnace or the scrap pile, but it is because no way has been found to make a profit from the rejected material. The constant working of many persons along the line of better utilization has cut down waste in many quarters. A tendency toward a certain kind of cooperation among manufacturers is observable. They are helping one another to use scraps, and, of course, each expects to make something for himcourse, each expects to make something for himself while he is helping others. If one has material which he cannot use, he tries to find some one who can use it; or if he needs stuff which may be in some one's else scrap heap, he makes his wants known, and increased business for both often follows. known, and increased business for both often follows. A plano manufacturer needed choice wood for sharps, and found enough to make 80,000 in the waste heap of a shuttle block maker. Another factory man was in the market for small pieces of hardwood for a certain kind of chisel handle, and he, too, found what he wanted in a shuttle block maker's back yard. Workers in red cedar sell their sawdust to floor sweeping compound companies. Pencil slat cedar is sawed in small pieces and much of it goes to sawdust, and it is particu-

converted into finished articles ready for use; but a great deal of other material comes from Tennes see's timber regions. Much rough lumber is consumed without passing through any shop or factory after it leaves the saw mill. It is built into bridges, frames of houses, fences, railroads and is in other ways disposed of without further manufacture. Material of that kind has not been accounted for up to this point in this report. It is evident that justice would not be fully accorded the state's forest resources in any report which does not take rough lumber into account and show how much is used without further manufacture after it has left the saw mill. Unfortunately, complete data of that kind can not be presented because It was never collected; but the United States Census Bureau has compiled statistics showing the annual cut of lumber in Tennessee by species; the extent of the cooperage business; the output of veneers, and other facts concerning woods which go in the rough or partly rough condition to the consumer. The figures which follow have been condensed from the which follow have been condensed from the latest available census returns for Tennessee.

Lumber Cut in 1910.

Saw mills in Tennessee to the number of 1,774 reported to the Bureau of the Census a cut of 1,016,475,000 feet of lumber in 1910, of which 207,

Other Products.

The yearly output of lath in Tennessee, as shown census figures, is 21,550,000; and of shingles 19.044.000.

Cooperage is a large husiness in the state and is of two kinds—tight and slack. Tight cooperage is of a kind made to contain such liquids as oil, whishey, wine, beer, etc., and slack cooperage is means for dry commodities, such as vegetables, fruits, cement, lime and numerous others. The line separating the two kinds is at times distinct enough, and ing the two kinds is at times distinct enough, and at times there seems to be overlapping. Generally tight cooperage is understood to hold oils, wines and spiritous liquors, and all other kinds are slack cooperage. Statistics show that in 1910 Tennessee produced 60,938.000 tight cooperage staves, most of which were oak, and 5.390,978 sets of heading. Many woods are not fit for tight cooperage. Some contain substances which color or taint the contents, but the chief objection to the majority of woods is that they are too porous and leakage results.

Almost any wood that may be had in sufficient quantity and of adequate size is suitable for some sort of slack cooperage. There is ample room, however, for choice among the many available woods. Some suit one thing best, some another. Butter tubs are not made from woods with strong odors, but material of that kind is not objectionable for

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cement barrels. Strength has much to do with the suitability of a wood for a specific purpose. Red gum, cottonwood, elm and most of the oaks are strong enough for all ordinary purposes. Cottonwood is excellent material for flour barrels, and yellogs of low poplar for tobacco hogsheads, though less of it is so used than formerly. The following figures show Tennessee's output of slack cooperage in 1910 and the woods, with the amount of each:

	Staves.
Oak	16,632,000
Cottonwood	12,366,000
Red gum	11,925,000
Elm	3,736,000
Ash	2,247,000
Maple	703,000
Beech	500,000
Ali others	1,621,000
	10.720.000
Total	19,730,000

Heading is counted by sets, and the number in Tennessee in 1910 was 2,572,000 of all woods, and of hoops 18,041,000.

In the manufacture of hoops in Tennessee elm is by all odds the most important wood. The hoops are sawed from logs. A great change in hoop making has occurred in the last fifty years. The hoop-pole business, as it once existed, seems to be no more in Tennessee. The hoops were once made from little saplings, from one to two inches in diameter. Such a sapling made one hoop, or if it would split nicely it was good for two. These were cut by thousands, and most of them were shaved and notched at odd times by farmers who snaved and noticed at odd times by farmers who traded them for merchaudise or sold them for what cash they would bring. It was a remarkably wasteful business. No one who cut the saplings then seemed to consider that every one was a little tree seemed to consider that every one was a little tree which, if left alone, would become a large tree. The straightest and best were taken, and they were the ones to grow into the best trees. Fortunately that business is a thing of the past in Tennessee, and they now make hoops of large trees.

In 1910 Tennessee stood eighth among the states in the output of veneer, its total being 27,665,000 feet, log scale. Veneer is lumber cut very thin. So thin are some of the sheets that more than one hundred are required to make one inch in thick-

So thin are some of the sheets that more than one hundred are required to make one inch in thickness. Most of the veneer is not nearly as thin. It is of three kinds, classified according to the method of manufacture in rotary cut, sawed and sliced. More than nine-tenths of all veneer produced in this country is rotary cut. Expensive hardwoods are usually sawed or sliced. Spanish cedar, a moderately cheap foreign softwood, used by cigar box makers, is often sliced very thin. Rotary cut veneer is reduced from the round log, by revolving it against a strong knife which pares off a thin layer round and round until only a small core remains of the log. Thin saws convert seasoned lumber into veneer, or a log may be forced over the edge of a powerful knife and the sliced article results. The forests of Tennessee contributed liberally to The forests of Tennessee contributed liberally to the country's supply of tanning materials, though some was used in that state which came from elsewhere. In 1910 the reported quantity of hemlock bark was 1.193 tons, worth \$9,505; oak, 23,843 tons, worth \$200,396.

Uses of Wood.

Manufacturers and others in Tennessee reported the following uses for the various woods listed in Table 1. It should not be understood that these are all the uses that have been found for wood. They include only those reported during the progress of the investigation in the state.

Basswood. Excelsior. Finish (interior). Frames (window). Furniture.

Blnck Gum.

Black Walnut.

Binck Willow.

Caskets and coffins. Coat hangers. Curtain poles. Crating. Doors.

Berry crates. Church pews. Egg cases. Finish (interior).

Altars.
Bods.
Cabinet work.
Caskets.
Church fixtures.
Finish (interior).

Boxes (packing). Casing.

Bed slats. Brown handles. Chairs. Curtain poles. Flooring. Furniture (inside).

Balusters.. Cabinet work. Casing. Chairs.

Dressers. Finish (interior). Boxes. Caskets and coffins. Casing. Egg crates.

Birch (Yellow)

Furniture, Mantels, Musical, instruments, Stair work, Tables, Wardrobes,

Furniture (inside). Siding. Table legs.

Furniture. Gum stocks. Moldings. Musical instruments. Stair work.

Excelsior. Furniture (inside).

Buckeye. Excelsior. Flooring. Trunks

Kitchen cabinets. Kitchen tables. Siding. Tables. Wagon boxes.

Boxes (packing). Casing. Caskets and coffins. Crates. Curtain poles. Doors.

Cabinets.
Car construction.
Finish (interior).
Furniture.
Mantels.

Ceiling. Finish (interior).

Boxes (packing). Finish (interior). Furniture (inside).

Cottonwood.

Boxes. Cabinet work. Doors.

Balusters. Boats.
Butter tubs.
Candy pails.
Casing.
Cornice.

Boxes (packing). Crates. Coops.

Boxes. Ceiling. Crates.

Athletic goods.
Cant-hook handles.
Chairs.
Chicken coops.
Handles.
Golf sticks.

Agricultural implements.
Car construction.
Curtain poles. Doors.
Flooring.
Finish (interior).
Framing. Bank fixtures.

Bureaus. Cabinet work. Car construction. Caskets. Furniture.

Bobbins. Golf-stick heads,

Cabinets.
Cedar chests.
Ceiling.
Coffins.

Berry baskets. Ceiling. Chairs. Chicken coops. Church pews. Curtain poles. Finish (interior).

Chairs. Chicken coops. Ceiling. Curtain poles. Curtain poors.
Doors.
Flooring.
Finish (interior).
Furniture.
Hat racks.
Kitchen cabinets.

Berry cases, Cabinet work.

Boxes. Cabinets.

Berry cases.
Curtain poles.
Egg cases.
Finish (interior).

Baskets.
Berry cases.
Chairs.
Curtain poles.
Egg crates.

Base boards. Broom handles. Chairs. Couch frames. Curtain poles. Flooring.

Butteruut.

Fixtures (store and office).
Molding.
Chestnut.

Finish (interior).
Furniture.
Mantels.
Moldings. Screens. Trunk slats.

Cherry.

Moldings. Showcases. Store fixtures. Window frames.

Flooring. Plow handles.

Chestnut Onk.

Shittimwood. Imitation work.
Mantels.
Sash.

Box boards (wagons). Boxes (crating). Butter pails. Candy baskets. Egg cases, Excelsior. Panels (wagon). Oil boxes.

Cucumber Tree.

Finish (interior). Furniture (inside). Sash and frames.

Frames (doors). Panels. Siding. Tanks. Window frames.

Dogwood.

Shuttle blocks.

Hackberry.

Egg cases. Trunk slats.

Hemlock.

Sheathing. Siding. Weatherboardings.

Hickory.

Meat skewers. Spokes. Sucker rods. Trunk slats. Wagon stock.

Longleaf Pine.

Hoppers.
Pickets.
Refrigerators.
Sash.
Sign boards.
Spring cot frames.
Wagon beds.

Muhogauy.

Mantels.
Panels.
Sash, doors, etc.
Tables. Tables. Window screens.

Perslmmon,

Shuttle blocks.

Flooring. Novelties. Pencil stock. Siding. Wardrobes.

Red Gum.

Hundles.
Handles.
Mantels.
Molding.
Pump stock.
Siding.
Wagon boxes.

Red Oak.

Mantels. Moldings. Moldings.
Panels.
Panels.
Plow handles.
Refrigerators.
Screens.
Siding.
Tables.
Wagon stock.

River Birch. Furniture.

Molding. Sash frames. Window frames.

Fixtures (office and store). Furniture. Show cases. Table legs.

Sliver Maple.

Flooring. Finish (interior). Furniture. Mantels. Refrigerators.

Finish (interior). Furniture. Mantels. Refrigerators. Stands. Tables.

Shortleaf Plne.

Boxes. Caskets. Church pews. Coffins. Cornice. Doors. Hoppers. Molding. Refrigerators. Sash. Siding. Window frames.

Flooring.

Ball bats. Boat cars. Curtain poles.

Berry crates. Butter tubs. Candy pails.

Flooring. Finish (interior). General mill work. Handles.

Boats.
Ceiling.
Chairs.
Coops.
Couch frames.
Curtain poles.

Flooring.

Boxes. Ceiling. Coffins. Molding.

Crates

Curtain poles. Furniture. Mantels.

Doors. Finish (interior).

Finish (interior). Kitchen cabinets. Siding.

White Ash.

Implements.
Moiding.
Sash.
Sucker rods.
Trunks.
Vehicle parts.
Wagon reaches.

White Eim.

Berry crates. Boxes. Chairs. Chicken coops. Egg crates. Trunks. Wardrobes.

White Oak.

k.
Handles.
Hat racks.
Hoppers.
Plow stocks.
Porch seats.
Refrigerators.
Screws.
Tables.
Wagon stock.

White Pine.

Patterns, Siding, Wagon boxes.

Yellow Poplar. Berry boxes. Car construction. Caskets. Ceiling. Molding. Porch seats. Sash.

Screens.
Siding.
Tables.
Wagon beds.

Directory.

Below is a list of Tennessee wood-using manufacturers who supplied the data contained in this report. Those manufacturing several products classified under different industries will appear in the list, with their addresses, under more than one industry.

Agricultural Implements.

Chaitanooga Implement & Mfg. Co. Chaitanooga Chattanooga Plow Co. Chaitanooga Newell & Sanders Co. Chaitanooga The Harriman Mfg. Co. Harriman C. D. High & Co. Hartsville Wells-Jones Plow Co. Jackson Harris Mfg. Co. Johnson City The Wm. J. Oliver Mfg. Co. Knoxville

C. D. High & Co. Jackson
Harris Mfg. Co. Johnson City
The Wm. J. Oliver Mfg. Co. Johnson City
The Wm. J. Oliver Mfg. Co. Knoxville

Roxes and Crates, Packing.

Chattanooga Bottle & Glass Mfg. Co. Alton Park
Duckworth Lumber Co. Bridgeport
Paxton Lumber Co. Bridgeport
Paxton Lumber Co. Chattanooga
Chattanooga Box & Lumber Co. Chattanooga
Chattanooga Goffin & Casket Co. Chattanooga
Chattanooga Implement & Mfg. Co. Chattanooga
Chattanooga Plow Co. Chattanooga
Chiverside Lumber Co. Columbia
Cookeville Veneer Co. Coveville
Cloy & Nants Dickson
A. H. Leathers Handle Co. Dickson
Dyer Fruit Box Mfg. Co. Erwin
Graysville Fruit Package Co. Graysville
Ward Kent Co. Greenfield
Ward Kent Co. Greenfield
Ward Kent Co. Harriman
The Weis & Lesh Mfg. Co. Harriman
The Weis & Lesh Mfg. Co. Knoxville
Knoxville Saw Mill Co. Knoxville
Knoxville Saw Mill Co. Knoxville
Knoxville Saw Mill Co. Knoxville
Walter Lutz & Co. Knoxville
Knoxville Saw Mill Co. Knoxville
Walter Lutz & Co. Knoxville
Noss Lumber Co. Knoxville
Wanter Lutz & Co. Knoxville
Noss Lumber Co. Knoxville
Noss Lumber Co. Knoxville
Noss Lumber Co. Knoxville
Noss Lumber Co. Memphis
Darnell-Taenzer Lumber Co. Memphis
Darnell-Taenzer Lumber Co. Memphis
Darnell-Taenzer Lumber Co. Nashville
Sequatchie Handle Works Sequatchie
J. E. Edwards Sequatchie
Sequatchie Handle Works Sequatchie
J. E. Edwards Sequatchie
J. E. Edwards Sequatchie
Sequatchie Handle Works Sequatchie
J. E. Edwards Sequatchie
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J. E. Edwards Se

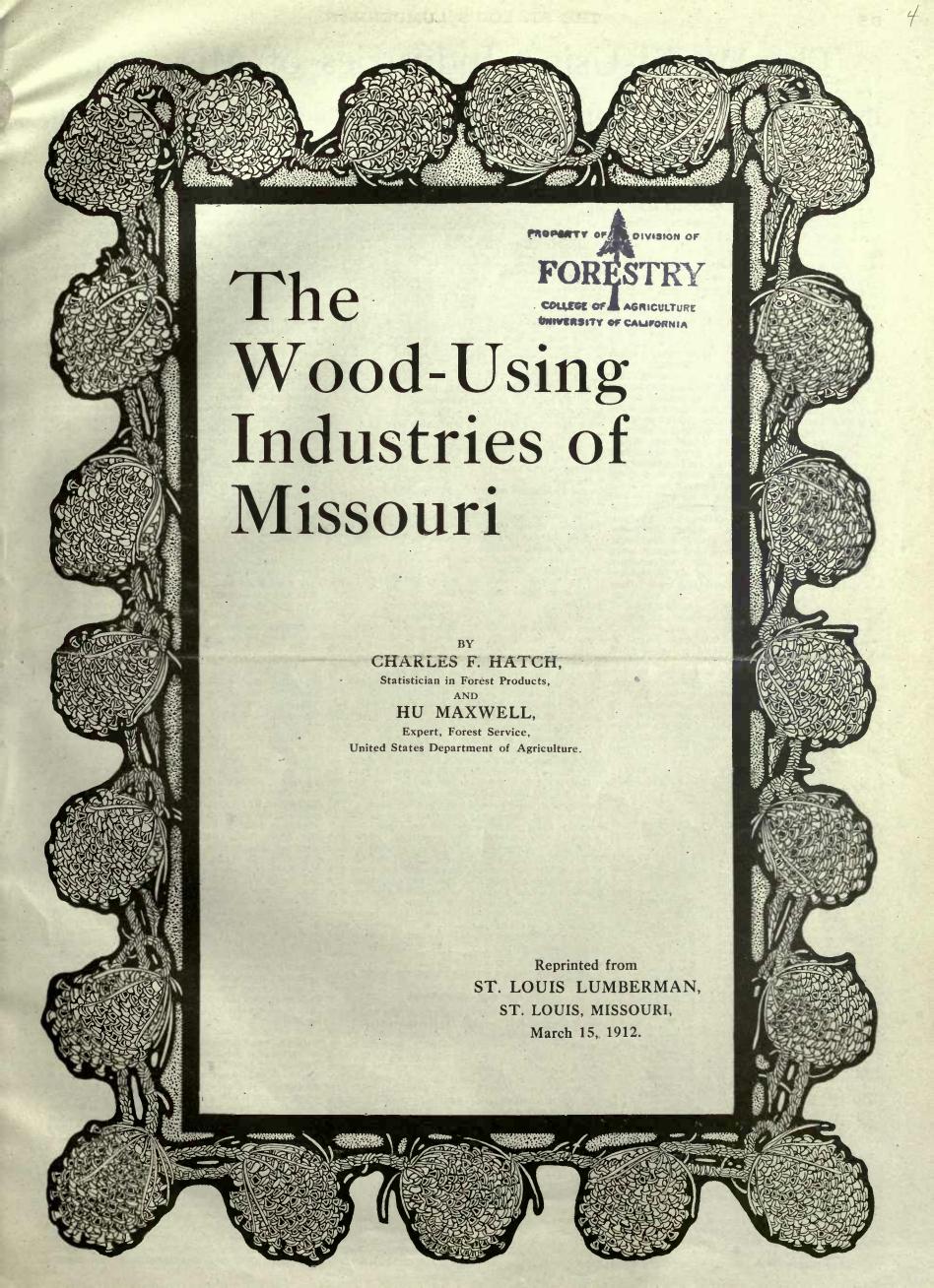
Cuskets and Coffins.

Chakets and Collins.

Bristol Coffin Co. Bristol Chattanooga Coffin & Casket Co. Chattanooga Tennessee Coffin & Casket Co. Chattanooga Cleveland Coffin & Casket Co. Cleveland Hall & Donahue Coffin Co. Knoxville Knoxville Coffin Co. Knoxville Maryville Planing Mills Maryville Southern Coffin & Casket Co. Maryville Memphis Coffin Co. Memphis John T. Walker Rogersville

Chulrs.

	02					
	Madisonville Chair Co	le	Wilder & Leach	Huntingdon	Knoxville Furniture Co	
	Johnson-Baker-Donaldson Chair CoMorristow Larkin Company of AmericaSouth Memphi	IS	Jellico Lumber Co	Jellico	Nickerson Mfg. Co	Knoxville
	T. A. GunnTullahom	ıa	Harris Mfg. Co	Johnson City	D. M. Rose Lumber Co	Knoxville
	Excelsior. Patton-Black Mfg. Co	n	Broadway Mfg. Co	Knoxville	Tennessee Mantel Mfg. Co Wilson County Planing Mill Co	
	Knovville Coffin Co	1e	F. B. Cooley & Son	Knoxville	Electric Lumber Co	Lenoir Clty
	Knoxville Excelsior Mattress Co	le	T. M. Michaels	Knoxville	John J. Lutz Mfg. Co W. B. Presley	Loudon
	Fixtures.		D. M. Rose Lumber Co	Knoxville	D. D. Smythe	Lynchburg
	Athens Planing WillAthen	ıs	Brown Hunt Co	Lafayette	J. R. Burllason	Madisonville
	Budde-Lindsay Mfg. Co. Jackso Southern Seating & Cabinet Co. Jackso	n	Freeman Mill Co	Larayette	Builders' Lumber Co	
	Furniture.		A. P. Wyley	Lawrenceburg	Cole Mfg. Co	
		0.0	Electric Lumber Co	Lenoir City	Denton Lumber Co	
	Athens Table & Mfg. Co	a.	B. N. McGaugh & Son	Lewisburg	Wabash Screen Door Co Walden Braxton Mfg. Co	Memphis
	Hunt Spring Bed Co	a	T. Edwards	Lexington	J. M. Hull	
	W I Oakes Chair Factory	a	Draper Bros		Perkins-Crichlow Co	
	J. H. Thomas & Co. Columbi Erwin Mfg. Co	n	A. W. Ward Lumber Co	Loudon	Allen Bros	Nashville
	The Greeneville Furniture CoGreenevill	[e	Lynnville Lumber Co	McKenzie	Buchanan Bros	
	Exum Furniture Co. Johnson Cit C. B. Atkins Co. Knoxvill	le	Hutchins & Alcott	McMinnville	R. A. Griffin & Sons	Nashville
	The Knoxville Table & Chair Co	re	Walling Lumber & Mfg. Co	McMinnville	Home Bullding & Mfg. Co Kirkpatrlck & Co	Nashville
	The Proctor Furniture Co	le	J. R. Burllason	Madisonville	McGinnis & Co	Nashville
	Schaad & Rotach	le le	City Lumber Co		Newcomb Mrg. Co	Newcomb
	Cherokee Mfg. Co	le	Bittle & Hufstetler Co	Maryville	McCabe Lumber Co	Pulaski
	Chickasaw Table FactoryMemphi Memphis Furniture Mfg. CoMemphi	18	G. N. Mize	Maryville	Sevierville Planing Mill Co Landers & Co	Sevierville
	Tennessee Furniture Mfg. CoMemphi East Tennessee Woodworking CoMorristow	S	Cole Mfg. Co		Ransom & Frierson	Shelbyville
	Anchor Spring & Bedding Co Nashvill Edgefield & Nashville Mfg. Co	le	Darnell-Taenzer Lumber Co George O. Friedel Lumber & Mfg		O. M. Davis Jr. & Co	South Pittsburg
	Edgefield & Nashville Mig. Co	le le	Lee Lumber Co	Memphis	Sparta Colonial Column Co	Sparta
	Myers Mfg. CoNashvill	le	Moore & McFerren	Memphis	Springfield Planing Mill Co U. S. Beard	Sweetwater
	Rothschild Mfg. Co	le	Walden Braxton Mfg. Co York Mfg. Co		S. Young Samuel Weaner	
	Newcomb Mfg. CoNewcom Wolfe Bros. & CoPiney Flat	ı D	W. J. Keaton	Milan	Bransford Lumber Co	Union City
	T. W. Pittman & CoPulask	ζŢ	Monterey Planing Mill Co East Tennessee Woodworking Co.	Morristown	Robert Patton	White Bluffs
	John T. Walker	a	I. P. Fort Co	Morristown	Ship and Boat Buil	
	Handles.		Perkins-Crichlow Co	Murfreesboro	T. J. Martin	Dover
•	J. A. IsbellBaxte	er	Bradford Wholesale Furniture Mfg The Davidson, Hicks & Greene Co	g. CoNashville Nashville	Anchor Boat Oar Co Eagle Boat Works	
	Dixle Logging Tool Co	n	I. N. DeHart & Son	Nashville	Shuttles, Spools, Bobb	
	Fowlkes Handle CoFowlke	98	Edgefield & Nashville Mfg. Co	Nashville	Speyer Lumber Co	
	W. J. Beasley	n	Kirkpatrick & Co	Nashville	E. B. Chester	Brownsville
	Unaka Handle Co Johnson Clt The Hartzell Handle Co Memphi	y	Southern Lumber & Mfg. Co	Nashville	Dorman & High	Dickson
	Nashville Snoke & Handle Mfg. Co Nashvill	9	Standard Box Co		Hohenwald Block Mills The Anchor Block Mills Co	Hohenwald
	Sequatchie Handle WorksSequatchi	1e	Newcomb Mfg. Co	Newcomb	Anchor Boat Oar Co	Memphis
	Miscellaneous.		McCabe Lumber Co	Newport	Sporting and Athletic	
	National Refrigerator & Butcher Supply Co	n	L. A. Ward		E. B. Chester	Brownsville
	The Odorless Refrigerator Co Chattanoog Clarksville Foundry & Machine Co Clarksvill	le	J. B. Sowell	Petersburg	E. G. Willingham	Memphls
	Barnes Mfg. Co	ld	Walto Drog & Co	Piney Flats	Trunks and Valle	ses.
	H. L. Judd Co East Chattanoog W. J. & Hugh McAllster Fayettevill	le	Portland Planing Mill Co Tennessee Lumber Mfg. Co	Portland	The G. E. MacKenney Trunk Co.	Chattanooga
	The Wels & Lesh Mfg. Co	n	J. M. Patterson & Son	Pulaski	Harris Mfg. Co	
	Florence Pump & Lumber Co	ls	T. W. Pittman & Co	Quebeck	Whittle Trunk & Bag Co I. P. Fort Co	
	Jorgensen Bennett Mfg. Co Memphi Lenox Broom Co	is	John T. Walker Troy & Tillman	Rogersville	Ewing & Hooner	Nashville
	National Washboard Co. Memphi Oil Well & Supply Co. Memphi	is	Sevierville Planing Mill Co	Sevierville	Nashville Trunk Co	Nashville
	J. T. Willingham	is	Landers & Co	Shelbyville	Vehicles and Vehicle	
	Ware & Goodwin CoTrezevar	nt	F. J. Bluhm	Smithville	Reveridore & Taylor	Bristol
	Pencil Material.		Carter & Potter	Sparta	E. B. Chester	Brownsville
	Cedar Products Co Alton Par Gulf Red Cedar Co Lebano	n	East Sparta Planing Mill Co Graham & Shackley	Sparta	Chattanooga Buggy Co	Chattanooga
	American Lead Pencil CoLewlsbur	g	Springfield Planing Mill Co	Springfield		
	Houston & LiggettLewlsbur	g	U. S. Beard S Young	Sweetwater	Hickory Spoke Works	
	Planing Mill Products.		Tellico River Lumber Co	Tellico Plains	Taylor Lumber Co	
	J. E. Thompson	10	Trenton Lumber Co	Drenton	The T. H. Leinart Co	
	Donnell & Patterson	la	The Anderson-Stegall Mfg. Co Walter C. Gordon	Tullahoma	T T Martin	Dover
	Athens Planing MillAthen	ns	G. T. McGhee	Van Leer	Dresden Spoke Co	
	J. A. Royle	ns	Robert Patton	Watertown	Craig Lumber Co	Franklin
	Cloyd BrosBristo	ol	J. T. Anderson & Son Lucas Land & Lumber Co		D II Sindle & Co	Gallatin
	Paxton Lumber Co	ol	Young Bros		Enterprise Wagon Co.	Greeneville
	D. F. Hargis	ol Is	White Bluffs Planing Mill	White Bluffs	W. N. Clayton Halls Spoke Co.	Halls
	Hudson & Durdin	en	J. A. Walton	Winchester	The Mitchell Wheel Co	Honen ward
	Carthage Lumber & Hoop Co	le	Sash, Doors, Blinds and Gene	rni Mili Work.	Frank H. Port & Co	Lexington
	Charleston Lumber Co	n	Athens Planing Mill		J. C. Bilbrey Snoke Co J A. McCarroll	Livingston
	King-Baxter Lumber Co	ga	Clovd Bros	Bristol	Burroughs-Ross-Coville Co	McMinnville
	Union Lumber Co	ra nd	Reynolds Lumber Co	Bristol	Manchester Mfg. Co	Manchester
	Marshall Planing Mill	nd	Hudson & Durdin			
	G. P. MayberryColumbs	la	Chattanooga Lumber Co	Chattanooga	J. C. Dix Son & Co	wempins
	Riverside Lumber Co	la la	King-Baxter Lumber Co Lookout Planing Mills	Chattanooga	Jorgensen Bennett Mfg. Co	Memphis
	Vaughn Mfg. CoColumbi	ia	Union Lumber Co	Chattanooga	Wilson & Vance	
	Crawford, Lowe & Qualls	lle	Sewanee Lumber Co	Clarksville	Standing Stone Mfg. Co Philnot Lumber Co	MOTTISON
	S. P. Bruner & Sen Decher Dickson Planing Mill Co Dickson	rd	Barnes Mfg. Co J L. & J. Hughes	Cleveland	Carver Lumber Co	Morristown
	Earle SaegerDickso	on	Marshall Planing Mill	Cleveland	Allon Drog	D. II A EL STATE A LA STATISTICA CONTRACTOR
	Hearn Lumber Co	on	The T. H. Leinart Co	Columbia	Rock City Spoke Co	Newbern
	N. Christianson	'in	Vaughn Mfg. Co	Columbia	Pulaski Rim & Spoke Co	Rogersville
	J. K. Williams Lumber CoFayettevil	lle	Erwin Mfg. Co	Erwin	To T Triang & Son	Smilliville
	Craig Lumber Co. Frankl Southall Bros. Frankl	in	Chas. E. Johnson & Bros W. J. & Hugh McAllster	Fayetteville	Sparta Spoke Factory	Spring City
	Williams & Mallory Frankl C. E. Northrop & Son Gallat	ln	Craig Lumber Co	Franklin	M. R Camphell	Tullahoma
	S. D. Simpson & Son	in	S R. Simpson & Son		John O'Donnell	Unlon City
	J. H. Edens	an	Dame Mantel Co	Knoxville	Woodenware and No	veltles.
	C. D. High & Co	lle	Broadway Mfg. Co	Knoxville	The Wels & Lesh Mfg. Co Columbia Package Co	
	Hohenwald Planing Mill & Brick Mfg.		F B Cooley & Son	Knoxville	Perkins-Crichlow Co	Murireesburu
	Co	rid.	H. L. Ingles Mantel Co	XIIIXVIIIe	Indiana Lumber Co	



The Wood-Using Industries of Missouri.

By Charles F. Hatch, Statistician in Forest Products, and Hu Maxwell, Expert Forest Service, United States Department of Agriculture.

PREFATORY NOTE.

The following report was prepared by Charles F. Hatch, statistician, and Hu Maxwell, expert, under the direction of H. S. Sackett, chief, office of wood utilization, United States Forest Service. It is published and thus made available to the public through the courtesy of the St. Louis Lumber-

INTRODUCTION.

The area of Missouri is 69,415 square miles, of which 680 are water. About 40,000 square miles are under forest cover, but that includes many large areas of cut-over or brush land, where timber of commercial size is scarce. Other regions contain unculled forests of great value. Estimates of the total remaining stand of timber have not been made, nor does such an estimate appear practicable with the meager available data. If it is assumed that the average for the entire wooded area of the State is 1,000 feet board measure per acre it would foot up 25 billion feet still uncut. It has been estimated that the State contains 10 billion feet of uncut short leef nine and a new theory leef nine nine and a new the nine and a new theory leef nine and a new the

mated that the State contains 10 billion feet of uncut short-leaf pine, on 3 million acres.

Originally, the surface of the State was covered with forests, some very heavy, others thin. Much of the best was removed to open farms. The pioneers selected the rich bottom lands for their homesteads where the best timber grew. There being little market for it, the settlers used what timber they needed and destroyed the rest. All accounts agree that some of the timber on the fertile bottom lands was of exceptional size and quality, and rich in variety. There are more than one hundred tree species native to Missouri, and most of them attain sizes fitting them for use, and practically all have been put to some use, either sold as lumber in the market, pressed into service as farm timber, or at least as fuel. Many valuable trees timber in the market, pressed into service as talk timber, or at least as fuel. Many valuable trees reach their largest size in the region in which Mis-souri is situated. It is well known that when a species covers a large part of the country it attains its highest development in some favored part of its range. The table which follows presents at a glance some of the well-authenticated records of finely developed trees of numerous species in Missouri. Doubtless, in many cases, individual trees much larger have been seen in the State, but records were not preserved.

RECORD OF TREE MEASUREMENTS IN MISSOURI.

Species—	Height of diameter, measure, ft.	Diameter of tree, feet	Height of tree, feet	County
Sycamore	2	15	65	Mississippi
Catalpa	6	3	90	Dunklin*
Cypress	6	6	130	Cape Girardeau
Cottonwood	6	10	125	Mlsslssippi
Pecan	6	6	130	Misslssipplt
Black walnu	t 2	7	110	Benton
Black willow	v 6	8	100	Pemiscot
Tupelo	_ 2	10	120	Stoddard
White oak	6	9	100	Howard New Madrid
Willow oak			100	Howard
Pin oak	0	41/2	125	Howard
White elm	- 6	6 1/2	100	Pemiscot
Yellow popla	m 9	0	110	Cape Girardeau
Sweet gum	2	5	130	Cape Girardeau
Basswood	2	71/2	110	Howard
Buckeye	2	3	95	Howard
Hackberry	6 r 2 2 2 2 2 2 2 2	9 5 7½ 3 4 9	124	Howard
Spanish oak	_ 6	9	90	New Madrld
Sassafras	2	3	70	Mississippi
White ash	6	.5 1/2	100	Mississippi
Honey locust	2	41/2	125	Howard
Water iocust		3	80	New Madrid
Persimmon	6	3	80	Mississippl
Redbud	6 2 2	4½ 3 2 2 1½ 6	30	Mississippi
Dogwood	2	2	45	Pemiscot
Hornbeam	_ 2	11/2	45	Mississippl
Beech	6	6	100	Stoddard

*Canoes were hewn from the trunk of this tree.
†This pecan was 80 feet to the first limb.
†The trunk of this popiar measured 90 feet to the limbs.

In 1909, which is the latest official return of lumber production by the United States Census, Missouri stood 23 in the list of 45 States reporting. It is worthy of mention that the State which stands It is worthy of mention that the State which stands midway in the list in point of lumber production, also occupies a place nearly in the geographical center of the United States—a little east of it. The table which follows gives the cut of lumber in 1909, and the average value of each species at the mili. The figures are from "Forest Products of the United States, 1909," compiled by the Bureau tongular density of manuscription and misunderstanding often result. The forest Service, wishing to establish a uniform list of names for the core mercial woods as far as could be done in a practical way, compiled an official "Check List of the Forest Trees of the United States, Their Names, and Ranges," and in all Formation. The figures are from "Forest Products of the United States, 1909," compiled by the Bureau

LUMBER CU	T IN MI	SSOURI, 1909	•
	Vo. mills	Aver	age value
	reporting	Feet.	at mill
Oak	1,820	271,623,000	\$15.18
Shortleaf pine	455	142,271,000	11.59
Red gum	282	83,905,000	11.98
Hickory	630	33,259,000	29.95
Cypress	125	32,891,000	15.88
Elm	810	27,913,000	15.18
Cottonwood	509	17,987,000	18.17
Ash	354	12,685,000	21.75
Sycamore	501	10,526,000	13.12
Maple	434	10,376,000	14.37
Biack walnut	384	4,314,000	42.39
Red cedar	9 .	2,984,000	24.11
All others	*****	9,425,000	Incommitted.
Total	**********	660,159,000	

The oak listed in the table includes several specles, perhaps all of the following:

White oak Yellow oak Spanish oak Post oak Pin oak Overcup oak
Chinquapiu oak
Swamp white oak
Cow oak Black jack Water oak Shingle oak Lea oak Texas or spotted oak (red oak) Willow oak

The maple probably includes sugar or hard maple, silver or soft maple, black maple, and box elder. The elm includes white elm, slippery elm, cork elm, and wing elm.

The ash Includes white, black, red, green, blue, and pumpkin ash.

The hickory listed in the table doubtless embraces the following species:

Small pignut Shell bark Mockernut Bitternut Pecan

The "all others" is made up of a large number of species, some of which are of much greater importance in other States than in Missouri, such as yellow poplar, beech, basswood, cherry, hackberry,

and willow.

This report, in its plan of treatment of the subject, is divided in three parts. In the first part, consideration is given to the kinds of wood growing in the State or brought in for manufacturing purposes. The supply of available timber in Missourl, and the extent to which it will probably figure in the future, are considered. In the second part the industries which draw a portion or all of their industries which draw a portion or all of their raw material from the forests are presented statistically, and their annual demands are shown. The tables which accompany the discussion of the industries show what woods are employed in each industry, the cost, and the quantitles used. The third part is a summing up of uses for each species in all the industries. It does not pretend to give a list of all the uses for which a certain wood has been or may be found suitable, but only those reported in actual practice by manufacturers in Misported in actual practice by manufacturers in Missouri. In the discussions of industry tables in the second part, the purpose has been held constantly in view of explaining, as far as information warrants, what reasons underlie the use of a wood for a particular commodity.

THE WOOD-USING INDUSTRIES OF MISSOURI.

Kinds of Wood Used.

Missouri manufacturers report the use of 56 species of wood, and in 1910 they consumed 443 million feet In producing their commodities. These woods, with the quantity of each, are shown in Table I. The common names are given in the first column, and the botanical names In the second. These are the official names recognized by the United States Forest Service. Nearly all commercial woods have different names by which they are known in different localities. It occasionally happens that the name by which a wood is known in one part of the country is never spoken in another region. Thus, a well-known wood is called white wood in Massachusetts and yellow poplar in Missouri. Some of the pines possess more than a Missouri manufacturers report the use of 56 spesouri. Some of the pines possess more than a dozen names, and some of the oaks nearly as many. Confusion and misunderstanding often result. The Forest Service, wishing to establish a uniform list

of the Census in co-operation with the Forest Service.

LUMBER CUT IN MISSOURI, 1909.

Kinds of wood Reporting Feet. at mill 1,820 271,623,000 \$15.18

Shortleaf pine 455 142,271,000 11.59
Red gum 282 83,905,000 11.98
Hickory 630 33,259,000 29.95
Elm 810 27,913,000 15.18

believed that, in this way, a certain species will finally come to be known everywhere by a single and recognized name. The process, however, will be slow. People in one locality who have always known a tree by a certain name will not be quick to drop that one for another. It will do no harm, however, for them to know what the official name is —that which it is hoped will sometime be recognized name. The process, however, will only and recognized name. The process, however, will to drop that one for another. It will do no harm, however, for them to know what the official name is —that which it is hoped will sometime be recognized name. The process, however, will show a level of the drop that one for another. It will do no harm, however, for them to know what the official name is —that which it is hoped will sometime be recognized name. The process, however, will not be quick to drop that one for another. It will do no harm, however, for them to know what the official name is —that which it is hoped will sometime be recognized name. The process, however, will not be quick to drop that one for another. It will do no harm, however, for them to know what the official name is —that which it is hoped will sometime be recognized name. The process, however, will not be quick to drop that one for another. It will do no harm, however, for them to know what the official name is —that which it is hoped will sometime be recognized name. The process, however, will not be and recognized name. The process, however, will not be always to drop that one for another. It will do no harm, however, for them to know what the official name is —that which it is hoped will sometime to the common name of the not have always to the common name of the not have always to the

This applies to the common names only. Nearly every tree, however, has two names; one the common or English, the other the botanical or Latin. The botanical names are given in the second col-The botanical names are given in the second column of Table I for the convenience of persons who may wish to consult them, and to assist in the identification of the species. There is no such confusion among botanical names as among common for the reason that comparatively few persons (principally scientists) make use of the botanical names, and they agree among themselves what the names shall be, and all call them the same. For example, the botanical name of short-leaf pine is Prince echinata, and botanists in all parts of the Prinus echinata, and botanists in all parts of the world, whether in America, Germany, India, or Japan, all call the tree by that name when they speak of it, though perhaps some of them do not know what the tree's English name is. This is the explanation of the purpose of the second column of names in the table—for the convenience of persons who may wish to ascertain, or to refresh their memory as to the world-wide name of any tree in the table.

Twenty-nine of the woods listed in the tables came wholly from without the State, while 24 were grown partly within. Only 3 were produced entirely by Missouri. They were butternut, Spanish oak, and hackberry, no more than 62,000 feet in all. Ten woods were wholly supplied by foreign countries. Only one foreign wood—mahogany—supplied a million feet to the Missouri manufacturers.

Short-leaf Pine.

Four valuable sonthern trees are usually grouped as the yellow pines of the South. They are long-leaf, short-leaf, loblolly, and Cuban, all confined to the Atlantic and Gulf coast region, and the lower Mississippi valley. Only two were reported by Missouri wood-users, long-leaf and short-leaf. The Short-leaf pine is of more rapid growth than long-leaf, and the wood is softer, often a little lighter in color, and many prefer it for doors, sash, blinds, and window frames. The softest of it bears considerable resemblance to white pine. The State now furnishes a little more than half of what is demanded by its manufacturers of wooden products. Most of the remainder comes from Arkansas. short-leaf pine does not grow north of Missouri in the Mississippi valley, and there is no reason to suppose that it ever will. As a species, it is not extending its range, but is withdrawing from regions where it once grew, and seems to be retreating south. It once was found in New York, and later it was lumbered on the Potomac river and on some of the upper tributaries of the Ohio. In some of those regions a single tree can now scarcely be found. Southern Missouri is at this time the northern range of the species in the Mississippi valley; and it is the opinion of many observing men that the tree is soon to disappear there as a comshort-leaf pine does not grow north of Missouri in that the tree is soon to disappear there as a commercial wood. Young trees are not coming in sufficient numbers and vigor to make up the loss of old forests which are passing. The Missouri manufacturers use more short-leaf pine than of any other two woods. other two woods.

Red Gum.

Of the woods used in Missouri, red gum is second largest in quantity, and the State supplies one-third of it. Most of the State-grown wood of the species comes from the southeastern part. Users frequently list two kinds, white and red. The white is more often called sap gum. It is all the same wood, however. The white wood is the outside, or sapwood; the red is the colored heartwood. side, or sapwood; the red is the colored heartwood. Some gum trees are nearly all colored wood, others are largely the white sapwood. One manufacturer prefers one kind of wood, another takes the other kind. It depends upon the purpose desired. Some of the fine rotary-cut veneer which is finished to imitate Circassian walnut is sapwood. The naturally watered or clouded appearance of the wood hears close resemblance to the very expensive Circassian walnut which comes from the Caspian sear region. Few woods have risen more rapidly and steadily in favor during late years than red gum. It was not so long ago that it was little thought of, and most of it is still employed in this country

SUMMARY OF KINDS OF WOOD USED IN MISSOURI.

TA	TOT	177	T

	111,000					Grown
A STATE OF THE PARTY OF THE PAR	Quantity	used	Average	Total C	Frown in	out of
Kinds of wood,	annual		cost	cost	Missouri	Missouri
. Linds of wood,	feet	per	per	f. o. b.	per	per
Common name. Botanical name .		cent	1000 ft.	factory	cent	cent
Common name. Botanical name . Shortleaf pinePinus echinata	38 662 682	31.28	\$ 17.43	\$ 2,416,589	55.59	44.41
Shortlear pinerinus echinata	95 064 325	21.45	16.37	1.555,844	33.36	66.64
Red gum Llquidambar styraciflua	97 669 179	8.50	28.72	1,081,691	10.18	89.82
CypressTaxodium distichum	24 104 050		38.90	1,329,115	34.37	65.63
White oak Quercus alba	34,104,000	7.71				
Cottonwood Populus deltoides	29,309,213	6.61	22.53	660,482	29.59	70.41
Hickory Hicoria	26,642,056	6.01	28.14	749,767	38.49	61.51
Red oak Quercus rubra	14,195,830	3.20	36.99	525,078	29.25	70.75
Yellow poplar Liriodendrom tulipifera	10,728,862	2.42	39.00	418,418	9.76	90.24
White ash Fraxinus americana	10,528,675	2.38	28.44	299,409	41.92	58.18
Douglas fir Pseudotsuga taxifolia	5.295,355	1.19	33.76	178,749	***************************************	100.00
White nine Pinus strobus	4,746,592	1.07	43.09	204,527	**************************************	100.00
Silver maple Acer saccharinum	4,603,054	1.04	24.98	115,002	32.09	67.91
White elmUlmus americana	4,176,103	.94	18.13	75,721	30.07	69.93
Longleaf pine Pinus palustris	4,001,160	.90	25.24	100,985	***************************************	100.00
Sugar manle Acer saccharum	3,196,922	.72	34,71	110,957	18,59	81.41
Sweet birch Betula lenta	2.770.770	.63	44.20	122,481	.13	99.87
ChestnutCastanea dentata	2,716,535	.61	21.58	58,634	*******	100.00
Sycamore Platanus occidentalis	2,248,490	,51	17.92	40,293	54.59	45.41
Sitka spruce Picea sitchensis	2,169,371	.49	38.91	84,417	01.00	100.00
Tupelo. Nyssa aquatica.	2,002,800	.45	20.00	40,061	30.05	69.95
Tupeloe	1.816.512	.41	137.82	250,360		100.00
MahoganySwietenia mahagoni	1,527,587	.34	29.72	45,396	4 20	
BasswoodTilia americana	943.130				4.39	95.61
Black sprucePicea mariana		.21	39.08	36,856		100.00
RedwoodSequoia sempervirens	568,871	.13	45.25	25,739	************	100.00
West, yellow pine. Pinus ponderosa	480,972	.11	58.91	28,332	***********	100.00
Spanish cedarCedrela odorata	383,000	.09	38.97	14,925	************	100.00
Black cherry Prunus serotlna	362,027	.08	80.65	29,197	.97	99.03
Beech Fagus atropunicea	332,500	.08	39.19	13,030	.30	99.70
West, white pine Pinus monticola	312,800	.07	51.51	16,112	***********	100.00
Black willow Salix nigra	307,000	.07	13.36	4,100	98.50	1.50
West, red cedarThuja plicata	213,255	.05	34.54	7,366	0	100.00
Locust Robinia pseudacacia	201,000	.05	35.07	7,050		100.00
Black gumNyssa sylvatica	. 190,000	.04	15.95	3,030	50.00	50.00
Sugar pine Pinus lambertiana	_ 164,853	.04	50.83	8,379		100.00
Black walnut Juglans nigra	140,608	.03	75.83	10,663	11.38	88.62
Red cedar Juniperus virginiana	135,670	.03	54.75	7,428	2.65	97.35
Yellow oak Quercus velutina	75,000	.02	18.00	1,350	66,67	33.33
Hackberry Celtis occidentalis	61,000	.01	18.18	1,109	100.00	00.00
Nor. white cedarThuja occidentalis	50,000	.01	75.00	3,750	100.00	100.00
Post oak Quercus minor		.01	25.00	1,250	20.00	80.00
Norway pine Pinus resinosa	35,125	*	50.70	1,781		
Norway pineFinus Testnosa	10.000	*	30.00		**********	100.00
Sassafras Sassafras sassafras		*		300	*********	100.00
VermilionPterocarpus Indicus		*	202.31	1,315	***********	100.00
Prima vera Tubebuia donnellsmithii	4,000		150.00	600		100.00
Yucca mohavensis	3,500		36.29	127		100.00
Bur oak Quercus macrocarpa	2,500	*	35.20	88		100.00
Circassian walnut. Juglans caucasica	2,400	*	203.33	488	************	100.00
SatinwoodChloroxylon swietenia	2,000	*	500.00	1,000	Q0+000 000 110	100.00
Pecan Hicoria pecan	2,000	*	50.00	100	************	100.00
RosewoodPterocarpa erinoceus	900		200,00	180		100.00
Ebony Diospyros ebenum	550	*	390.91	215	***********	100.00
Spanish oak Quercus digitata	500		24.00	12		200.00
Holly		*	126.00	63		100.00
Butternut Juglans cinerea	500		40.00	20		
Tulip wood Physocaly'a scaberimum	200	*	120.00	24	100.00	100.00
Boxwood Buxus sempervirens	7	*	1000.00	7		
DOAWOOUDUAGS SCHIPCT VITCHS			1000.00	CA COLUMN TO A	********	100.00
Totals	443 272 903	100.00	\$ 24,12	\$10,689,962	25 00	C4 90
	220,212,330	100.00	\$ 24.12	φ10,009,902	35.80	64.20
*Less than 1/100 of 1 per cent.						

for common purposes; but in Europe where they know how to appreciate a wood at its true value red gum is in much favor. In England they call it Satin walnut, and there can be little doubt that much which goes across the Atlantic as red gum comes back later as Circassian walnut furniture. That transformation is many times made without shipping over seas; and red gum goes into a factory and the high-class furniture or finish that comes out is sold as white or red oak, cherry, birch, or some other fine cabinet wood. Manufacturers were a long time learning how to handle this wood. It was hard to season, but the secret has been learned—more than one secret, for different ways are known. Some secure results by special methods of kilndrying; others have found that something may be done by felling the trees at a something may be done by telling the trees at a certain time of year and sawing and handling them in a certain way; and others believe that the immersion of logs several months in running water produces highly desirable results. There is no question that many improvements have come about in recent years in ways and methods of preparing this excellent and beautiful wood for the many purposes to which it is now put.

are other trees known as gum which are not in the same family as red gum. Four deserve mention here, for the purpose of differentiating them from red gum, though two will be mentioned later in their own proper places. The four other gums are black gum, tupelo, water gum, and sour tupelo.

Cypress.

Six species of cypress grow in the United States, four in the west and two in the south and east, yet practically all lumber comes from the eastern and southern species, and no distinction is made between these two at sawmills. They are so nearly alike that botanists alone recognize a difference be-tween the two. Cypress stands third in Missouri in amount used by manufacturers, and the State grows only 10 per cent of it. It is a swamp tree and can maintain its place on ground covered with water most of the year. Nevertheless, there must be dry ground part of the time or the tree can not plant its seeds and secure reproduction. The seeds of very few trees are able to sprout and grow in water. The mangrove can do it in appearance, in water. though its seeds actually sprout before they drop from the tree, and need only to take root in water and grow. But the mangrove is not found in Missouri, and the cypress there holds first place as a swamp and overflow land species. This fact is of considerable economic importance, because larger tracts grow cypress better than any other wood along the Mississippi river flood plain in Missouri. By that means waste land produces a valuable commodity. The suggestion has been made that

the swamp lands along the Mississippi and other rivers of that region be perpetually given over to cypress growing, but the economy of such a policy is doubtful. Most of that land may be drained, and will then become much more valuable for agrithat it can never appeal to a forester as a profit-able tree to grow even to the size of the smallest for a tree to grow even to the size of the smallest saw log. It would seem, therefore, that when lumbermen have cut the cypress trees which nature planted, the end of that resource will have been reached. The supply is still considerable, but by no means inexhaustible. Missouri, like other cypress States, has much less of this timber than it once had. In 1909 the State cut less than four per cent of the country's cypress of syracs. four per cent of the country's output of cypress

White Oak.

Three trees belonging to the white oak group are listed for use by the manufacturers of Missouri. The most important is the common white oak, which is known by that name wherever it is cut for lumber. Post oak and bur oak are also listed in Missouri. The lumber cut from these three species is so much alike that few sawmill men or manufacturers take the trouble to keep them. or manufacturers take the trouble to keep them separate. There are several other oaks in the State that doubtless go the same way. In some parts of Missouri the white oak is of excellent quality as to strength, size, grain, color, and other properties. In other localities, however, complaint is sometimes heard by manufacturers that the oak is not first class, and much culting is necessary to secure satisfactory stock. The chief complaint is that the standing trees are attacked by insect enemies. This holds true more in some localities than mies. This holds true more in some localities than in others; for oaks, like other timbers and also like farm crops, are of better quality on good ground than on poor. The white oak is strong, vigorous, long-lived, yet few trees in the American forest have more insect enemies. It is subject to support that this coasts. numerous diseases. It is claimed that this one tree has more than 1,000 insect foes. It is usually able to fight them off, particularly if it occupies good soil; but sometimes it is devoured alive by its enemies, some of which are formidable in size and voracious in appetite. It has been asserted that the strongest oak will sooner or later succumb if a single carpenter worm (prionoxystus robinia) finds ledgment in its trunk. The yearm is three a single carpenter worm (prionoxystus robinia) finds lodgment in its trunk. The worm is three inches long, bores to the tree's heart a hole half an inch in diameter, and continues its work year after year. It is found from Maine to California, and reports indicate that Missouri possesses its full share of the animals. There are many others which, though not so large as the carpenter worm, do more injury in the aggregate. Mature oaks are

much damaged by forest fires, though they may scarcely more than burn through the bark. Such wounds open the way for multitudes of insect and wounds open the way for multitudes of insect and fungus enemies to gain entrance to the wood, and when once established they seldom depart until the tree is completely ruined. There is no certain cure, but the proper remedy consists in keeping fires out of the woods if possible, and, as far as it is found practicable, cutting dead and diseased trees to put a stop to the hatching of the insect eggs and spread of the broods already in the trunks. That method will be followed in the rather uncertain future whn the Missouri forests pass from the wild and uncared-for conditions in which they have been and still are, to the wood-lot state where the owners will find it profitable and possible to look after the health of their trees, as the progressive stock grower now watches over the the progressive stock grower now watches over the health of his cattle.

Cottonwood.

Missouri's sawmills cut nearly 18 million feet of cottonwood lumber yearly and manufacturers use nearly 30 million. It therefore is necessary to bring in about 12 million feet a year from else-where. Most of it comes from Arkansas, which is of all the States the largest producer of cottonwood lumber. The cotton-wood tree has several wood lumber. The cotton-wood tree has several relatives, among them being aspen, which is of little importance in Missouri, Balm of Gilead, a more northern tree, black cottonwood of the far northwest, and the three planted trees, Carolina poplar, Norway poplar, and Lombardy poplar. In Missouri the three last named seldom or never reproduce from seed, and are of small importance reproduce from seed, and are of small importance as producers of lumber; but cottonwood yields seed in vast numbers, and the wind scatters them far and wide. Each seed is equipped with fine, silky hairs which buoy it up and assist it to travel long journeys through the air. This causes the cottonwood to spring up wherever suitable soil is found; for seeds manage to find their way nearly everywhere in this country. The tree is disposed to grow along streams, and it is in such situations that many of the best logs are cut. To some extent it is a wet ground tree, though not in the same degree as the cypress. Prior to settlement when Indians were accustomed to burn the country for the purpose of killing the woods and maktry for the purpose of killing the woods and making grass for game, the cottonwood was often the last survivor among the trees, because it grew on damp ground near the rivers where fires were weak. This applied, however, to the regions north and west of Missouri rather than to the State !tself, for the Indians had not yet succeeded by their fires in reducing much of Missouri to prairie when the white settlers drove them out. However, many a large cottonwood tree that had often been saved from fires because it grew on damp ground, is now being cut into lumber, and forms good material for the furniture and other factories in Missouri. The tree has always been put to use in the region where it grows (and it grows nearly everywhere), but one of the first demands for it, as a high-class lumber, was as a substitute for yellow poplar for beds of farm wagons. Many regarded it as next to yellow poplar for that purpose, and some of the best wagon-bed stock came from Missouri in early times—that is, 20 or 30 years ago—and still comes from there. from there. It lacks figure, and is never selected for any beauty other than its clean white color; but it is tough and does not split readily when made into wagon beds. It is an important box lumber for the same reason; and it gives reliable service in the manufacture of furniture, and in many other industries. Cottonwood is one of the forest trees upon which lumbermen can depend in the future. There will be trees of this species as long as any other forest trees live wild in this country. It grows rapidly and will be profitable if the time comes when lumber is cut from planted forests in this country as it is now cut in some European countries. Hickory.

Six or more species of hickory are cut in commercal quantities in Missouri, and all are put to similar uses without much distinction. Hickory is not the strongest or the most elastic wood in this country, but no other so admirably combines strength, elasticity, and toughness and these properties are responsible for the wood's many uses. For light vehicle wheels and running gears it is the best in the known world. It is sent all over the world and meets no rival in its line. many other exacting uses.

In production of hickory by sawmills, Missouri stands fourth, with Tennessee first among the States. All of the hickory, however, in the State does not pass through sawmills—probably less than half of it does. It is not generally worked up that way. Many manufacturers of hickory products cut the trees, and make their commodities without passing the logs through a regular sawwithout passing the logs through a regular saw-mill. Such are those who make wagon spokes and tool handles from split billets or those sawet on dimension mills. Specially fine trees are some-times cut for sucker rods, used in oil wells. The principal hickory area of Missouri lies in the southeastern quarter of the State. In that re-gion the best stock is cut, and most mills and fac-tories are located there. Some hickory grows in

all parts of the State and small amounts are cut in all the counties. It is not the tree's habit to produce pure forests, like short-leaf pine, but trees are scattered among forests of other species, groware scattered among forests of other species, growing best where the soil is fertile and deep. When no obstacles are met, the hickory likes to send a large central root, like a radish, deep down into the subsoil. It is a tree of fairly rapid growth, and the wood is separated in two parts, white and red. The white is the sapwood, and in young trees makes up most of the trunk. Many small trees show only a small core of redwood in the center; large trees increase the proportionate quantity of the red. The white wood of a young trunk becomes the red. The white wood of a young trunk becomes red when the trunk is old. Hickory is not peculiar in this respect, however, since most trees change the sapwood to heartwood as the tree becomes old. The belief is well-nigh universal that the white wood of the hickory is better than the red; yet the differences are so slight as to be negligible, and for some purposes the red wood is fully equal to the other. The red is more often rejected through the other. the other. The red is more often rejected through prejudice or misunderstanding than for any just cause. There are many degrees of excellence in both the white and the red. The butt of a tree is usually better than the top, and a young trunk growing in the open is more apt than a large one to possess the desired properties of toughness, elasticity, and strength. Of course, a large trunk near the ground is freer from knots than is the top of the same tree; and the matter of knots often has much to do in determining the fitness of hickory for special purposes.

is well known that good commercial hickory It is well known that good commercial nickory is becoming scarce. The demand is enormous; but until recent years there was always plenty a little farther back, and a higher price would bring it to market. But the time has now come when not much lies farther back anywhere, and even if higher prices were offered, few new sources would be made available though the supplies might be used up a little faster. It is by no means too early to discuss the effects which will follow decline in the hickory output. Scarcity is bound to come, and nowhere in the world has there yet been found a wood to take hickory's place for some of its most exacting uses. Claims have been made for a few, notably some species of eucalyptus and the crowfoot elm of Australia; but these claims have not yet been made good. The supply of hickory can be lengthened by economy, by using this wood for the highest purposes only for which it is suitable, and substituting other woods in inferior places. There is much waste and it might be lessened. In some instances it seems well-nigh unavoidable be-cause of distance from market and other economic conditions which prevent full utilization. There is, nevertheless, much waste which might be prevented by care and foresight.

Hickory might be grown with profit.

much land in Missouri suited to that purpose. Woodlots planted with trees properly spaced, and the trunks cleared of limbs to give clean and smooth boles, would grow rapidly into money. The cordwood from the tops and limbs of such a cutting, when the woodlot is harvested, would, if near a good market, he worth enough to pay a large part of the taxes and other costs incurred in bringing the trees to marketable size. A hickory need not be very large to make good handles, and the growth of a few more years will give it size sufficient for larger commodities.

Yellow Poplar.

Missouri is not a large producer but is a rather Missouri is not a large producer but is a rather large user of yellow poplar. This fine tree is at its best farther east, in Tennessee, Kentucky and West Virginia, but 86 mills reported cutting some of the lumber in 1909 in Missouri. It is another of the valuable timbers which are passing away. The cut for the whole country in 1909 was 23 per cent less than it was ten years earlier. Poplar was once used for nearly all ordinary purposes, but it has new become expensive and goes chiefly into highnow become expensive and goes chiefly into high-class work. Missouri finds place for nearly ten and three-quarters million feet of it a year, which is several times as much as its forests produce. Ninety per cent of the total demanded by the factories of the State comes chiefly from Tennessee and Kentucky. It finishes very smooth, and it takes stains so well that one of its principal uses is as imitation of mahogany, cherry, and birch. It was once largely used for farm wagon beds, but it is made into bodies and panels for buggies, carriages, and automobiles. There is no wood in this country that will paint to better advantage, and that quality gives yellow poplar one of its principal values. The trunks grow large, tall, and free from limbs half or two-thirds of the way to the tops. They yield clear lumber, and of high grade. No American hardwood surpasses it in this respect, and few softwoods are its equal. Extra wide pleces are cut, suitable for large panels, or whole counter tops.

White Ash.

Six species of ash are found in Missouri, all of some commercial importance, and in the aggregate of much value. Only one species is reported by manufacturers in the State, the white ash. There is no question that most or all of the others are used, but they are not separately distinguished by those who handle them at the mills and fac-

The species of ash in Missouri are the white, black, blue, green, red, and pumpkin. It is noticeable that all, except the pumpkin ash, are named from some color. It is difficult to assign a satisfactory reason why this is so. The winter buds and the bark of the red ash suggest the name, but the red color is by no means pronounced; the other species in the list have not that much to suggest the

colors which commonly go with their names.

Ash is a strong, stiff, serviceable wood. White ash is usually considered a little better than the others for general use. It is widely distributed in this country, and Missouri produces some of the best in the market, though it is not among the largest producers, as nine States were ahead of it in 1909, Arkansas standing first on the list. More than four per cent of the country's ash lumber is credited to Missouri. This species seldom forms credited to Missouri. This species seldom forms thick forests, but usually the trees grow scatteringly, a single tree or a few in a place. It may be said generally that ash is used where strength and rigidity are desired in furniture, machines, and particularly in farm tool handles, such as shovels, rakes, scythes and hoes. The grain of the wood is rather coarse, yet it may be nicely finished and it then presents a handsome appearance in furniture and interior finish. It is the first widely used. ture and interior finish. It is the most widely used wood in this country for boat oars. It is heavier than spruce and cedar and for that reason they are sometimes preferred to it for oars. The ash is well able to hold its own among other trees in the matter of reproduction, and it will maintain a place in the forest for a long time to come. Its seeds are winged, and the wind carries them. They do not, however, fly as readily or as far as the maple's seeds, whose wings whirl them rapidly in air and help to sustain them, while the ash's seed has a wing as property and of such a shape that it does awing so narrow and of such a shape that it does not whirl as rapidly as the maple's and can not carry the load so far. Seedling ashes, therefore, are usually found in the vicinity of the parent

Douglas Fir.

This wood was unknown in the eastern and mid-This wood was unknown in the eastern and middle regions of the United States a few years ago, and as a comparatively new comer, it has met with favor. Most of it is cut in Washington and Oregon, but it abounds in the northern Rocky Mountain States. A common name for it is Oregon pine, and it is occasionally called red fir. The trees attain great size, and very large timbers are cut from them. In Missouri it enters into competition with long-leaf pine probably oftener than with ther. The two woods are much alike in many Both are very strong and stiff, and are used any other. for similar purposes. Douglas fir is cut in larger quantity than any other wood in the world, except the southern yellow pines, and is so cheap in the regions where it is produced that it is able to force way into markets hundreds or thousands of les away. More than five million feet yearly miles away. More than five million feet yearly are bought by manufacturers in Missouri at an average price of \$33.76 delivered at the factory. That is between seven and eight dollars more than the average price paid in the State for long-leaf

White Pine.

The reign of the white pine in the United States is a thing of the past, though a fairly large amount is still demanded by Missouri manufacturers. The tree does not grow in the State, and the lumber now used there comes principally from the Lake States where it was once lumbered in enormous States, where it was once lumbered in enormous quantities, but now to a much less extent. One of its largest uses in Missouri is for patterns. its largest uses in Missouri is for patterns. No other wood as satisfactory can be had. Of course, much white pine lumber is still in the market, but not all that passes for white pine is the genuine article. Some is Norway pine cut in the Lake States and Canada; some is the western white pine (a different species) from the Northern Rocky Mountain States; the California sugar pine furnishes some of it, and the western yellow pine more, and a small amount is the Mexican white pine. This last is said by good judges to be the pine. This last is said by good judges to be the nearest approach to genuine white pine lumber in this country. These several species pass as white pine in the lumber market, and it is difficult to determine how much of the total is the real article. All are good woods, and for some purposes are doubtless as good as white pine. No manufacturer expects, nor should the buying public expect, to obtain white pine now of a grade equal to that on the market when the original pine forests of New England, New York, Pennsylvania, and the Lake States were available.

Silver Maple.

In Missouri this tree is usually called soft ma-In Missouri this tree is usually called soft maple, and four and a half million feet are bought annually by factories, at an average cost a little under \$25 a thousand. One-third of it is cut in the State. The only other maple reported was sugar or hard maple. It was demanded in smaller quantity and cost nearly ten dollars more a thousand.

tories, and thus go in under one name. The white ash is more abundant than the others; perhaps The wood of these two maples bears much resemble to missouri it exceeds in quantity all the others combined. The differences between the wood of these two maples bears much resemble to combined. The differences between the wood of the silver maple is weaker and of the sugar mawith it are not apparent to the ordinary observer. Ples tronger. Both produce accidental forms of the superior of apparent to the ordinary observer. growth called birdseye. This is not, as some suppose, a different kind of tree, but the birdseye effect is caused by buds that grow up through the wood during many years, and never succeed in forcing their way through the bark. Birdseye effect is found in other woods than maple, and is

due to similar causes.

The botanical ranges of the sugar and the silver maple lie in the same general regions—the eastern and northeastern parts of the United States, extending into the Gulf States—but their commercial ranges differ. Most of the sugar maple is cut in northern regions, but not much in the South. The reverse is true for silver maple. Little is cut in the North, and a comparatively large amount further south. Missouri produces more silver maple than sugar maple. Sawmills do not usually keep the two species separate where they cut both, for which reason it is difficult to determine the proportionate quantities of each in the output. The census returns compiled by the United States do not list maple separately in lumber returns, though five or six species contribute to the total. The maple is a tree difficult to exterminate. It produces multitudes of seeds, ripens them in the spring and scatters them well before the early sur/mer rains are over, and maple reproduction is heavy. Young trees thus constantly come on, and their effect on the lumber supply will be apparent in future years. Trees, like the cypress, which go and leave few seedlings to take their places, can not be counted upon in the country's future lumber supply, as the maple can.

White Elm.

This was the only elm listed by the Missouri manufacturers, but there can be no question that other species of elm were included. Four are found in that State in quantity to make them commercially important. The white elm is most abundant, and ly important. The white elm is most abundant, and is associated with slippery elm, cork elm, and wing elm. The name "rock" elm is sometimes applied to all of these, by different persons and in different localities. It is a term like "rock" oak which does not mean any tree in particular, although the man who uses the term may know what species he has in mind. White elm is the most common of the elms in most regions where different species of the eims in most regions where different species grow; slippery elm is seldom mistaken for any other, because of its thick, soft, mucilaginous inner bark; cork elm is so named on account of the dark, chocolate colored corky excrescences on the small twigs; and wing elm receives its name from a very similar growth, but in its case, the excrescences are flattened, like little keels, on opposite sides of the twigs, and resemble long narrow

Workers in wood say that few trees show as readily as elm the effect of soil upon wood. One soil may produce brash wood, another a very tough one; and there seems to be much difference in weight and color, which is accounted for by differences in soils. This may explain why in one locality the name rock elm is applied to a certain species, and in another locality the term is given to an elm of a different species. The wood of all the elms is coarse and characterless, and is never where handsome appearance is the obemployed ject sought.

Sweet Birch.

Manufacturers of furniture, interior house finish, and other wood commodities in Missouri use nearly three million feet of birch, which comes almost en-tirely from outside the State. A large part of it is sweet birch, also called cherry birch and mahogany birch because it is frequently finished in imitation of those woods. It is a northern tree, rather expensive when it reaches the furniture factory, and it is becoming scarce. The name "sweet" is given it because the soft new growth of wood just under the bark in early summer is often scraped off and eaten by children and others. It taste. Most of the oil of wintergreen of commerce is made from this birch. There are other birches in the lumber market, but yellow birch is probably the only one which ever passes for the sweet birch. Most of it comes from regions where the sweet birch grows, and the heartwood of the two species bears considerable resemblance, but no one would ever mistake a standing tree of one for the other. River birch grows in Missouri, and doubtless some of it is used, though no manufacturer reported it. The wood is very plain, presents no figure, and the color is dull and without character; yet the wood possesses substantial qualities which fit it for many common purposes.

This wood does not grow in Missouri, and there is no reason to suppose that it will ever be planted in the State for commercial purposes. The largest supply comes from Pennsylvania, West Virginia, Kentucky and Tennessee. Some chinquapin, which resembles chestuut, grows in Missouri and

is occasionally made into lumber, but more fre-

Sycamore.

This is a waste land tree, in the same class with cypress in that particular. It has no objection to good ground, but thrives on mudflats, hollow banks, and gravel bars, and it thus brings profit where otherwise there might be none. It occasionally attains large size, but the best lumber comes from trees of moderate dimensions, because the largest are usually hollow. The growing of sycamore for profit is perhaps practicable in Missouri where there is much wet land and many tracts liable to such frequent overflow as to be unsuited to agri-culture. Sycamores plant themselves in countless thousands along streams where the space is sufficiently open to let in the sun, and the ground moist. Growth is rapid, and as soon as the trunk develops enough heartwood to make boards six or eight inches wide, cutting may begin. Sycamores from 10 to 15 feet in diameter have been measured in the State, but they were never plentiful, and probably none that large exists now. Missouri stands second among the States in the production of sycamore lumber, being exceeded only by Indiana, and produces nearly five times as much as Its factories demand, and yet about half of their demand is supplied by imported lumber.

Missouri ranks low in the production of basswood. In 1909 the census report gave 111 mills cutting it. The chief supply comes from the North, and Missouri is on the extreme western edge of the tree's region. Basswood is soft and white, and has no grain or figure to make it attractive. It finishes picely but always presents a plain appear. finishes nicely, but always presents a plain appearance. The name "bee tree" is sometimes given it, and this is supposed to mean that the trunks are frequently hollow and are occupied by wild bees for storing honey. This, however, is a misnomer, for the trunks are no more liable to hollowness than other trees. The bloom is abundant, is rich in honey, and bees frequent it—hence, the name.

Black Willow.

This tree is not of great importance in Missouri at present, but its value will increase, rather than diminish in the future because it grows rapidly, and thrives on land too wet or too much subject to overflow to be attractive to farmers. At an age when cypress is scarcely large enough for handspikes, willow may be cut for saw logs. Immense quantities of it will come to maturity on comparatively small tracts, from 100 to 200 trees comparatively small tracts, from 100 to 200 trees to the acre having been reported. It is the most common willow in this country, though many other species are found. It grows from Maine to California, but only where water is abundant. It reaches its best size and form near large water courses where it prefers low, rich ground, but it will do fairly well on thin soil if moisture conditions are right. Until recent years the willow was colden put to any purpose. seldom put to any purpose; but it is now becoming valuable for certain commodities. Millions of feet of it are annually made into boxes in the United States, principally for meats and other provisions. It is one of the substitutes for yellow poplar and cottonwood for wagon beds, and furniture makers are working it into interior places where its appearance does not matter. It is not a handsome wood, its color being dark and dull. Some manufacturers call it brown cottonwood. The lumber is tough, light, difficult to split, and is cheap. Trees four feet in diameter are occasionally cut, but the average size of willow saw logs is less than half of that. The willow's importance in Missouri would seem to lie principally in the future. The wild forests will be cut out in time, and only species which will pay best will be planted and cared for. As rough, coarse lumber, willow will commend itself, because of its rapid growth and the large yield per acre.

Sitka Spruce.

Five woods known as spruce figure in the country's lumber output, the red, black, white, Engelmann, and Sitka. The three first named come from the north and northeast, the Eugelmann is a Rocky Mountain species, and the Sitka's home is in Oregon and Washington. The Missouri manufacturers use two of these woods, the black and the Sitka, but much more of the latter than of the former. The two woods average about the same in price when they reach that State. The grades used are rather high.

This is one of the hardest, strongest, and most This is one of the hardest, strongest, and most enduring woods in this country. It was originally confined to the eastern half of the United States, and was best developed in the Appalachian Mountains between Georgia and New York, but the species has spread through the agency of man to many districts, where it did not formerly arise. many districts where it did not formerly exist. The tree is well known in Missouri, though it is doubtful If it was found there at the coming of the early settlers. Its rapid growth, and the natural beauty of its foliage and bloom, together with the excellence of its wood for posts and pins, made it a favorite with those who planted trees for ornament and use. However, the reports of Missouri

the State, and the demand was met from without. In some parts of the country the tree suffers much attacks of the locust borer (Cyllem robinia) which perforates the trunk and large branches. Forty other known enemies attack the tree, but most of them do little harm. The honey locust is found in Missouri, but is inferior to the above named locust in all respects except size, and it has not been reported for manufacturing purposes in the State.

Black Walnut.

The Missouri sawmills cut more than thirty times as much black walnut as the factories in the State make use of. The State ranks fifth as a producer of this cabinet wood; those above it, in the order named, are Ohio, Indiana, Illinois and Kentucky. The best walnut lumber is cut from large trees, for age is necessary to give the heartwood the rich color which makes it valuable. that reason, the planting of walnut trees for the purpose of growing timber does not promise as quick returns as in the case of some other species which grow no faster. The wood has great value, and is becoming scarce. It is the highest priced wood in the United States that goes to market as lumber, though osage orange, which is sold for a special purpose, is above it.

The Cedars.

Four cedars figure in Missouri's wood-using industries, but in rather small quantities. Spanish cedar, from Mexico, supplies most, and it is all made into cigar boxes. Next is western red cedar from Oregon and Washington, and its chief use is for doors and frames. Red cedar, which grows in all parts of the South, East, and Middle West, is In much demand by coffin and casket makers; but the total amount consumed in Missouri is small because the wood is expensive and scarce. Lead-pen-cil makers pay so much for red cedar that they secure most that reaches the market. There are two pencil slat mills in the State. The northern white cedar reported came from the Lake States. It is frequently known as arbor vitae, and is seldom sawed into lumber, though large quantities are made into poles, posts and formerly into street paving blocks. That converted into lumber is chiefly consumed by manufacturers of cances and small boats, but a little finds place as car lining or ceiling.

Minor Species.

Several woods are reported in use by Missouri manufacturers, but in small quantities. Hackberry is one of them. This bears more resemblance to ash than to any other, but is in most ways inferior to it. The species is not plentiful, but scattering trees range over the country. Sassafras occasionally attains to saw-log size, and it goes to sawmills with logs of other species. The lumber is not generally set apart and kept separate, but sometimes flooring is made of it. An old belief prevailed, and possibly yet survives in some localities, that sassafras floors and bedsteads repel troublesome insects, and conduce to sounder sleep. Whether that view is correct or not, the wood makes good flooring, wears well, is handsome in appearance, strong for its weight, lasts well in damp situations, and in pioneer days was much emdamp situations, and in pioneer days was much employed along the Mississippi river for dugout canoes. It reaches large size in Missouri. Pecan is a species of hickory which is at its best in the region south of Missouri. It is substituted for hickory in some situations where great toughness is not required. Holly appears among the woods used in the State, but in quantity so small as to be unimportant, and it is not plentiful in Missouri. It is in most demand by the manufacturers of brush backs and musical instruments. Butternut receives little more than mention among the woods in use. If it can be had in sufficient amount it serves well in many places, and in some can be substituted for black walnut. It is lighter in color, and to some it is known as white walnut. It is native to Missouri, but most of the butternut lumber in the mar-ket is cut in Texas, Indiana and Wisconsin. A peculiar far western tree is listed by manufac-turers in Missouri, but the total amount demanded yearly is only a few thousand feet. The tree is yearly is only a few thousand feet. The tree is the yucca, a sort of palm, growing in California and Arizona, with a trunk a foot or more in diameter, consisting of tough fibers and a kind of pith, not much resembling wood. It is cut in thin strips and veneer, and is used for surgeons' splints and as wrapping material for bottles.

Foreign Woods.

number of foreign woods are employed by manufacturers in Missouri, but mahogany and Spanish cedar are the only ones demanded in falry large amounts. Circassian walnut comes from the Caspian sea provinces of Russia and Turkey. It generally costs about twice as much as black walnut, or an average of \$203.33 per thousand in Mis-It has pleasing figure, and the colors are d. It is not practicable to give even approxisubdued. mate figures by which to compare the amount of the genuine with woods employed for imitation in this country; but it is certain that imitations are seen much oftener than the real. Perhaps the ratio

manufacturers who work in wood do not show that of the Imitations to the true Circassian walnut in a single stick of home-grown locust was used in furniture, finish, and musical instruments exceeds furniture, finish, and musical instruments exceeds ten to one. Prima vera or white mahogany, is a native of southern Mexico and Central America. It has been in the market about thirty years, and is not a true mahogany though it is not farther from it than are some of the darker woods on the market which pass for mahogany. The foliage is bright yellow, at least at certain seasons of the year, and trees may be distinguished at long distances. Historically, prima vera occupies a unique place in that it was well known to the lumber trade many years before botanists knew of its ex-Istence. The tree was first described by Captain John Donnell Smith of Baltimore, who found it growing in Guatemala in 1890. His name was given it by botanists. Furniture makers have expressed the opinion that it is less durable than true mahogany, but it is not apparent that sufficient tests of the matter have been made to warrant a conclusion. conclusion.

Turkish boxwood is used in amount so small in Missouri that it is of interest there only because of its great cost per foot. It is one of the most expensive woods in the world, and in Missouri the price was a dollar a foot, and it sometimes costs more than that. Ebony comes from a number of foreign countries and is of different shades of blackness. It is the heartwood of different species of persimmon trees. Some of the best comes from Ceylon, Madagascar and the east coast of Africa. There is historical evidence that ebony was cut for commercial purposes on the Red Sea coast 5,000 years ago, and some of the wood cut 4,500 years ago is still in a good state of preservation. Tulip wood is a name applied to several woods which are brightly colored, or variegated. The amount used in Missouri came from Brazil. The small Brazil. The principal objection to it is that the bright colors are liable to fade upon long exposure to the air. Rosewood listed in Missouri is a native of Africa, but there are different species of rosewood from different regions. The satinwood is a native of India, and so is vermilion.

INDUSTRIES.

The various woods available to manufacturers in Missouri are listed and discussed on preceding pages, and the wealth of forest resources is large. It remains to be shown what industries avail them-selves of those resources, and to what extent. The following pages will present that information in considerable detail, and it will be pointed out, in many instances, why one wood is more valuable than another for certain purposes.

Boxes and Crates.

The manufacture of boxes and crates is the largest of the wood-using industries of Missouri, measured by the amount of material used, but more money is spent for the lumber in the sash, door and general millwork business. Boxmakers generally use a rather cheap class of material. Many buy it in the log and convert it into lumber or veneer themselves, and thus keep cost down. There are wood-using industries in Missouri, however, which buy their raw material at a lower price than boxmakers buy theirs. The cheapest of all is bought by excelsior makers.

boxes and crates, except cigar boxes The except cigar which are considered as belonging to an industry by themselves. The piano box and the large shipping case used for dry goods are the limit in one direction, and the pint or pound container is the limit in the other. There are all kinds and sizes between. Formerly when lumber was plentiful and much cheaper than it now is, the custom was to make most hoves of lumber from one-half to to make most boxes of lumber from one-nail to one inch thick; but as the price of lumber rose from year to year, the boxmaker used thinner lumber, in an effort to make a given amount go farther. The use of veneer in this industry has into make most boxes of lumber from one-half to creased. The kind employed by boxmakers is nearly always rotary cut. A log three or four feet long is fixed in a machine like a lathe and is turned rapidly while a powerful knife is held against it, slic-ing off veneer in ribbons as broad as the log is long. It varies in thickness from 5-16 to 1-50 of an inch. Frequently three sheets of veneer are glued together, making three ply, with the grain of the middle sheet running across that of the other two. This is very strong, and is much used by boxmakers in the manufacture of large shipping cases. The corners are reinforced with lumber. A well-made reinforced box of three-ply veneer is not only cheaper than a box made of boards, but it is also stronger, unless the board box is of extra thick

Advance in the cost of lumber has caused boxmakers to resort to cheaper grades. At one time clear, soft white pine was most frequently the box material in all regions within reach of the white pine country; for it was, when all things were considered, the most satisfactory wood for that purpose. The day of the clear white pine box is states, but it is not the clear lumber. The box boards are sawed from small, defective logs, from tops, and from sapwood. Wood of that kind was once thrown away at the white pine mills, or was

left in the woods by the log cutters. Missouri listed in this industry in Missouri. The convenience in Table IV. Thirty-eight woods are listed, rang-still works more than half a million feet of white of short-leaf pine accounts for its low average ing in amounts from over 23 million feet for short-pine into boxes yearly, largely into florist boxes, price. The grades are rather high, and \$13.71 for leaf pine to 300 feet for sycamore, and in cost which is a very small amount compared with red such lumber is cheap. It is based on the boards from \$500 a thousand feet for satinwood to \$18.24 gum, cottonwood, short-leaf pine and others. More than half of all the box material demanded annually in Missouri is red gum. Some of it goes into rually in Missouri is red gum. Some of it goes into very cheap boxes and crates, and some into those of high class. That wood is plentiful, and answers most purposes well, either as boxes, crates, fruit baskets, or small cups for herries. Cottonfruit baskets, or small cups for herries. Cotton-wood answers as well for all purposes, and for some it is better liked, hecause of its white color. It is more expensive than red gum, and naturally where the gum will do as well, cottonwood must glve way. Packers who ship meat in wooden boxes consider cottonwood among the most sultable woods for such hoxes, because it is free from odor and taste. Willow from States further south is a pretty active competitor with Missouri cottonwood for meat hoxes. It is darker than cottonwood, hut otherwise is as satisfactory. Considerations which give cottonwood an important place in the manufacture of meat hoxes, cause the employment of yellow poplar and tupelo for butter boxes. Most of the basswood reported was bought by lard box-makers, and its principal recommendation is that it is odorless and tasteless. The maker of ship-ping containers for provisions must make a closer study of the properties of woods, with regard to odor and taste, than any other manufacturers. Some kinds of foods absorb impurities so readlly that proxlmity to objectionable wood may ruin the contents of a box. Other food products, such as apples, potatoes, and most vegetables, are affected little or not at all. When the maker of egg cases selects cottonwood he is influenced by the wood's color and lightness, not its lack of taste or smell. For the same reason, cottonwood seems to be the favorite material for boxes in which to ship sirup favorite material for boxes in which to ship sirup cans. The prevailing use of red gum in Missouri for apple barrels is due to the wood's cheapness and toughness, and white elm hoops are recommended for banana hampers. Strength of material seems to be the only consideration. Drums (a kind of barrel) for shipping coffee are made of sycamore veneer. They are almost air-tight. Sycamore has long enjoyed a high reputation as a tasteless and edecless wood. Sycard angree for newdored sy and odorless wood. Sugar drums, for powdered sugar, are of cypress. They are constructed in nearby the same way as the sycamore coffee drums. The makers of cheese boxes with best rims give preference to white elm. It is very tough and bends without splintering.

An examination of Table II shows that several rather high-priced woods are bought by boxmakers. rather high-priced woods are bought by boxmakers. Among these woods are Douglas fir and Sitka spruce from Washington to Oregon, redwood and yucca from California, and red and white oak. Some of these are made into boxes of large size, such as plano boxes, where strength is demanded, and good grades of lumber must be had. Others, as redwood, are intended for boxes of a permanent kind such as tool boxes or boxes in which nent kind, such as tool boxes, or boxes in which beer bottles or milk hottles are carried ahout. They are used again and again and must be not only strong, but respectable in appearance. The yucca listed in this industry is a desert palm from California and Arizona, and is used for veneer bottle

BOXES AND CRATES, PACKING.

	Quantity	used	Average	Total	Grown ln	Grown out
	annua	lly	cost	cost	Missouri	of Missouri
	feet	per	per	f. o. b.	feet	feet
Kinds of wood.	B. M.	cent	1000 ft.	factory	B. M.	B. M.
Red gum		62.42	\$ 15.42	\$ 1,074,837	18,822,773	50,882,345
Cottonwood		15.68	21.38	374,352	4,068,499	13,444,848
Shortleaf pine	12,029,800	10.77	13,82	166,297	2,834,350	9,195,450
Cypress	5,533,605	4.96	15.30	84,644	478,794	5,054,811
White elm	2,483,103	2.22	15.87	39,408	660,867	1,822,236
Sycamore	1,147,090	1.03	17.18	19,177	672 373	474,717
Tupelo	621,000	.56	13,35	8,290	500,000	121,000
White pine	586,600	.52	26.68	15,648		586,600
Red oak	519,749	.47	32,84	17,070	342,576	177,173
White ash	298,158	.27	18.00	5,366	149,079	149,079
Sweet birch	200,000	.18	28.00	5,600	magric-10-10-10-10-10-10-10-10-10-10-10-10-10-	200,000
Silver maple		.16	17.00	3.109	93,834	89,033
Basswood	177,000	.16	30.11	5,330	50,000	127,000
Yellow poplar	145,300	.13	18.06	2,624	100,000	45,300
Sugar maple	121,911	.11	18.31	2,233	62,556	59.356
Longleaf pine	110,000	.10	13.36	1,470	***************************************	110,000
Black gum		.08	17.00	1.530	45,000	45,000
White oak		.08	32.79	2.893	58,813	29.417
Hickory	81,820	.07	20.00	1,636	40,910	40,910
Norway pine	9,000	.01	25.00	225	***************************************	9,000
Douglas fir	7,000	.01	35.00	245	************************	7,000
Sitka spruce	7,000	.01	35,00	245.	******************************	7.000
Redwood	3,500		36.29	127	********************	3,500
Yucca	3,500		36.29	127	\$5000000000000000000000000000000000000	3,500
*Less than 1/100 of 1 per o	111,664,699 cent.	100.00	\$ 16.41	\$ 1,832,483	28,980,424	82,684,275

TABLE II.

Planing-Mill Products.

Planing-mill products, as considered in Table III, include flooring, ceiling, siding, finish, and such molding as is used in the interior finish of houses. These products are usually made by planing-mills run in connection with sawmills. Nearly 94 per cent of all of it is short-leaf pine. This excellent wood is abundant in Missouri, and in regions south, and the quality of the wood is high. In softness and color some of it is claimed to approach white pine, and is popular for siding, ceiling and molding. this employed also in large amounts for flooring; but if in situations where wear is heavy, it has not quite the lasting qualities of the harder long-leaf pine which grows a little farther south, but is not

when they reach the planer.

The reported average cost of white oak in this table is low. The only explanation offered is the proximity of the wood to the factories. It is nearly all produced in Missouri, and it is notable that the small amount imported from other States costs \$70 a thousand, or about the price in other States of white oak suitable for flooring and moldlng. Siding is not made of white oak. The native-grown red oak, and that brought from other States, follow almost exactly the same rules as the white oak, namely, the home-grown wood is cheap, and the imported is expensive. Some of the manufac-turers explain the difference in cost by pointing out that the imported oak is much better than that cut in Missouri forests. At any rate, they say, only high grades are brought into the State, while all grades make up the average cost of that procured at home.

The cheapest wood listed in this industry is cot-The cheapest wood listed in this industry is cottonwood, all of which is home grown; but the amount is not large. Red gum is cheap and does not reach the importance in the industry which might be expected of a wood so highly regarded away from home, particularly in some foreign countries. countries.

Most of the flooring included in this table is the ordinary tongued and grooved kind, yet parquetry belongs here, although much work after it leaves the planing mill is necessary before it hecomes a finished product. The black walnut listed in the table was used for parquetry and inlaid horders and fields, but some of the woods which are associated with it, heing demanded in small amounts, were not reported by the manufacturers, perhaps for the reason that most of the colored woods were supplied by carpenters and contractors who laid the parouetry floors. Among woods put to that use are black walnut, already mentioned, which is of dark color; maple, white in color, and forming sharp contrast with wainut; manogany and ebony, dark or black in color; vermilion, red; holly, white; cherry, red; and oak for borders and general pattern pieces. White pine is soft, and is liked for a foundation on which to law the paragraphy floor. dation on which to lay the parquetry floor.

The waste in a planing mill is an important item,

even when the best economy is practiced. Four or five hundred pounds of wood (and sometimes twice that) are planed off of every thousand feet passing through the machines. Manufacturers make special effort to lessen this loss by finding sale for shav-ings, sawdust, and the dust from polishing belts. Shavings are occasionally sold at 25 cents per

PLAINING-MILL PRODUCTS.

for chestnut. The average cost of the wood when it reaches the factory where it is converted into finished products is high, \$36.55. The wood demanded by manufacturers in this business must be of good quality, seasoned, and well selected. Practically none of it comes to the factory in the Practically none of it comes to the factory in the log. Little more than one-seventh of that shown in the table grew in Missouri, and four species are not native of the United States. Woods from the Paclfic coast hold an Important place, and average above \$45 ln price. Seven species are listed from the far west. This industry is highly developed, and material is selected more carefully than in almost any other industry. If a wood is found specially suitable for a particular purpose, and is procurable it is pressed into service, even if it must be brought from distant regions. if it must be brought from distant regions.

Perhaps the largest use of white pine in this in-

dustry is for the backing of veneer in the making of doors, interior finish, and columns. Formerly much of that kind of work was made of solid white plne, that is, a door or a column was of that wood through and through. Built-up construction has largely taken the place of the solid work of former times. The inside is of one wood, and the visible part is of something else. The outside material is veneer—oak, birch, mahogany—glued upon the core. One of the best known woods for the core. core. One of the best known woods for the core or backing is white pine. It is light, strong, and holds its shape well. It warps and twists very little, and glue adheres to it with firmness. Another good core wood is chestnut, but it is not usually considered equal to white pine. Western white pine from Idaho and Montana also serves well as core material. The western yellow pine is employed in the same way and also for solid doors and frames; sometimes under its own name, but frequently as "California white pine." It is not a white pine, but belongs to the yellow pine group, though it bears considerable resemblance to white pine. It is more resinous than any of the white (five-needle) pines, and for that reason is often objected to as a substitute for white pine for doors, frames, molding, and sash.

Douglas fir is much employed for porch columns Douglas fir is much employed for porch columns in Missourl, and for outside house finish in general. It is taking the place of white pine in such places, and for doors, frames and sash. Rotary-cut veneer of Douglas fir possesses a handsome and characteristic figure. It shows to good advantage in using figured pleces. The fir's strength and lasting properties are its chief recommendations for this class of work.

TABLE III.

Kinds of wood. feet B.M. cent per Shortleaf pine 62,256,677 93.85 Cypress 2,195,000 2.97 Red gum 1,400,000 1.90 Red oak 489,500 .66 White oak 263,500 .3 Cottonwood 125,000 .17 Black walnut 36,000 .05		Quantity		
Kinds of wood. B.M. cent 62,256,677 93.88 Cypress 2,195,000 2.97 Red gum 1,400,000 1.96 Red oak 489,500 66 White oak 263,500 3.36 Cottonwood 125,000 1.76 Black walnut 36,000 .05		annually		
Shortleaf pine 62,256,677 93.85 Cypress 2,195,000 2.97 Red gum 1,400,000 1.90 Red oak 489,500 .66 White oak 263,500 .36 Cottonwood 125,000 .17 Black walnut 36,000 .05		feet	per	
Cypress 2,195,000 2.97 Red gum 1,400,000 1.90 Red oak 489,500 .66 White oak 263,500 .36 Cottonwood 125,000 .17 Black walnut 36,000 .05			cent	
Cypress 2,195,000 2.97 Red gum 1,400,000 1.90 Red oak 489,500 .66 White oak 263,500 .36 Cottonwood 125,000 .17 Black walnut 36,000 .05	Shortleaf pine62.	256,677	93.89	
Red gum 1,400,000 1.96 Red oak 489,500 .66 White oak 263,500 .36 Cottonwood 125,000 .17 Black walnut 36,000 .05		195.000	2.97	
Red oak 489,500 .66 White oak 263,500 .38 Cottonwood 125,000 .17 Black walnut 36,000 .05		400.000	1.90	
White oak 263,500 .36 Cottonwood 125,000 .17 Black walnut 36,000 .05			.66	
Cottonwood 125,000 .17 Black walnut 36,000 .05		263,500	.36	
Black walnut 36,000 .05	Cottonwood	125,000	.17	
			.05	
			-	
Totals	Totals73,	765,677	100.00	

Average	Total	Grown in	Grown out
cost	cost	Missouri	of Missouri
per	f. o. b.	feet	feet
1000 ft.	factory	B. M.	B. M.
\$13.71	\$ 949,495	66,896,677	2,360,000
19.84	43,556	1,745,000	450,000
13,15	18,412	1,400,000	***************************************
15.17	7,420	437,500	52,000
15.16	3,995	235,500	28,000
12.00	1,500	125,000	***************************************
64.44	2,320	5,000	31,000
\$ 13.92	\$ 1,026,698	70,844,677	2,921,000

Sitka spruce, from the same region as Douglas fir, is demanded in more than twice the amount of that wood. Many of its uses are the same as Douglas fir, but it is employed indoors rather than out. It is light in weight, white in color, strong, rigid, and generally free from objectionable works, and defects, and is an ideal material for inknots and defects, and is an ideal material for in-terior house or hall finish, except that it has little

figure

Another substantial wood from the Pacific coast which fills a place in this industry is the western red cedar. The amount demanded is much below red cedar. The amount demanded is much helow Douglas fir and Sitka spruce. It is more frequently mentioned for window frames than for any other purpose, and the part of the frame where it generally appears is the sill. That is the bottom piece of the frame, and if outside, it is much exposed to dampness, and therefore subject to decay. The western cedar is one of the so-called "everlasting woods," and it is purposely selected for window sills because of its ability to resist decay. dow sills because of its ability to reslst decay. The eastern red cedar, which grows in Missouri, but reaches its hest development in Tennessee, is also selected for window sills, and a rather large amount of it is so used in Missouri. Cypress, which is also an enduring material, is employed for the corner purposes, but the whole forms. for the same purposes, but the whole frame is made of cypress more frequently than the sill alone.

Cypress and California redwood are specially reported as suitable for fire doors and fire shut-ters because they contain no resin and are slow to take fire. Redwood is the less combustible and absorbs water so readily that If dampened, its incombustibility is increased in a marked degree. Some manufacturers refer to the slow combustion some manufacturers refer to the slow combustion of white plne as one of its chief recommendations of white plne as one of its chief recommendations for fire doors and shutters. It contains little resin, but when it takes fire it is speedily consumed.

Sash, Doors, Blinds and General Millwork.

Statistics of this industry in Missouri are given Some manufacturers refer to the slow combustion of white plne as one of its chief recommendations for fire doors and shutters. It contains little resin, but when it takes fire it is speedily consumed.

The high-grade cabinet woods listed in this industry, such as cherry, black walnut, Circasslan walnut, mahogany, satinwood, sweet birch, vermi-

two-horse wagon load. The buyers are distillers of wood alcohol, livery stables which use the shavings for horse bedding, and some shavings are thrown on muddy walks. Sawdust is generally salable in large towns. About 10 cents a sack retail is the price for that spread on saloon and meather. shop floors, and the demand for it is rather large. Certain floor-cleaning compounds are made of saw-dust with chemicals added. The dust is often ground to powder before the chemicals are added. Another use for sawdust is as an absorbent for nitroglycerin in dynamite manufacture.

SASH, DOORS, BLINDS AND GENERAL MILLWORK.

PT.	Α	D.	T TO	13	7

	Quantity annua		Average	Total	Grown in Missouri	Grown out of Missouri
	feet	per	per	f. o. b.	feet	feet
Kinds of wood.	B. Mt.	ſ	1000 ft.	factory	B. M.	В. М.
Shortleaf pine	23,396,985	33,85	\$ 26.19	\$ 612,587	5,958,977	17,438,008
Cypress	22.059.043	31.91	35.41	781,210	1,541,950	20,517,093
White oak	4.992.937	7.22	58.11	. 290,138	946,522	4.046,415
Red oak	4 077 857	5.90	50.28	205.022	982,635	3.095,222
White pine	2 593 459	3.75	47.26	122,575		2.593.459
Sitka spruce	2 1 4 5 2 2 1	3.10	38.71	83.047		2.145.221
Sweet birch	1 585 320	2.29	47.05	74.595	1.000	1.584,320
Yellow poplar	1 907 597	1.88	44.05	57.162	305,500	992.037
Red gum	1 176 107	1.70	22.98	27.032	239,700	936,407
Ten guili	1,110,101	1.45	26.44	26.575	about to continue and comme	1.005.000
Longleaf pine		1.33	38.71	35,591		919,380
Black spruce		1.19	37.87	31.210	######################################	824.115
Douglas fir		.70	58.91	. 28,332	D4000400000000000000000000000000000000	480.972
Western yellow pine		.56	44.69	17.440	***************************************	390,267
Sugar maple		.52	159.39	56.945	***************************************	357,273
Mahogany	0 - 0 - 0	.45	51.40	15.872	***************************************	308.800
Western white pine		.44	24.96	7.654	131,000	175,639
Silver maple	000 000	.29	45.00	9,000	202,000	200,000
Beech		.29	35.00	7.000	***************************************	200,000
Locust		.29	47.49	9.422	***************************************	198.412
Basswood		.21	50.94	7.379	\$200 00 10 10 10 10 10 10 10 10 10 10 10 1	144.853
Sugar plne		.20	40.27	5,566	\$0000000000000000000000000000000000000	138,255
Western red cedar			44.78	3.108	\$0000000000000000000000000000000000000	69,411
Redwood		.10	46.45	2.645	3,601	53.344
Red cedar		.08	18.24	930	3,001	51,000
Chestnut		.07	25.40	1.270	25,000	25,000
Cottonwood		.07	45.42	1.596	,	35,137
White ash		.05	60.00	1,500	\$10000 pp = \$100000000	25,000
Norway pine		.04	102.88	1.646	1,000	15.000
Black walnut		.02	83.71	1.331	1,000	14,900
Black cherry		.02	30.00	180	-,	6,000
White elm		.01	59.97	181		3,018
Hickory		01	200.00	200	D14470111 010110000 1101400	
Circassian walnut			500.00	500	*************	1,000
Satinwood			40.00	20	500	1,000
Butternut			126.00	63	900	F.0.0
Holly					000100000000000000000000000000000000000	500
Vermilion		*	230.00	115	***************************************	500
Sycamore	300	•	26.67	8	****************	300
Totals	69,130,643	100.00	\$ 36.55	\$ 2,526,647	10,138,385	58,992,258
*Less than 1/100 of 1 per co	ent.					

Car Construction.

The construction and repair of cars in Missouri consumes annually over 50 million feet of lumber of different kinds and dimensious, from the heavy beams and timbers in the frames of freight cars to the costly cabinet woods demanded in small amounts in the finish of passenger coaches. A por-tion of the material listed in Table V is used in tion of the material listed in Table V is used in building cabs for locomotives, but the amount devoted to that purpose is comparatively small. Wood demanded for certain other parts of railroad equipment is likewise included. Thus sign boards and whistling posts, cattle guards, engine pilots and dump cars are included. The only reported use for post oak in this industry was for slgn posts; but white and red oak were employed in large amounts for many parts of car construction. The most important wood in the industry, judged by the amount used, is short-leaf pine, which sunby the amount used, is short-leaf pine, which supplied half of all the wood demanded by car buildplied half of all the wood demanded by car builders in Missouri. It goes largely into siding, roofing and flooring, but much of the framing is also of this species. It is the cheapest of the twenty-two woods in the table, and it is a matter of surprise that practically all of it is brought into Missouri from other States, largely from Arkansas. No reason has been given for going out of the State for a wood so abundant within.

Nearly three times as much Douglas fir as longleaf pine is used, though the two woods are rated

Nearly three times as much Douglas fir as long-leaf pine is used, though the two woods are rated much the same in stiffness and strength, and the fir must be brought two thousand miles and the pine only a few hundred. The fir is nine dollars higher in cost than the long-leaf pine, with which it comes in competition in the car shop. White ash fills an important place. It is strong and stiff for frames, and handsome for finish. The high cost indicates that the best grades are demanded. The cottonwood listed in this industry is likewise high class, as shown by the average price paid for it.

The leading wood for interior finish of passenger cars is yellow poplar of which four and a quarter million feet are used annually. This wood shows to best advantage in wide panels, finished and stained to imitate dark-colored woods such as mahogany, cherry and birch. There is no econ-

as mahogany, cherry and birch. There is no econ-

out a joint or splice where birch and cherry will not, because too small. For that reason yellow poplar panels are highly esteemed, in spite of cost. It may be polished so smoothly and stained so perfectly that it will pass under close inspection for some of the finest woods on the market. Some of the Douglas fir listed in the table was made into broad car panels. The other cabinet woods employed for that purpose and for other interior car finish were black cherry black walnut may car finish were black cherry, black walnut, ma-hogany, sweet birch, and vermilion or padouk. Much of the white and red oak listed was employed in the same way.

Vehicles and Vehicle Parts.

The commodities included in Table VI cover a wide range, not including hand wagons and sleds, or steam end electric cars, but vehicles of nearly all kinds between. The principal types are business

lion, oak, and yellow poplar, are made into finish. omy in substituting yellow poplar for cherry, and pleasure wagons and carriages for horses, panels, pedestals, wainscoting, mantels, chair- as far as the cost is concerned, for it is and motor vehicles. Sleds and sleighs are inboards, railing, brackets, spindles, newels, stairs, cheaper than the poplar; but the latter may be had in larger pieces, and will make entire panels with- class of vehicles in Missouri is unimportant. Horse vehicles hold chief place. Some are made in larger pieces, and will make entire panels withare turned out of small shops where most of the work is done by hand, and the methods followed do not much differ from those practiced generations do not much differ from those practiced generations ago. A good many blacksmiths have a corner of the shop fitted with wood-working tools, and they make a few wagons during the year, not for the general market but for special customers who want hand-made vehicles. The total number of vehicles yearly turned out thus falls far short of those made in factories; but the home-made product should not be ignored in presenting statistics of vehicle manufacture in Missouri, and all available figures are given in this report.

There are different kinds of vehicle factories. Some do all the work from the arrival of the rough stock to the ironing and painting of the finished vehicle; but others pursue other methods. One mill or factory may rough-turn the spokes, cut out the felloes, turn, mortise, and bore the hubs,

out the felloes, turn, mortise, and bore the hubs, cut the pieces for the poles and shafts, and send them to other factories to be finished. Or, wheels may be finished, except the ironing and painting, and in that form they go to a factory that finishes them. One mill may make shafts and poles only; another may turn out axles, hands, bolsters and reaches. It is thus apparent that all vehicle manufacturers do not work in the same way. Often the facturers do not work in the same way. Often the finished product of one becomes the raw material for another—they follow the work step by step, one beginning where another leaves off, until the whicle is finally completed and put on the market. The various methods pursued by the manufacturers in this industry make the collection of statistics difficult. Constant inquiring and care are necessary to guard against counting the same material twice, when it is found in different factories as it passes from stage to stage in the process of manufacture, and there is likewise danger of missing it altogether, for many of the shops and mills are very small and diffcult to locate. In the whole range of wood-using industries, no other pre-sents such difficulties to the statistician who undertakes to compile a trustworthy report of the kind and amount of wood demanded, and its cost.

The industry includes both vehicles and vehicle parts. The term "parts" is employed advisedly, for in many instances the parts are put on the general market for sale. Hubs made in Missouri may be sold in Iowa; shafts may find their market in Illinois; wheels ready for the irons may find their way to Indiana. Trade in such commodities is large. In most instances the "parts" when so listed are of hickory or of oak. Wheels for small vehicles are generally of hickory. Large

Grown in Grown out

VEHICLES AND VEHICLE PARTS.

	TABLE	VI.
Quantity	heed	Average

	Quantity used		Average	Total	Grown in	Grown out
	annually		cost	cost	Missouri	of Missourl
	feet	per	per	f. o. b.	feet	feet
Kinds of wood.	B. M.	cent	1000 ft.	factory	B. M.	B. M.
White oak	_12,622,027	36.37	\$ 32.68	\$ 412,496	6,921,148	5.700.879
Hickory		33.11	39.21	450,504	3,180,802	8,307,420
Cottonwood	3,016,350	8.69	37.71	113,759	386,400	2.629.950
White ash	1.434.708	4.13	33.78	48,468	636,700	798,008
Red oak		3.71	35.28	45,418	696,861	590,509
Silver maple		2.53	22.10	19.373	553,660	323,120
Red gum		2.51	26.60	23,172	30,750	840,500
Yellow poplar		2.29	53,56	42,648	49,000	747,194
Sugar maple		2.07	22.41	15.851	452,990	264,380
Shortleaf pine		2.02	24.61	17.257	102,208	598,916
Tupelo		.87	26.96	8,136	1,800	300,000
White elm		.69	23.25	5,534	28,000	210,000
Yellow oak		.22	18.00	1,350	50,000	25,000
Beech		.17	35.00	2,100		60,000
Sycamore		.15	18.77	959	10,000	41,100
Hackberry		.14	18.00	900	50,000	
Post oak		.14	25.00	1,250	10,000	40,000
Sweet birch		.07	22.65	555	10,000	24,500
Cypress		.06	51.29	1,035	5,181	15.000
Basswood		.02	34.07	276	6,000	2,100
Black spruce		.01	60.00	180	0,000	3,000
White pine		.01	43.14	110	******	2,550
Bur oak		.01	35.20	88	Outstandings	2,500
Pecan	0 000	.01	50.00	100	Personana	2,000
Mahogany			170.00	170		1.000
Spanish oak			24.00	12	500	•
-			-1.00	1.0	300	***********
Totals	34 701 626	100.00	\$ 34.92	\$1,211,701	13,172,000	21,529,626
*Less than 1/100 of 1 per cent	,	200.00		,-,-11,.02	20,2.2,000	22,020,020

CAR CONSTRUCTION.

T	AB	L.E.	V.

	Quantity		Average	Total	Grown In Missouri	Grown out
	feet	per	per	f. o. b.	feet	feet
Kinds of wood.	B. M.	cent	1000 ft.	factory	B. M.	B. M.
Shortleaf pine	25,312,900	49.16	\$ 19.49	\$ 493,338	120,000	25,192,900
White oak	5,942,642	11.54	31.92	189,717	173,000	5,769,642
Yellow poplar	4,240,046	8.23	50.20	212.851	****************	4.240.046
Red oak	3,965,284	7.70	26.81	106,293	99.000	3,866,284
Douglas fir		7.51	33.03	127,706	01701111110101010000	3,866,340
White ash		5.63	51.64	149.800	nerverters contracted	2,900,800
Longleaf pine		2.67	24.00	32,944	manage that reads	1.372,660
Cottonwood	1,350,000	2.62	29.63	40,000	***************************************	1,350,000
Mahogany		2.05	125.87	132,556	***************************************	1.053.146
Chestnut		.97	24.00	12,000	***************************************	500,000
Black cherry		.51	83.56	22.054	910000111111111111111111111111111111111	263,927
Sugar maple		.32	47.66	7,892	***************************************	165,600
Sweet birch		.32	43.11	7.070	***************************************	164,000
Silver maple		.26	47.11	6,383	***************************************	135,500
Turpelo		.19	60.00	6,000	Marrie manual and and	100,000
Cypress		.14	31.37	2,290	dearing cross-right	73,000
Northern white cedar		.10	75.00	3,750	***************************************	50,000
White elm	20,000	.04	35.00	700	***************************************	20,000
Hickory		.02	56.31	505	***************************************	8,969
Vermilion	6,000	.01	200.00	1,200	************	6,000
Black walnut	2.738	.01	92.40	253	passes to a to	2,738
Basswood	75		26.67	2	Greet	75
Totals		100.00	\$ 30.20	\$ 1,555,304	392,000	51,101,627

hubs, and entire large wheels are often oak. Shafts nubs, and entire large wheels are often oak. Shafts of hickory are usual, and the same applies to small poles, though ash has considerable use for that purpose. Two-thirds of all the wood reported for vehicles in Missouri is white oak and hickory. Most of the hickory comes from the southeastern quarter of the State.

The manufacture of automobiles is included in Table VI, and several of the high-priced woods go into that clarge of vehicles. The males are this

Table VI, and several of the high-priced woods go into that class of vehicles. The spokes are of hick-ory, while beech, sugar maple, ash and the oaks appear in the frames. The bodies of some motor vehicles are of metal; but others are largely of wood. The panels and curved parts of the bodies demand wood of good quality, and the best where smoothness of finish is the chief consideration is yellow poplar. That holds also for panels and portions of bodies of carriages and fine business vehicles, such as delivery wagons. Tupelo frequently takes the place of yellow poplar in that work. It bends well and takes a satisfactory polish. Mahogany and sweet birch find place as antomobile trim, and probably most of the birch is finished in imitation of mahogany. Cottonwood

supplied three million feet to this industry, and much of it was made into heds for farm wagons and the tops of business wagons. Beech is very strong and stiff, and serves as automobile frames. It serves likewise as felloes for very heavy wagons, some preferring it to white oak because it shrivels and swells less under seasonal changes, and tires are less likely to work loose. When extra large spokes are required, white elm is sometimes used. spokes are required, white elm is sometimes used. The hackberry reported was probably substituted for ash, and the pecan for hickory. Sycamore is made into shelving for bakers' wagons, because it is easy to keep clean. Red gum was used for sides and panels of coal wagons. Ash is occasionally employed for the same purpose. Red gum sideboards for farm wagons were reported, and the small quantity of black spruce in the table was used in the same way. Some of the manufacturers made wagon tongues of red oak. Basswood bends well and is valuable for panels. Hearse and undertaker wagon manufacturers prefer this wood.

Furniture.

Although twenty woods contribute to the supply of furniture material in Missouri, four-fifths of all is supplied by four woods—red gum, white oak, silver maple and red oak. Red gum is nearly half. In no other industry is this wood so largely employed in imitation. When carefully selected it passes without much staining for Circassian wal-nut, and it may be printed to resemble maple and oak. Silver maple also is printed to imitate oak; and sweet birch passes for other woods, while yellow poplar takes the color of birch and is substituted for it. The art of finishing and staining wood has been so perfected that almost any effect can be produced to order, and the purchaser's tastes can be satisfied. Some imitations are apparent and deceive no one who examines them carefully; but others are so skillfully executed that none but

an expert can separate the true from the false.
Furniture makers have made a close study of different woods and understand what each is best suited for. Some give their best service as outside material; others seldom so appear, but make the inside, hidden parts. Where strength or hardness inside, hidden parts. Where strength or hardness is desirable, it is possible to select woods to fulfill the conditions; if smoothness is wanted, rather than figure or grain, there are woods of that kind. There are white, sanitary woods, attractive in appearance and easily kept clean. Such material is popular for kitchen and pantry furniture; and among woods of that kind are basswood, cottonwood, maple, ash, sycamore and yellow poplar. Woods which wear smooth by sliding, one upon another, are demanded by furniture manufacturers for drawers and drawer slides, and for the slides of extension tables. A wood which serves that purpose well must be hard and have a fine grain. Sugar maple, beech and birch fulfill the conditions. Furniture of solid oak, mahogany, birch, walnut,

Furniture of solid oak, mahogany, birch, walnut, cherry or other handsome, costly woods is now seldom made. The cost would be excessive, and unless the material were long and carefully seaunless the material were long and carefully seasoned and the joining and fitting executed in the most skillful manner, the heavy pieces of furniture would be likely to warp out of shape, and pull apart at the joinings. This danger is avoided by using cores or backing of built-up veneers of softwoods or of the softer kinds of hardwoods. The article of furniture, such as a chair, table, or chiffonier, is thus made of two parts, the inner frame of cheap woods, and the outer visible part of thin sheets of costly veneers glued upon the frame sheets of costly veneers glued upon the frame work. Such a piece of furniture has the appearance of being solid oak, walnut, or some other landsome material, and the core of cheaper wood nowhere appears. When deep carving is desired, the outer wood must be thick enough to receive the outer the content of cutting. Occasionally a buyer insists on furniture of solid oak, mahogany, or some other cabinet wood. of solid oak, mahogany, or some other cabinet wood. The manufacturer gives him what he wants, but even then, in most cases, the furniture is built up of veneers and overlays. In that case, if for example, the wood is to be mahogany, the whole article, core as well as outside, is of the specified wood and there is no deception as to material. The manufacturer takes the extra trouble of building up the furniture instead of making it of thick, solid pieces because his reputation is at stake solid pieces, because his reputation is at stake and he knows that the built-up article is better. A table top three inches thick of solid wood almost invariably warps and checks, but if built of transverse sheets of veneer, it stands time and weather, changes, and retains its shape. Good backing or cores for veneers should have but small tendency to warp and twist. White pine is by many considered the ideal wood for that purpose, but bass-wood, cottonwood, chestnut, soft maple, and sev-

eral of the pines are satisfactory.
One factory seldom makes all kinds of furniture. The business is highly specialized. The making of chairs is so distinct from furniture manumaking of chairs is so distinct from furniture manufacturing in general that it is often regarded as a separate industry. Further than that, chair factories are specialized. Some produce dining-room chairs; opera and hall chairs are the exclusive output of some; others manufacture pulpit chairs, dentists chairs, barber chairs, or perhaps cheap camp stools. The same practice obtains among makers of other kinds of furniture. That which is upholstered falls into a class; davenports, lounges, and couches are sometimes the special HANDLES.

	Quantity		Average	Total cost	Grown in Missouri	Grown out
	feet	per	per	f. o. b.	feet	feet
Kinds of wood.	B. M.	cent	1000 ft.	factory	B. M.	B. M.
Hickory	.14,174,000	72.16	\$ 19.35	\$ 274.230	6.602.500	7,511,500
White ash	2,580,000	13.14	15.96	41.188	1.287,500	1,292,500
Red gum	1.750,000	8.91	16.25	28,438	1,750,000	-,,
White oak	770.000	3.92	15.17	11,680	770,000	
Red oak	310,000	1.58	14.39	4,460	310,000	***************************************
Sugar maple	35,000	18	23.71	830		35,000
Cypress	. 22,000	.11	18.00	396	\$0000000000000000000000000000000000000	22,000
Totals	19,641,000	100.00	\$ 18.39	\$ 361.222	10 720 000	8 921 000

product of a factory; bedroom suites, or even bedsteads only, may constitute the output; and some
large establishments make only kitchen, diningroom or porch furniture. All of these are brought
together in statistics shown for Missouri in Table VII.

Toughness
and resiliency are the most essential properties.
There are other commodities into which the remainder of the hickory tree may be worked, and
the waste is not necessarily excessive, though some
times it is not small. Articles made from hickory,
other than handles, are huggy snokes and rims,

It can be readlly understood that all furniture factories do not demand the same kinds of wood. The maker of cheap camp stools has no use for cherry, walnut, or mahogany; the manufacturer of parlor pieces needs little elm, cottonwood, or pine, except possibly as backing for veneer. In Missouri the tops of kitchen tables are usually of basswood, cottonwood, or soft maple. These are known as sanitary woods; they are easily kept clean. The sapwood of red gum is liked for the bottoms and backer of draways and soft maple are also backs of drawers, and elm and soft maple are also so employed. A rather large amount of sycamore is used, some high-class, other cheap. When quar-ter-sawed it makes handsome table tops and carved ter-sawed it makes handsome table tops and carved chair arms; the common grades go to kitchen tables and the interiors of book cases, wardrobes, bureaus, and cupboards. White elm is employed in carrings for wardrobes, kitchen safes, and brackets. White and red oak are so universally used in furniture manufacture that almost every department of the business owes something to them. The use of mahogany for furniture in Missouri apears small; but the place is gupplied with imitation mahogany made its place is supplied with imitation mahogany made of birch, red gum, and yellow poplar. Red cedar meets a demand for an aromatic wood as bottoms for drawers in bureaus and chiffoniers, shelves and backs of wardrohes, and as chests in which clothes are stored. The belief is widespread, and has existed during generations, that the odor of red cedar protects furs and clothes against moths, and other injurious insects. At any rate, a pleasant odor is imparted to clothing left for a considerable time in contact with the wood. The real efficiency of cedar in destroying insects is a matter on which opinion in destroying insects is a matter on which opinion differs. It does not appear that a scientific investigation of the question has ever been made. The opinion has prevailed during three hundred years that a red cedar clothes chest is proof against moths. The same opinion is held regarding the incense cedar of California, the Port Orford cedar of Oregon, and the one-seed juniper and mountain juniper of western Texas.

other than handles, are buggy spokes and rims, shafts, poles, axles, sucker rods for pumping deep shafts, poles, axles, sucker rods for pumping deep wells, dowels, shewers, athletic goods, and many more. Meat packers buy hickory cordwood for smoking meat. If as much of a hickory tree is worked up as is fit for one or more of these commodities, there will be little left to rot in the woods. Sometimes, however, the hickory lumbering is carried on in districts so far from transportation that only the choice parts of trees can be taken out with profit. The principal hickory region of Missouri is the southeastern part of the State, and several large and many small operators are located there. Not half of the hickory cut in Missouri is converted into the finished products in the State, but much is shipped elsewhere either in the State, but much is shipped elsewhere either in the rough or in the partly manufactured form.

TABLE VIII.

Though or in the partiy manufactured form.

Though hickory is the most important it is not the only wood valuable to Missouri handle manufacturers. Two and a half million feet of white ash are used. This wood is highly satisfactory as handles for certain farm tools, particularly pitchforks, rakes, hoes, and shovels. It is stiff, strong, and moderately light.

White oak is occasionally substituted for hickory in railroad pick handles, and even for ax handles, but for ax handles it lacks much of measuring up to hickory.

Much of the sugar maple and cypress in the table

was made into broom handles, and a small part of the red gum was so used.

Large numbers of small handles of various patterns are turned out, and for some of them there is not much choice of wood. Among handles of that class are hand grips on bucket pails and on boxes and packages. Red gum is largely used for that and packages. Red gum is largely used for that commodity, and red oak and ash contribute to the supply. There are gimlet, awi, auger, chisel, saw, and other tool handles. Some are made from waste, There are gimlet, awl, auger, chisel, saw, Whip handles are reported as a by-product of saddle-tree factories, cut from pieces sawed out to give

TABLE VII.

FURNITURE.

rop City Set 1	Quantity	ally	Average cost	Total cost	Grown in Missouri	Grown out of Missouri
	feet	per	per 1000 ft.	f. o. b.	feet B. M.	feet B. M.
Kinds of wood.	B. M.	cent 45.23	\$ 19.81	\$ 252,333	4,876,250	7,863,400
Red gum	12,739,650	21.82	43.61	268,088	1,940,875	4,206,125
White oak			21.96	46,557	424.830	1,695,170
Silver maple		7.53	36.26	72,483	583,125	1,415,875
Red oak		7.10	22.45	34,019	304,500	1,210,500
Cottonwood		5.38	21.79	23,795	359,500	732.500
White elm		3.88	23.72	24.037	61,670	
Sugar maple	_ 1,013,500	3.60		12,475		951,830
Sycamore		2.29	19.37		479,000	165,000
White ash	443,000	. 1.57	26.98	11,950	1,500 117,500	441,500
Yellow poplar	149,000	.53	27.35	4,075		31,500
Shortleaf pine	123,800	.44	24.89	3,082	14,000	109,800
Sweet birch	57,900	.21	51.05	2,956	00.0000000000000000	57,900
Cypress		.16	20.34	895	A	44,000
Black walnut	. 31,000	.11	73.38	. 2,275	***************************************	31,000
Basswood	15,000	.05	35.00	525	-	15,000
Hickory	10,000	.03	21.00	210	***************************************	10,000
Tupelo	40 000	.03	18.50	185	M*************************************	10,000
Mahogany	0.000	.03	183.15	1,685	***************************************	9,200
White pine	9 000	.01	92.50	185	***************************************	7,000
Black cherry	500		84.00	42	***************************************	500
Totals	28,165,550	100.00	\$ 27.05	\$ 761,852	9,162,750	19,002,800
*Less than 1/100 of 1 per cent	•					

Handles.

The statistics in Table VIII, relative to the manufacture of handles, include many sizes, from handles for gimlets and awls to those for cant hooks. Seven woods figure in this business and nearly twenty million feet are consumed. Hickory is the most important, and white ash next. Most handles require fairly high grades of wood, yet the average prices paid are low. The apparent inconsistency is easily explained by the fact that most handle woods are bought in the log or billet form, and little work has been done on them when they reach the factory. Some of the material does not pass through a sawmill, and no sawyer's bill is included in the cost. Billets are sometimes split in the woods and go in the rough form to the handle maker or go in the form of bolts. Sometimes they are rough-turned before they go to the finishing factory. This holds good for hickory chiefly, but some white oak and white ash go through the splitting and rough-turning process. The statistics in Table VIII, relative to the manu-

white ash go through the spitting and rosgaing process.

The bulk of the 14 million feet of hickory is made into ax, pick, and sledge handles. Such handles are 36 inches long, but the bolts are cut 40 inches to allow for trimming the ends to rid them of seasoning cheeks. Wood of that kind is measured by the cord or rank and this is good for about 300 handles. A lathe makes 400 handles a day. In selecting material for ax, pick, and hammer handles,

shape to the saddle tree. They are of ash, maple, oak, and hackberry.

A by-product of handle factories is the dust from the sanding belts. This is very fine particles of wood, like flour, and it is bought by manufacturers of floor-cleaning compounds, and dynamite. Some of the finest dust is used for polishing silver ware.

Fixtures.

Fixtures are closely related to furniture. The line separating the two industries is often difficult line separating the two industries is often difficult of definition. Fixtures are generally made for a particular room or place, while furniture is not so restricted. Fixtures are adjuncts of banks, offices, stores, saloons, halls, and hotels. They consist of showcases, counters, presses, and cabinets, window seats, wall benches, soda fountains, exhibition racks, bars, fixed desks, shelving, and many others of similar kind. They differ from interior finish which is made fast to walls, ceiling, or floor, and can not be removed without considerable injury to the finish and the room. and the room.

Fixtures are made in much the same way as furniture; similar materials are used, and similar effects are produced by selecting and grouping woods. Veneers are as largely employed as in furniture, and shelving and paneis hold the relative place which they occupy in furniture. In Missouri 28 woods are reported in this industry, and four of them

have been expected. Only twelve of the twenty-eight species grew even in part in the State. Donglas fir and redwood came from the Pacific Coast; three species, Circassian walnut, satinwood, and mahogany were imported from foreign countries; and not one was furnished entirely by Missouri.

The use of sassafras as backing, or core wood, for veneers is particularly mentioned with approval by a manufacturer. It is light and retains its form in a satisfactory manner under climatic changes. Soft maple likewise receives commendation as a core material when employed in fixtures of large size where wood is put to severe test. Another place where soft maple comes up to expectation is in shelving where tendency to warp or twist would be a serions defect. Sycamore and cottonwood serve with it and with equal satisfaction.

Results are rather disappointing in the utilization of waste in this industry. One manufacturer works sweet hirch scraps into flatiron handles, and another makes fish bobs of small pleces of redwood.

FIXTURES.

	Quantity used annually		
	feet	per	
Kinds of wood.	B. M.	cent	
Shortleaf pine		27.85	
White oak		17.13	
Cypress	863,250	8.42	
Red oak	830,880	8.11	
Silver maple	734,437	7.17	
Sweet birch	591,150	5.77	
Yellow poplar	531,985	5.19	
Sycamore	375,000	3.66	
Mahogany	360,050	3.51	
Red gum	254,400	2.48	
Cottonwood	248,516	2.42	
Douglas fir	200,000	1.95	
Redwood	200,000	1.95	
White pine	113,000	1.10	
White ash	82,372	.80	
Beech	60,000	.59	
Basswood	51,500	.50	
Sugar maple	60,874	.50	
Black walnut	23,600	,23	
Chestnut	17,000	.17	
Sassafras	10,000	.10	
White elm	6,000	.06	
Black spruce	5,000	.05	
Hickory	5,000	.05	
Black cherry	1,600	.02	
Locust	1,000	.01	
Satinwood	1,000	.01	
Circassian walnut	400		
Totals	10,248,826	100.00	
*Less than 1/100 of 1 per cent.			

Caskets and Coffins.

The mahogany used in Missouri in the manufacture of coffins and caskets is of lower price than that demanded by any other industry in the State. Some of it is choice material, but in the State. Some of it is choice material, but in the making of caskets it is practicable to use what is known commercially as "wormy mahogany." This is employed in the manufacture of casket shells and burial boxes. It is as sound as any, so far as decay is concerned, but it is perforated with small holes ranging from the size of a pin to a lead pencil. The holes are the work of the teredo or ship worm and represent a period in the mahogany. ship worm, and represent a period in the mahogany log's history, on its way from forest to factory, during which it was submerged for a considerable time in brackish water somewhere in the tropics and was subject to the attack of the destructive teredo. The mahogany is often cut into logs somewhere in the interior of Mexico or Centeral Control of Centeral Control of Mexico or Centeral Control of Centera structive teredo. The mahogany is often cut into logs somewhere in the interior of Mexico or Central America, floated down the rivers to the sea and is there loaded on ships for northern markets. The worm gets in its work while the logs lie in salt water. The perforated mahogany is similar in appearance to "sound wormy" chestnut, which is a common form of that wood which is used for many purposes. The wormy mahogany is cheaper then cound wood but for certain purposes, it is as than sound wood, but for certain purposes it is as good.

Cypress is used in Missouri for coffins to a greater extent than any other wood. It is handsome, long-lasting, and cheap. California redwood, which is also of remarkable lasting properties, is working its way into this industry, though at the present time it is in less demand than any other of the ten species shown in Table X. Red cedar holds a place of considerable importance and next to mahogany it is the costliest wood demanded by the casket makers in the State. It has always been a favorite material for this purpose and formerly, when it was less expensive, the demand was greater. It resists moisture, is light, and is handsome in appearance. The red cedar coffin material in Missouri is imported from Tennessee, though cedar grows in Missouri. Red gum is more prominent in cheap coffins than in expensive kinds. A large amount of pine is listed pensive kinds. A large amount of pine is listed in the table which shows statistics of the indus-try. Most of this is manufactured into burial boxes in which the coffins are placed. The same

cost more than one hundred dollars per 1,000 feet, and four others cost fifty or more. The average cost of the furniture woods in Missouri was \$27.05, but the fixtures woods was \$37.24. Generally, the manufacturer of fixtures demands pieces of larger size than those going to the furniture factory; and it holds true in most cases that the larger the piece of wood demanded the higher the price will be per of wood demanded the higher the price will be per innertenths of the wood consumed by this industry fire woods. Custom has adopted chestnut and nine-tenths of the wood consumed by this industry that the greater cost of Missouri. That was scarcely to have been expected. Only twelve of the twenty-eight species grew even in part in the State. Douglas fir manufacturers meet this demand. It is made into burial boxes as well as caskets, and the same is true of cypress, red cedar and several other woods. Only two of the woods listed are produced in part in Missouri—red oak and short-leaf pine—and they in small quantity.

CASKETS AND COFFINS.

	Quantity	
	feet	per
Kinds of wood.	B. M.	cent
Cypress	3.670.294	47.68
Chestnut	2,148,535	27.91
Shortleaf pine	850,000	11.04
Red gum	600,000	7.79
WX73-74 1-	285,000	3.70
7	78,725	1.02
	21,068	.27
Mahogany		
.Red oak	. 20,000	.26
Basswood	15,000	.20
Redwood	10,000	.13
Totals	7,698,622	100.00

Cigar Boxes.

Table XI presents statistics of cigar-box manufacture in Missouri. Seven woods are in demand,

Average	Total	Grown In	Grown out
cost	cost	Missouri	of Missouri
per	f. o. b.	feet	feet
1000 ft.	factory	B. M.	B. M.
\$ 19.83	\$ 56,615	111,000	2,743,800
54.14	95,074	387.332	1,368,680
21.52	18,573	37,250	826,000
47,42	39,399	375,560	455,320
25.01	18,367	134,600	599,937
44.04	26,036	1,000	590,150
38.29	20,369	23,000	608,985
18.89	7,085	35,000	340.000
151.63	54,593 .	***************************************	360,050
20.31	5,166	76,200	178,200
26.83	6,668	66,000	182,516
30.00	6,000	discount and the same of the s	200,000
58.00	11,600	99444484 = 9444 4	200,000
38.79	4,383		113,000
32,35	2,665	31,000	51,372
18.00	1,080	***************************************	60,000
25.20	1,298	****************	51.500
37.82	1,924	************	50,874
101.22	2,389		23,600
21.18	360	****************	17,000
30.00	300	*******	10,000
15.00	90	3,000	3,000
33.00	165	*************	5.000
50.00	250	000000000000000000000000000000000000000	5,000
50.63	81	************	1,600
50.00	50	**************	1,000
500.00	500	*****************	1,000
220.00	88	***************************************	400
\$ 37.24	\$ 381,618	1,280,842	8,967,984

the two used in largest amounts being red gum and yellow poplar, two and a half million feet each. Next in quantity to them is Spanish cedar. The chief reason for considering the manufacture of cigar boxes as an industry distinct from boxes in general is that those who make cigar boxes seldom make any other kind, and they are manufactured in a particular way. To be sure, there are different kinds and sizes of cigar boxes and different woods are employed, but there is a sameness in the methods everywhere.

Most boxes in which high-class cigars and cigar-

		2223		
	Average cost	Total cost	Grown in Missouri	Grown out
	per	f. o. b.	feet	feet
t.	1000 ft.	factory	B. M.	B. M.
Ř	\$ 17.98	\$ 65,999		3,670,294
1	21.10	45.344		2.148,535
4	17.06	14,500	280,000	570,000
9	19.83	11,900	Protestant man	600,000
0	25.96	7,400	********	285,000
2	60.75	4,783	*********	78,725
7	86.58	1,824	501010 vocabban	21,068
6	45.00	900	20,000	
n	44.00	660		15,000
3	55.00	550	addedd no neger gaps	10,000
0	\$ 19.99	\$ 153,860	300,000	7,398,622
U	4 10.00	Ψ 200,000	500,000	1,030,022

The Spanish cedar employed in this industry

TABLE X

is imported from Mexico. Central America or the West Indies. It costs from one-third to one-fourth west indies. It costs from one-third to one-fourth as much as mahogany, and is rather cheap for an imported wood. Its value for cigar boxes is due to its odor. It is handsome in appearance, but that alone would not give it the important place it holds in this industry; and it is not in much demand by any other industry in this country. It has been imitated by other woods, but instances of such imitation have not been reported in Missouri. Vellow nonlar has served as an imitation sourf. Yellow poplar has served as an imitation. One process of preparing it has been to pass thin sheets of poplar veneer between rollers furnished with minute teeth by which the wood is indented to give the appearance of the pores characteristic of the cedar. The veneer is then stained to impart the proper color and the odor is artificially given by treating the veneer with a decoction of

given by treating the veneer with a decoction of cedar shavings and sawdust.

The cedar veneer is cut very thin, scarcely thicker than sheets of writing paper, and a few thousand feet, log measure, produce large amounts of veneer surface. It is sliced and the waste is reduced to a minimum.

All cigar and cigarette boxes are not veneered. Many of yellow poplar, cypress and red gum are solid, and are used plain or the wood is covered with litho paper. The presence of black gum in this industry should be noted, for that wood is pretty backward in finding places where it can be of service and any enlargement of its uses are welcome. welcome.

Except red gum, Missouri produces little of the raw material for its cigar boxes.

Trunks and Valises.

of the chief reason for considering the manufacture of cigar boxes as an industry distinct from boxes in general is that those who make cigar boxes eldom make any other kind, and they are manuactured in a particular way. To be sure, there are different kinds and sizes of cigar boxes and ifferent woods are employed, but there is a sametes in the methods everywhere.

Most boxes in which high-class cigars and cigar-

TABLE XI

Grown in Missouri

feet B. M. 2,400,000

> 100,000 50,000

383,000 100,000 50,000

12,000

3,156,000

Total cost

f. o. b. factory 47,680 40,314 14,925 3,000 1,600

600 510

CIGAR BOXES.

	Quantity	
	annua	11y
	feet	per
Kinds of wood.	B. M.	cent
Yellow poplar	2,510,000	43.61
Red gum	2,501,000	43.45
Spanish cedar	383,000	6.65
Tupelo	200,000	3.47
Black gum	100,000	1.74
White elm	50.000	.87
Cypress	12,000	.21
Totals	5.756,000	100.00

packed are constructed of two woods, ettes are packed are constructed of two woods, one constituting the core and the other the thin veneer overlying the core. The veneer is nearly always Spanish cedar. In Missouri no other wood is reported for that use. The core or backing may be any one of several woods. Those listed for that purpose in Table XI are cypress, black gum, red gum, tnpelo, white elm and yellow poplar. The preference for the gum woods will be noted, three of the six species used as cores being gum and constituting half of all. The wood on gum and constituting half of all. The wood on which the veneer is laid is cut into thin lumber

\$ 108,529 2,600,000 are for the outside to strengthen the trunk. are for the outside to strengthen the trunk. The metal knobs and reinforcements are usually attached to the slats. The box, forming the body of the trunk, is of veneer, three ply or more in thickness. The inner sheet is laid with the grain crossing that of the sheets on either side. This prevents splitting and lessens warping. Such a sheet may break under sufficient pressure, but will not split. A sheet of veneer built up in that way is much stronger than a solid plece of equal thickness. Formerly trunks were simply boxes made by nailing boards together and covering them with cloth, leather or

TRUNKS AND	D VALISES	5		TABL	E XII.	
	Quantity annua feet		Average cost per	Total cost f. o. b.	Grown in Missouri feet	Grown out of Missouri feet
Kinds of wood,	B. M.	cent	1000 ft.	factory	B. M.	B. M.
vpress	950,000	21.77	\$ 22.95	\$ 21,799	25,000	925,000
hlte pine	859,000	19.68	30.61	26,297	***************************************	859,000
asswood	858,000	19.66	27.00	23,172		858,000
nortleaf pine	705,000	16.16	20.00	14,100	600,000	105,000
ellow popiar	340,000	7.79	23.47	7,980	340,000	
otton wood	275,000	6.30	27.33	7,515	145,000	130,000
ed gum	200,000	4.58	18.00	3,600	150,000	50,000
hite elm	162,000	3.71	19.44	3.150	113,500	48,500
liver maple	15,000	.35	30.00	450	***************************************	15,000
Totals'	4,364,000	100.00	\$ 24.76	108,063	1,373,500	2,990,500

Average cost

\$ 18.85

The trays and other compartments for a trunk are not subject to strain like the outer box is, and they may be of thin boards, covered with cloth or paper, but even there a preference is shown for built-up veneers. White pine is liked for the inside equipment of trunks because it is light, but other woods are used. When cheap trunks are made in the old way by nailing boards together, short-leaf pine is frequently selected. The white elm reported is practically all worked into slats. Its toughness fits it for that use. Veneer is made of cottonwood, red gum, sycamore, soft maple, white oak, red oak and white asb. The basswood and cypress appearing in the table are worked into trays and other compartments of trunks and the wooden parts of suit cases and valises.

Some of the trunk makers have little wood-work-

Some of the trunk makers have little wood-working machinery, but buy the veneer, slats and other wooden parts cut to proper size and ready to assemble semble.

Exceisior.

Excelsior consists of fine, narrow shavings cut by machinery made for that particular purpose. The woods of which it is made are selected with a view to their fitness. The somewhat general belief that nearly any wood will make good excelsior is erroneous. The product is not made from odds and ends of waste to be gathered about mills and factories nor of waste to be gathered about fifths and factories nor from species selected at random. The wood must be tough and stringy. The fine ribbons must not break easily and pull apart or the excelsior will lose its softness and elasticity and possess little value. In Missouri only three species were reported in this industry—basswood, cottonwood and black willow industry—basswood, cottonwood and black willow—and nearly 90 per cent was cottonwood, but in certain other parts of the country several other species are manufactured into excelsior. The bolts employed in excelsior making are 18 inches long and about six inches thick, and they must be fairly free from knots and other defects. Machines with cutting points and plane-like knives slice the excelsior in thread-like ribbons 18 inches long. With suitable wood these ribbons do not break badly. If the wood is not stringy, bowever, the excelsior is easily reduced to a state resembling sawdust and becomes almost valueless.

It is commonly supposed that most excelsior

most valueless.

It is commonly supposed that most excelsior serves for upholstery purposes, but such is not the case. Flve or 10 per cent of the output may be so used, but very much more is demanded for packing dishes, glassware, hardware and general merchandise, and some for filtering. It is not usually shipped far from the region where it is manufactured, for the mills are numerous that make it and each seeks to supply local markets. It is packed for shipment into bales like bay and is sold by weight or by the bale.

by weight or by the bale.

Waste is moderate in the manufacture of excel-Waste is moderate in the manufacture of excelsior and results chiefly from the rejection of knots and defects and from the loss of the small slab or spail by which the dogs hold the boit during the operation of slitting and slicing the excelsior. Even that small piece is occasionally utilized by working it into plugs three and one-fourth inches in diameter. These plugs are bought by manufacturers of roofing papers and are inserted in the cylindrical hollow space in the ends of paper rolls. It is customary in shipping such paper to customers to pack certain accessories, such as paint brush and pails certain accessories, such as paint, brush and nails in the center of the roll, and the plugs are forced in each opening and a safe shipping cavity is thus provided.

The average price paid for wood demanded by the excelsior industry is lower than in any other woodusing industry of Missouri. Its cheapness is partly due to the fact that it passes directly from the forest to the factory wthout going to a sawmill for a preliminary step in its manufacture. This would not be the case if excelsior were made from sawed lumber instead of bolts.

EXCELSIOR.

	Quantity	
Kinds of wood. Cottonwood Black willow Basswood	feet B. M. 3,500,000 300,000 105,000	per cent 89.63 7.68 2.69
Totals	3,905,000	100.00

Laundry Appliances.

Laundry Appliances.

Manufacturers of laundry appliances in Missouri demand nearly four million feet of wood annually and not one foot of it comes from the forests of the State, yet eight of the ten species employed grow in Missourl and in commercial quantities, and Western red cedar is the only one not found in the State at ali. Tupelo is the cheapest and sugar maple the most expensive of the woods which figure in the industry. About one-third of all is cypress.

Laundry appliances include many articles. Among them are wash tubs, washing machines, wash boards, ironing boards, drying racks, clothespins, flatiron handles, mangles, wringers and others. Experience has shown one or more woods specially suited to each of these articles. Tubs and washers must resist wear while in a wet condition and must be proof against leakage. Cypress meets these requirements well. White ash is generally used for parts

metal, but only cheap trunks are now made that of the dolly, which is that portion of the washing in stores) sugar maple, sweet birch, and even maway.

The trays and other compartments for a trunk are not subject to strain like the outer box is, and they may be of thin boards, covered with cloth or paper, but even there a preference is shown for built are usually manufactured near the source of wood.

The two only cheap trunks are now made that of the dolly, which is that portion of the washing in stores) sugar maple, sweet birch, and even maway.

The trays and other compartments for a trunk are appear that many clothespins are made in Missouri. considered related to furniture and finish, particularly store finish, and is made of woods to match.

Otherwise, costly woods are not demanded.

As far as information was supplied by manufactured near the source of wood.

As far as information was supplied by manufactured near the source of wood. appear that many clothespins are made in Missouri. That would not naturally be expected if the wood for making them must be imported. Clothespins are usually manufactured near the source of wood supply. Ironing boards demand a smooth wood for the board, on which the clothes are worked, but the frame may be of nearly any species that it strong and light. Basswood and cottonwood are ideal for the smoothing board and tupelo serves well for the frames. The rollers of the mangles are of sugar maple. A hard, firm wood is demanded. Drying frames ple. A hard, firm wood is demanded. Drying frames of western red cedar are light and serviceable. Washboards are made in large numbers in spite of the increased use in recent years of washing machines. The washtub and the washboard are going out of use to some extent, but they do not seem to be going out of existence. They cannot be dispensed with in taking care of certain odds and ends of the family washing thought the hardest past of the work. family washing, though the hardest part of the work may be done with machines operated by electric power or water motors. The manufacturers of washbeards insist on white wood for the small piece on which the name is stenciled, and cottonwood and basswood are preferred. Woods of darker color are satisfactory for the rest of the article.

· LAUNDRY APPLIANCES.

	Quantity		Average	Total	Grown in	Grown out
	annua	lly	cost	cost	Missourl	· of Mlssouri
	feet	per	per	f. o. b.	feet	feet
Klnds of wood.	B. M.	cent	1000 ft.	factory	B. M.	B. M.
Cypress	1,415,000	41.74	\$ 25.02	\$ 35,410	******************	1.415.000
Tupelo	750,000	22.12	18.67	14,000	***************************************	750,000
Cottonwood	515,000	15.19	20.29	10,450	******************	515,000
Red gum	500,000	14.75	19.00	9,500	A94 1410 1010 00 011 0011 10 00	500,000
Western red cedar	75,000	2.21	24.00	1,800	***************************************	75,000
White oak	33,000	.97	28.00	924	\$6000AFFUNANT CURRENT CURP	33,000
Basswood	30,000	.89	30.00	900	Grange To all hill a proposocopets	30,000
White ash	30,000	.89	28.00	840	\$0.00×10000000000000000	30,000
Red oak	27,000	.80	28.00	756	Married Street, Committee and	27,000
Sugar maple	15,000	.44	34.00	510	*****************	15,000
Totals	3,390,000	100.00	\$ 22.15	\$ 75,090	***************************************	3,390,000

Woodenware and Novelties.

The classes of articles belonging to this industry are rather difficult to define. Laundry appliances, which in this report are considered to belong to a separate industry, are often listed as woodenware. There is a difference of opinion also as to what articles should be known as novelties. The term is rather general and includes such articles of wood The term is as do not seem to belong clearly in some other in-dustry. Some of the commodities which in this re-port are classed as woodenware are buckets and pails, bread and meat boards, butter dishes and but-ter tubs and other small tubs and stave ware, cloth boards, cutting boards, various kitchen utensils, lad-ders, measures picule plates and all sorts of small ders, measures picnic plates and all sorts of small veneer dishes, flag poles, shovels made chiefly of wood, scoops, show racks tent poles stakes and toggles. One of the conditions in defining woodenware is that the articles must be useful. Novelties may be simply ornamental or their purpose may be to amuse, however, the idea of usefulness is often pres-ent. Among commodities which fall in the novelty class are games, such as cless and checkers, doiles made of wood, gavels, match boxes and many other

made of wood, gavels, match boxes and many other small boxes for hairpins, buttons, jewelry and the like; paper weights, paper knives, and many kinds of small turnings and carvings.

In manufacturing the commodities included in the statistics shown in Table XV fourteen woods are used, three of which—cypress, shortleaf and white pine—are soft woods. More than balf of all is shortleaf pine, but practically none of it comes from the leaf pine, but practically none of it comes from the forests of Missouri. In fact, comparatively little of any of the wood comes from the State, although eleven of the fourteen grow in commercial quantities in Missouri. In the manufacture of long ladders use is made of longleaf pine from Mississippi and Louisiana, shortleaf pine from Arkansas, with hickory and white and red oak for rungs; and in making stepladders and for rolling ladders (used

TABLE XIII.

Average cost per 1000 ft. \$ 11.37 10.00	Total cost f. o. b. factory \$ 39,800 3,000	Grown in Missourl feet B. M. 3,500,000 300,000	Grown out of Missouri feet B. M.
13.33 \$ 11.32	\$ 44,200	3,800,000	105,000

WOODENWARE AND NOVELTIES.

	Quantity annual		
	feet	per	
Kinds of wood.	B. M.	cent	
Shortleaf pine		60.92	
Cottonwood	700,000	22.29	
Cypress	250,000	7.96	
Dod curm			
Red gum	121,000	3.85	
Yellow poplar	85,000	2.71	
Red oak	37,500	1.19	
White oak	13,000	.41	
Sugar maple	10.000	.32	
Silver maple	3,980	.13	
White ash	5,000	.16	
Sweet birch	1,000	.03	
White pine	560	.02	
Mahogany	200	.01	
Hickory	137		
	20.		
Totals	3.140.387	100.00	
Tong them 1/100 of 1 man arms	0,140,081	100.00	
*Less than 1/100 of 1 per cent.			

turers, every barber pole made in Missouri in 1910 was of sycamore.

A large part of the product included in the wood-enware and novelty industry consists of various kinds of boards, such as shoemakers' and saddlers' cutting boards, bread boards, meat boards, the boards which textile mills use in the centers of bolts of cloth, and the boards employed by cigar makers and tobacconists. Most of these are of cottonwood. It is clean, soft and white. A few are of cypress, sliver maple and white pine. Small trays for jewel-ry, buttons, pins and the like are made of cherry, yellow poplar, mahogany, white and red oak, sweet birch and basswood.

The bulk of the woodenware included in Table XV is for kitchen and pantry, and consists of small tubs and keelers, bowls, platters, rolling pins, spoons, paddles, vegetable cutters, lemon squeezers, turnip and potato mashers, boxes for salt, pepper and spices. Pie and picnic plates, cut from veneer, are manufactured in enormous numbers. This com-

TABLE XIV.

modity, which is intended to be used once and then thrown away, should not be confused with piates and platters produced on the lathe and intended as a permanent part of the pantry's or sideboard's equipment. Such articles are often ornamented with carvings and not infrequently are of costly woods. Large hewed or turned trays are in general demand for mixing dough or preparing saleds in the demand for mixing dough or preparing salads in the pantry. The best woods for such utensils are yellow poplar, basswood and sycamore. They are soft and can be easily cut with tools, they do not check badly under the influence of seasoning, the color is satisfactory and they contain no acids to taint articles of food of food.

Agricultural Implements.

The manufacture of agricultural implements in Missouri is not as large an industry as might be ex-pected from a consideration of the State's extensive land resources. It is probable that other States supply a portion of the demand for farm machinery supply a portion of the demand for farm machinery in Missouri, but on this subject there exists no statistics to show exactly what the demand is, though Table XVI gives the home supply, the amount of wood used and the cost. It shows, further, that 92 per cent of the wood demanded by manufacturers of agricultural implements is brought into the State from surrounding regions, though Missouri produces all the species listed except three. That demanded in largest amount, longleaf pine, does not grow in the State and must, of necessity, be imported. This wood supplies more than the combined eleven other wood supplies more than the combined eleven other species which are listed in the table, and it is, therefore, the most important wood in this industry. It is almost an ideal material for the manufacture of farm implements. It wants toughness and this disqualifies it from certain purposes, but it lacks little else required in the business. It is very strong and very stlff, and is well fitted for frames of machines. About the only complaint against it is that in some situations the heads of bolts pull into and through the wood if the strain is great and oscillation constant. This is apt to occur if longleaf pine is employed for frames of hay presses, cider mills and cornshellers, but that objection is removed by fitting the boits with large heads and washers. If this objection holds for longleaf pine, it holds yet more for shortleaf and other pines, which are softer. So extensively are longleaf and shortleaf pine employed in this industry that it is not necessary to specify particular places where greatest importance is seen: generally they go into frames, but hoppers and

TABLE XV.

	Average		otal	Grown in	Grown out
	cost		cost	Missourl	of Missouri
1	per		o. b.	feet	fect
t	1000 ft.	18	ctory	B. M.	В. М.
2	\$ 23.83	\$	45,581	2,000	1,911,010
9	27.00		18,900	***************************************	700,000
6	35.00		8,750	MARKA A A A STRANG CALLAD	250,000
5	21.16		2,560	1,000	120.000
1	28.59		2,430	85,000	120,000
9	46.80		1,755		*****************
1	40.92			37,500	******************
L			532	13,000	*************************
2	47.00		470	************	10,000
3	55.03		219		3,980
6	35.00		175	5.000	-,
3	35.00		35	, , , , ,	1,000
2	25.00		14	***************************************	
ī	125.00		25	Quesada errorrodor** conces	560
Ţ				0014110 000 cccccccccccc	200
	65.69		9	137	
0	\$ 25.94	\$	21,455	143,637	2,996,750

seed boxes, chutes, drawers, slides, riddles, pitmans, tongues and other parts are supplied by the ten other woods on the list. Longleaf pine is made into tongues or poles for many implements drawn by horses and for this use competes with white oak, red oak, hickory and Douglas fir. Pitmans and connecting rods which operate the oscillating parts of machines are generally of hickory. Hoppers and boxes, as well as sides and lining, are of cottonwood, cypress, red gum and white pine.

Farm wagons and carts are not included in this industry, and a good many kinds of tools are not. Pitchforks, shovels, hoes, scythes and some kinds of rakes are excluded because the handles are the rakes are excluded hecause the handles are the only parts made of wood, and they are accounted for in the handle industry. Wagons helong with vehicles and vehicle parts. The list of agricultural implements is so long that a catalogue of separate machines is not practicable at this place, but some of the most important are threshing machines, fanning mills, horse rakes, hay tedders, corn planters, cutters and shellers; manure spreaders, plows, harbows listers cultivators movers notate planters. hows, listers, cultivators, mowers, potato planters and diggers, meadow and alfalfa renovators; reapers, stackers, ditchers and grain drills.

AGRICULTURAL IMPLEMENTS.

	Quantity used		
	annually		
	feet	ner	
Kinds of wood.	B. M.	cent	
Longleaf pine	1,513,500	48.97	
Shortleaf pine	856,000	27.70	
Red oak	225,940	7.31	
White oak	184,860	5.98	
Douglas fir	115,000	3.72	
Cypress	77,000	2.49	
Sugar maple	41,500	1.34	
Hickory	32.880	1.06	
Cottonwood	15,000	.49	
Red gum	12.000	.39	
White pine	10,000	.32	
Silver maple	7,000	.23	
Totals	3,090,680	100.00	

Recent years have brought notable changes in the methods of conducting the business of dairymen, poultry raisers and the keepers of bees. It was once thought that a dairy was properly equipped if it had thought that a dairy was properly equipped if it had a pail or two, a supply of crocks and a churn; and that the raising of poultry could be successfully carried on with a "henhouse" outfitted with sassafras poles for roosts, a few coops for restraining the scratching proclivities of the mother hens with hungry broods chlrping for supplies, and a corncrib to be drawn upon in time of scarcity. Bees were provided with gums sawed from hollow logs and they were left to fight their battles alone. Old things have nearly passed away along these lines.

In Missouri white ash is the most important wood in the manufacture of apparatus for the dairy. The

in the manufacture of apparatus for the dairy. The churn with its dash is yet in use, and no wood is more suitable than ash. It has been said that the churn dash and the sickle are the oldest tools of human invention that are still in use, and in spite of all improvements they still hold their place, though an improvements they still note their place, though a somewhat inferior one. Until recent years churns were home made, but they are now turned out by factories and in different patterns, the barrel with its revolving dash, the box to be turned with a crank. The separator is winning its way over the churn. Other apparatus may be listed, such as but-

churn. Other apparatus may be listed, such as butter molds, hutter workers, trays, paddles ice-cream freezers and cooling boxes.

Brooders and incubators constitute a large part of poultry outfits made of wood. Coops and nests of many designs are provided to lessen labor and improve efficiency. California redwood, shortleaf pine and cypress are used in making these commodities. Some of these articles are constantly handled and carried from place to place, and lightness is essential. Redwood is very light and does not take fire easily, and this probably accounts for the high place it holds. It is very smooth when finished and is sanitary. The surface does not catch and hold dust and germs as rougher woods might do. It is also a peculiar wood in that it is not apt to become damp and foul. The surface absorbs dampness which may come in contact with it.

Bee keepers demand much improved apparatus of wood. They are no longer satisfied with hives made

wood. They are no longer satisfied with hives made hy sawing off hollow gum or sycamore logs or the hollow knees of cypress. The factory-made hives are of redwood, cypress and shortleaf pine. One of the essentials of a hive wood is that it shall resist decay. It is more or less exposed to dampness, and when decay begins the wood becomes unsanitary. Both redwood and cypress meet the required condi-tions

The small frames provided for the comb are of light, thin material, and basswood is ideal. Only five woods are reported in Table XVII, and nearly 90 per cent of the amount is cut in the State.

Sporting and Athletic Goods.

Table XVIII presents statistics of the manufacture of sporting and athletic goods in Missouri in the year 1910. Various articles are included in this industry and woods of several kinds are demanded, but more than half is yellow poplar. The following are among the commodities manufac-

Baseball bats,	Dumbbells,
Croquet sets,	Parallel bars,
Tennis rackets,	Springboards,
Billiard tables and	ap-Vaulting poles,
purtenances,	Golf clubs,
Pool tables,	Skiis,
Bowling alleys, plns	and Snowshoes,
balls,	Decoy ducks for hunters,
Tenpins,	Net floats,
Calisthenic rings,	Fishing rods,
Indian clubs,	Wooden bait.
Of course, a single	factory does not turn out

the full line of athletic goods, any more than one furniture factory makes all kinds of furniture.

Much of the yellow poplar reported is worked into billiard and pool table tops. It is one of the

TABLE XVI.

Average	Total	Grown in	Grown out
cost	cost	Missouri	of Missouri
per	f. o. b.	feet	feet
1000 ft.	factory	В. М.	B. M.
\$ 26.43	\$ 39,996	*****************	1,513,500
33.42	28,610	116,000	740,000
48.68	10,999	47,190	178,750
48.68	8,999	38,610	146,250
37.50	4,313		115,000
40.40	3,111		77,000
41.93	1,740	***************************************	41,500
24.85	817	30,000	2,880
20.00	300	0+	15,000
22.50	270		12,000
30.00	300	#*******************	10,000
25.00	175		7,000
\$ 32.24	\$ 99,630	231,800	2,858,880

Dairymen's, Poultrymen's and Apiarists' Supplies. best woods for that purpose, as it may be had in best woods for that purpose, as it may be had in large pieces and it polishes smooth. However, the price paid for it is low, \$31; and that is cheaper than good poplar usually can be hought. If the poplar is so cheap as to call for comment the small quantity of sweet birch is very high—about double what should be expected. It was a small lot and was probably of extra fine quality. The hickory was manufactured into parallel bars, ladder rungs and springboards. Ladder sides and vaulting poles were made of Sitka spruce.

Not one foot of the wood reported for this industry was grown in Missouri, though eight of the ten species in the table are found in commercial amounts in the State.

SPORTING AND ATHLETIC GOODS.

	Quantity used annually		
	feet	per	
Kinds of wood.	B. M.	cent	
Yellow poplar	487.000	50.77	
White oak	107,000	11.16	
White ash	107.000	11.16	
Red oak	100,000	10.42	
White elm	60,000	6.26	
Cypress	60,000	6.25	
Shortleaf pine	15,000	1.56	
Hickory	13,000	1.36	
Black spruce	10,000	1.04	
Sweet birch	200	.02	
Totals	959,200	100.00	

Musical Instruments.

Eighteen woods, the cheapest being silver maple at \$23 and the costllest ebony at \$390, are listed by Missouri manufacturers who make musical instruments (Table XIX). Only four of the woods ing hoards is attended to with more care than is are supplied in whole or in part by the forests accorded wood intended for almost any other pur-of the State, though four others grow in the pose. The maple selected for violin making is fre-

State. As might be expected, foreign woods hold an important place in this industry, six being on the list, but the total amount is not quite 15,000 In the manufacture of musical Instruments feet. In the manufacture of musical Instruments foreign woods are given place for the artistic effect they produce and frequently they are employed in very small amounts. An example is at hand in the case of ebony when used as mandolin and violin keys. One block measuring ten feet might last a factory for months. Nevertheless, it is an important wood for that purpose because buyers of instruments insist upon having ebony where it adds to appearance, though a plainer and cheaper wood might give as much service. Finger cheaper wood might give as much service. Finger boards and bridges of several small stringed instruments are usually ebony. In denseness of fiber it is claimed that no other wood equals ebony, and in certain parts of fine instruments it is liked for the service it gives as well as for its beauty. It is frequently seen in piano keys, and as veneer it becomes the outside visible part of pianos. Rosewood, which like ebony comes from different countries and is not all of one species, is a popular, high-grade finish for musical instruments. The massive legs of some old pianos are of solid rosewood, but no modern piano maker is ent to be seen. massive legs of some old pianos are of solid rose-wood, but no modern piano maker is apt to be so extravagant. A rosewood veneer, carefully and skillfully glued upon a core of silver maple, chestnut or white pine, looks as well, gives as good service and is cheaper. Rosewood is employed in the making of many small instruments and is frequently seen in the necks of guitars, mandolins and banjos. It is very firm and durable and is both useful and ornamental. Tullp wood sees service in much the same way as rosewood. Several species pass under this name. They come from Australia, Africa and South America and most of them are characterized by bright stripes, which resemble the variegated colors of a zebra. There is, however, much difference in the various species of tulip wood. The colors in some of them have a tendency to fade after long exposure. tendency to fade after long exposure.

Circassian walnut, mahogany and prima vera (white mahogany) are used in the same way for instrument making as in the manufacture of furniture. Some of the mahogany listed in this industry is the African species. In violin making the backs are often of black or Sitka spruce, and in some instances of Swiss pine (Pinus austriaca). Spruce is usually considered the most suitable material for the sounding boards of musical instruments, from the piano down to the smallest. The long fibers of this wood, and their uniform arrangement are supposed to give spruce its resonance. The quality belongs to all of the species—five in the United States—the Sitka spruce of the Pacific

TABLE XVIII.

Average	Total	Grown in	Grown out
cost	· cost	Missouri	of Missouri
per	f. o. b.	feet	feet
1000 ft.	factory	B. M.	В. М.
\$ 31.02	\$ 15,105	M0000010 0010103 0001 074 099	487,000
62.68	6,707	*******************************	107.000
31.95	3,419	4 + 4 + 4 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +	107.000
63.50	6.350	47 v0mm x v m 00 v10m v007 00 00	100,000
16.50	990	***************************************	60,000
30.00	1.800.	**************************************	60,000
30.00	450		15,000
61.46	799	***************************************	13,000
60.00	600		10,000
120.00	24	44 £000 100 000 44 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	200
120.00	44	024 24 0 41 0 110 - 1070 - 10100	200
\$ 37.79	\$ 36,244		959,200

Coast has won a prominent place as sounding-board wood. A little Norway spruce is imported into Missouri from Europe by violin makers, who claim that the tone quality has an individuality not found in other species. The seasoning of sound-

MUSICAL INSTRUMENTS.			TABLE XIX.			
	Quantity annua	11y	Average	Total	Grown in Missouri	Grown out of Missour'
771. 3	feet	per	per	f. o. b.	feet	feet
Kinds of wood.	B. M.	cent	1000 ft.	factory	B. M.	B. M.
White ash	240,500	45.37	\$ 42.05	\$ 10,112	0000	240,500
Yellow poplar	100,000	18.86	40.00	4.000	10,000	90,000
White oak	35,000	6.60	50.00	1,750	25,000	
Shortleaf pine	25,000	4.71	28.00	700	25,000	
Redwood	20,500	3.88	59.76	1,225	******************	20,500
Cypress	20,000	3.77	35.00	700	0.0000000000000000000000000000000000000	20,000
Sugar pine	20,000	3.77	50.00	1,000	\$9407************************************	20,000
White pine	15,700	2.96	46.18	725	***************************************	15,700
Red oak	10,000	1.89	50.00	500	10,000	day name announced assessments
Silver maple	10,000	1.89	23.00	230		10,000
Sugar maple	9,000	1.70	58.78	529	***************************************	9,000
Mahogany	8.275	1.56	199.64	1.652	ANALYSI MARKETT CONSTRUCTOR AND	8,275
Prima vera	4.000	.75	150.00	600	Ass to the section of the State	4,000
Sitka spruce		.71	56.00	210	an annuarant and virginia	3,750
Circassian walnut	1,000	.19	200.00	200	******************************	1,000
	900	17	200.00	180		900
		110	390.91	215		550
Ebony	550	.10	120.00	24	A0000-100000000000000000000000000000000	200
Tulip wood (S. Amer.)	200	.04	120.00	24		200
Totals	530.125	100.00	\$ 46.92	\$ 24,872	80,000	450,125

DAIRYMEN'S, POULTERERS' AND APIARISTS' SUPPLIES.

TABLE XVII.

	Quantity		Average cost	Total	Grown in Missouri	Grown out of Missouri
Kinds of wood.	feet B. M.	per	per 1000 ft.	f. o. b.	feet B. M.	feet B. M.
White ash	2,202,000	86.10	\$ 8.87	\$ 19,540	2,202,000	D. M.
Redwood	250,000	9.78	33.00	8,250	### TOTAL TOTAL TAX TOTAL TAX TOTAL TAX TOTAL TAX TOTAL TAX TO TAX TOTAL TAX	250,000
Shortleaf pine	62,000	2.42	13.71	850	2,000	60,000
Cypress	40,000	1.56	30.00	1,320	 	40,000
Basswood	3,500	.14	14.86	52	***************************************	3,500
Totals	2,557,500	100.00	\$ 11.73	\$ 30,012	2,204,000	353,500

quently the most artistic pieces of birdseye, curly

quently the most artistic pieces of birdseye, curly and smoked wood that can be had. Ash hurl has been successfully substituted for maple for the sides and backs of violins.

In the manufacture of church organs cypress is reported for pipes, yellow poplar for chests and bellows, redwood for action parts, white and red oak for cases, yellow longleaf pine for frames and white pine and sugar pine for portions of the internal mechanism. White ash is employed by muslcal instrument makers in double the quantity of

any other wood reported in Missouri and the piano makers find place for the most of it.

Patterns.

The making of patterns, models and flasks is a comparatively small industry in Missouri, less than half a million feet being required to meet its than half a million feet being required to meet its demands for lumber. Foundry flasks are rough boxes in which the sand is placed preparatory to receiving the molten metal in making the casting. Nearly any wood will answer this purpose. The foundry pattern, however, is a more carefully made article, and most of the white pine listed in Table XX went to the shops where such patterns are cut out. The pattern is shaped exactly like the article to be cast. A soft, even-grained wood is demanded to be cast. A soft, even-grained wood is demanded and it is necessary that it hold its shape because warping and twisting, after the pattern has been cut out, would destroy its usefulness. Experience cut out, would destroy its usefulness. Experience has shown that white pine has no superior for patterns. The wood's high price sometimes lessens its use and another wood is pressed into service. The fact that 94 per cent of all the pattern material in Missouri is white pine is evidence that no other has made serious inroads on its use there. All the white pine listed in Table XX was not employed for foundry patterns, though most of it was. Model makers draw supplies from that source. A model is usually an exact representation of a part of a machine or some other article, such as a wheel, valve, boat, column or something that is to be made in specified shape. The models are sometimes called machine-shop patterns to distinguish them from foundry patterns. Hat blocks are occasionally spoken of as patterns, and there are several kinds, each having its special use. Hat flanges are used in shaping the brims of felt hats; curling boards for brims of silk hats, stretchers for widening hats and hat sets to lengthen or widen. for widening hats and hat sets to lengthen or widen. Yellow poplar is the hest wood for hat blocks. It is seasoned a long time in dry air, then placed in artificial heat until the wood ceases to lose weight. Expensive hardwoods, like cherry and mahogany, are materials for models or shop patterns.

PATTERNS.

	Quantity used			
	annua	lly		
	feet	per		
Kinds of wood.	B. M.	cent		
White pine	393,723	94.38		
Sugar maple	9.100	2,18		
Cypress	5,000	1.20		
Western white pine	4,000	.96		
Yellow poplar	2,000	.48		
Norway pine	1.125	.27		
White oak	1,000	.24		
	900	.22		
Black cherry	300	.07		
Mahogany	300	.01		
	417 140	100.00		
Totals	417,148	100.00		

Weighing Apparatus.

Three woods demanded in Missouri by manufacturers of weighing apparatus are listed in Table XXI. The total amount is not much above a quarter of a million feet, and about two-thirds of it is shortleaf pine. Cypress is employed in making scale boxes and the reason assigned for its use is that it resists dry rot. The same reason is given for employing Douglas fir for a similar purpose, but this wood answers many other purposes in the manufacture of weighing machines. Such machines are often exposed to dampness in situations peculiarly liable to induce decay, and the woods employed must meet that condition.

WEIGHING APPARATUS.

	Quantity used annually			
	feet	per		
Kinds of wood.	B. M.	cent		
Shortleaf pine	195,750	65.43		
Douglas fir	102,900	34.40		
Cypress	500	.17		
Totals	299,150	100.00		

Frames and Molding.

Planing mills manufacture molding intended for interior finish of houses and other intended for picture and mirror frames and the frames in which picture and mirror frames and the frames in which advertising matter is displayed in public places. Table XXII gives statistics of molding which goes into frames. The figures are supplied by the makers of such frames. The industry is small in comparison with some others which use many times as much wood, but it is well defined and many shops make the commodity. Perhaps more wood goes into advertising frames than into the frames of pictures and mirrors. Much of the cypress and goes into advertising frames than into the frames of pictures and mirrors. Much of the cypress and oak of the table was worked into advertising frames and the basswood for picture frames. It finishes nicely and nails well, and when the article is to be glided or covered with goldleaf basswood proves satisfactory; it likewise gives good service if the frame is enameled. Red oak readily takes ammonia fumes in giving mission finish and it does well also when polish is desired. White elm is said to finish nearly as well as red oak, but its grain is not as handsome as that of oak. The black walnut and white pine listed in the table were used in the form of thin lumber or veneer, as backing for mirrors. The walnut was cheaper than the white and red oak, but little was used. Missouri

FRAMES AND MOLDING.

	Quantity	used	Average	Total cost	Grown in Missouri	Grown out of Missourl
	feet	- per	per	f. o. b.	feet	feet
Kinds of wood.	B. M.	cent	1000 ft.	factory	B. M.	B. M.
Red oak	36.850	28.07	\$ 40.76	\$ 1,502		36,850
White oak	30.150	24.96	40.73	1,228	-	30,150
Basswood	30,000	22.85	30.00	900	040400+++++1070-14+4490	30,000
Cypress	30,000	22.85	28.00	840	Water the second section of the second section second seco	30,000
White elm	3,000	2.28	25.00	75		3,000
Black walnut	1,000	.76	40.00	40	***************************************	1,000
White pine	300	.23	36.67	11	***************************************	300
Totals	131,300	100.00	\$ 35.00	\$ 4,596	***************************************	131,300

supplied none of the wood demanded by this in- actual amount of wood in an aeroplane is small, but

Printing Material.

Most of the wood listed in Table XXIII is used as base blocks for stereotypes, electrotypes, half-tone and zinc plates. Printers tack thin metal plates upon blocks of wood in printing. Such blocks are beech, sweet birch and cherry. The wood should be hard, straight-grained and smooth. It is liable to core in frequent contact with water and it. to come in frequent contact with water and it should resist a tendency to shrink and swell quickly. The three woods named are put to some use in Missouri in the manufacture of commodities of another kind used by printers, such as cases for type, cabinets and "furniture." The word furniture as the printer understands it means small blocks and strips of wood used in locking up forms of type preparatory to putting them on the press. Much of it is made of metal, but some prefer wood

PRINTING MATERIAL.

Kinds of wood. Black cherry Sweet birch Beech White pine Sugar maple	Quantity annua feet B. M. 74,200 21,700 12,500 1,550 50	per cent 67.45 19.73 11.36 1.41	Average cost per 1000 ft. \$ 67.28 76.50 68.00 50.32 60.00	Total cost f. o. b. factory \$ 4,982 1,660 850 78	Grown in Missouri feet B. M. 2,500 1,500 1,000	Grown out of Missouri feet B. M. 71,700 20,200 11,500 1,550
Boxwood	7	.01	1000.00	7	P&P 4001 100 071110-10700	7
Totals	110,007	100.00	\$ 68.90	\$ 7,580	5,000	105,007

TABLE XX.

Average	Total	Grown in	Grown out
cost	cost	Missouri	
per	f. o. b.	feet	feet
1000 ft.	factory	B. M.	B. M.
\$ 65.34	\$ 25,725		393,723
48.13	438	Direct Constitution of the	9,100
18.00	90	Quester 0.000 to 1.000 to 1.00	5,000
60.00	240	***************************************	4,000
68.00	136	gmailtainean +000 000 000 000 000 000	. 2,000
49.78	56	0010401111111111111111111	1,125
50.00	50	-	1,000
174.44	157		900
150.00	45		300
\$ 64.57	\$ 26,937		417,148

because it is lighter than metal. because it is lighter than metal. The quantity of boxwood used in this industry in Missouri is so small that it would not deserve mention were it not that it is the most expensive wood listed in any industry. The price is \$1000 per thousand feet. Even that is below rather than above the usual cost of this wood, which is imported from Russia and Turkey and is employed in making high-class wood engreyings. It sometimes costs three or four wood engravings. It sometimes costs three or four dollars a foot, and, of course, is not employed where a cheaper material will answer. It is in demand for rollers for skates and was formerly bought by shuttle makers, but of late years dogwood and persimmon have been substituted for shuttles. Engravers employ substitutes also and sugar maple

TABLE XXI.

Average cost per 1000 ft. \$ 23.60 22.11 56.00	Total cost f. o. b. factory \$ 4,619 2,275 28	Grown in Missouri feet B. M. 10,000	of Missouri feet B. M. 185,750 102,900 500
\$ 23.14	\$ 6,922	10,000	289,150

and apple and pearwood are among the best, but no substitute was reported in Missouri. For coarse engraving many woods are employed. Formerly wood type was cut from boxwood, but its high cost now stands in the way of that use. West Indies boxwood is a different species and much cheaper than that from Turkey.

Aeroplanes.

The making of aeroplanes is a new industry in

are sometimes made wholly of spruce, and at other TABLE XXIII.

TABLE XXII.

actual amount of wood in an aeropiane is small, but it is selected with much care and the waste is com-paratively large. Scarcely any mechanism demands greater perfection in material which enters into its construction, for a defect is liable not only to ruin the machine, but to result fatally to the operator as well

The frames are made of spruce. It is necessary that the wood he straight-grained and free from knots and other defects. The strain on an airship is at times sudden and severe, and the machine is so constructed that it distributes the strain equally on all parts or as nearly so as possible; and the wood is rejected with the numbers that every inch of its

all parts of as hearly so as possible; and the wood is selected with the purpose that every inch of it must stand its part of the strain in critical moments. Much care is bestowed on the propellers. It is absolutely essential that they shall have the strength necessary to stand the strain and at the same time no superfluous weight is allowed. They

1	Average	Total cost	Grown in Missouri	Grown out
er	per	f. o. b.	feet	feet
nt	1000 ft.	factory	B. M.	В. М.
.45	\$ 67.28	\$ 4.982	2,500	71,700
.73	76.50	1,660	1,500	20,200
.36	68.00	850	1,000	11,500
.41	50.32	78		1,550
.04	60.00	3		50
.01	1000.00	7	P67-001-00-001-00-00-00-00-00-00-00-00-00-0	7
.00	\$ 68.90	\$ 7,580	5,000	105,007

times are built up of different woods. A built-up propeller may consist of a strip of ash in the middle of each blade, with spruce on each side; then layers of mahogany outside the spruce and thin pieces of ash outside the hub. A propeller constructed in that way is believed to be stronger than one of solid wood. It at least offers the advantage of a more careful inspection of the material. One larger piece may have defects within which cannot be seen; but a propeller made of small pieces offers less chance for hidden defects. The pieces are held together with glue. It is claimed that if high-grade glue is used and is well applied it joins the pieces of wood so firmly that before the joints will pull apart the wood will break elsewhere. Mahogany is usually employed in making the steering wheels of aeroplanes.

Miscellaneous.

Missouri manufacturers annually make use of over eight million feet of wood outside of the industries described on former pages of this report. It goes into various commodities, the making of none of which is of sufficient importance in the State to be classed as an industry, but when considered in

of which is of sumctent importance in the State to be classed as an industry, but when considered in the aggregate they hold a prominent place. Twenty-three woods are listed, red gum being used in largest and mahogany and black cherry in the smallest quantities. Black willow is highest in price and red gum the cheapest.

The high cost of willow calls for explanation, for it is generally a cheap wood. It was reported for artificial limbs, and was bought partly manufactured. There appears to be some doubt as to the exact species of willow used. One of the manufacturers reported red willow, apparently meaning longleaf willow (Salix fluviatilis), which in most parts of its range is too small for artificial limbs, but it reaches its best development about the mouth of the Ohlo River, and there sometimes attains a height of 70 feet and a diameter of two. Some reported black willow, and others received willow from New York and supposed it was imported from Europe. In Table XXV all that was reported was listed as black willow, though some of it was questionable. able.

Most of the cost of artificial limbs is in the labor. Most of the cost of artificial limbs is in the labor. The material is scarcely more than one-tenth of it. Much of the wood is cut away and the waste is proportionately large. Only wood of straight grain can be used and it must be tough, light, strong and durable. Though all visible wood is willow, a little hickory, sugar maple or some of the hardwood finds place in the interior mechanism. In making brush-backs grant maple, and sum and valley norther work. The making of aeroplanes is a new industry in this country, and Missouri is the first State to supply statistics of their manufacture. A few dozen were turned out in 1910, and only three woods were reported as to amounts, though others were made use of, at least for experimental purposes. Locust and red gum are mentioned, but the exact uses are not given. Sitka spruce supplied 84 per brushes, They must wear well when alternately wet cent of all, mahogany and white ash the rest. The

22224 7 22 60 19			211211	3 38384 7 0	
annua		Average	Total	Grown in Missouri	Grown out of Missouri
feet	per	per	f. o. b.		feet
B. M.	cent	1000 ft.	factory	B. M.	B. M.
13,400	84.28	\$ 68.28	\$ 915	\$40000 AAAAAAAAAAA	13,400
1.500	9.43	72.00	108	********	1,500
1,000	6.29	115.00	115	*****************	1,000
15 000	100.00	0 71 77	. 1120	-	15 000
	annus feet B. M. 13,400 1,500	Quantity used annually feet per B. M. cent 13,400 84.28 1,500 9.43 1,000 6.29	Quantity used annually feet Average cost f.e.t per per B. M. cent 1000 ft. 13,400 84.28 \$ 68.28 1,500 9.43 72.00 1,000 6.29 115.00	Quantity used annually Average cost Total cost feet per B. M. cent 13,400 cent 1000 ft. factory 1,500 9.43 72.00 108 1,000 6.29 115.00 115.00	Quantity used annually feet Average cost Total cost Grown in Missouri f. o. b. 68.28 \$ 915 1,500 9.43 72.00 108 1,000 6.29 115.00 115

little disposition to check and warp. The scrubbing parts of brushes may consist of bristles from Turkey, Russia, China, or from this country; rice root from Italy, palm from the South or weeder called

key, Russia, China, or from this country; rice roet frem Italy, palm from the Seuth, or wooden splints made in nearly any locality.

The manufacturers of bakers' tools and appliances use yellow peplar exclusively, because bakers will take no other. Increase in cost in recent years does not apear to have lessened the demand for wood in that industry. The well-knewn properties of yellow poplar, which create and maintain the demand for it, are whiteness, fineness of grain, small liability to check and split, absence of eder and taste and good wearing qualities. Flour scoops, mixing troughs, deugh boards and rolling pins are some of the tools and appliances used by bakers. Between

troughs, deugh boards and rolling pins are some of the tools and appliances used by bakers. Between them and certain commodities generally listed as weodenware the line is net clearly drawn.

The small quantity of woed fer gunstocks in Missouri is supplied by black walnut and a little English walnut. The stocks fer airguns are included and they are made exclusively of black walnut, but the more costly English walnut is worked into pistel grips and the stocks of other firearms. Black walnut is strong for its weight and takes fine finish, tel grips and the stocks of other firearms. Black walnut is strong for its weight and takes fine finish, but it is maintained by some that there is no reasen, beyond old custom, why It should exclude many other weeds for gunstocks. The preference often shown for English, French, Italian and Circassian walnut in the gunstock industry is due to the seftness of colors and the fine figure of the wood. Some of the choice pieces cest from \$5 to \$10 for enough for a single stock. English, French and Italian walnuts are really the same species (Junglans regia) and it is not native of Europe, but seeds were brought in (as is supposed) from Persia by the Romans, and were planted first in Italy and France. Many woods are called Walnut, which are not related to it, such as red gum and prima vera. Hick-

brought in (as is supposed) from Persia by the Romans, and were planted first in Italy and France. Many woods are called Walnut, which are not related to it, such as red gum and prima vera. Hickory was formerly known as walnut, being sometimes distinguished as white walnut in Virginia and the States nerth of the Potomac.

The shoe-last industry in Missouri has grown to considerable importance, and all of the wood comes from other States. Only two species are reported—sugar maple and basswood. The latter is not made into lasts, but a related commodity, fillers or forms. They are inserted in shoes to maintain their shape when not being worn. "Trees" over which rubber boots are made are often of basswood and serve as lasts. Practically all the lasts in this country are of sugar maple. Other woods, such as beech, sycamore and persimmon, are eften listed as last material, but in practice they are hardly ever used. Most of the sugar maple in this industry is cut in Michigan. Manufacturers say that the grain and seasoning properties of maple in that region are superior to any other. The wood is split in billets, generally large enough to make three lasts, is airdried two years or mere, and then is seasoned several months in a kiln. Patterns or models for lasts are made by hand, but the lasts are made by machinery. Every change which fashion calls for in the shape of shees demands a new set of lasts and the old becomes useless. An exhibit of the different shapes of lasts in this country during the past century would form a valuable exhibit for a museum. St. Leuis manufactures great numbers of shees, but mest of the lasts used there come from outside the State. An average block from which a last is made contains a foet and a half of wood, beard measure, and costs about 10 cents. The block from which a filler is produced contains half a foot of wood.

The making of advertising signs of wood seems to belong more to the small shep than the large fac-

filler is preduced contains half a foot of wood.

The making of advertising signs of wood seems to belong mere to the small shep than the large factory. It is customary for a carpenter to cut the beard or beards in the desired shape and the village sign painter letters them. They are seen over the doors of blacksmith shops, shoe sheps and like places; finger beards at forks of roads, advertisements to be nalled on posts and fences, and the more pretentious bill boards which are familiar sights along railroads. When large numbers of wooden signs are wanted—such as sewing machine manufacturers, seap sellers and cleaning powder makers employ—they are printed by machinery. A higher class of werkmanship is demanded for signs with ralsed letters. Each letter is cut separately and nailed in place. Redwood from California and white pine from the Lake States are well liked for raised letters. They are easily cut and satisfacterily hold their shape. Where signs are to be painted white pine is well suited because the spirits of turpentine in the paint affiliates with the surface of the wood. Shortlest pine is listed for frames of turpentine in the paint affiliates with the surface of the wood. Shortleaf pine is listed for frames in which muslin sig are to be displayed. Cypress and redweed work to advantage when extra wide pieces are desired.

pieces are desired.

Sucker rods emple in pumping deep wells are of hickory and content from 18 to 35 feet long. The chief deman comes from oil fields.

Saddle trees, cart trees, stitching horses and whip stocks are grouped as part of a single industry in Missouri because they are reported together. The whip stocks are a byproduct of the saddle tree factory and are made from wood cut out in shaping the saddle tree. The making of hames is a kindred industry. Woods so employed are white oak, white ash, white elm and beech. Saddle-tree woods are sugar maple, silver maple, white elm, sycamore, white oak, red gum, hackberry, basswood and white ash.

Telephone and telegraph pins are made of white

oak and locust. It is not improbable that several other oaks contribute to the supply. The chief requisite is that the material must be strong and

The heads for rocking horses are made of red gum, and the rockers of this toy, and likewise of shooflies, are made of white elm. The bodies are

shooflies, are made of white elm. The bodies are principally of cypress.

The value of redwood is insisted upon in the manufacture of ice-cream refrigerators. Next to cork the wood is said to be the best obtainable non-conductor of heat. It is very porous, free from pitch, easily worked and may be obtained in any desired dimension.

The makers of blacksmiths' bellows prefer cottonwood for certain parts of the mechanism because of its lightness, to which is combined sufficient strength to meet requirements.

Stems for tobacco pipes are made of paper birch

Stems for tobacco pipes are made of paper birch from Minnesota. It behaves well in the lathe and turns easily and finishes with a good surface. It is liked where accurate cutting is desired because it does not quickly dull tools. Two hundred thousand feet of this birch were reported for pipe stems in Missouri.

MISCELLANEOUS.

to these commodities have been collected yearly by the Bureau of the Census, co-operating with the Forest Service, and in order to make the report on Missouri's wood-using industries more complete, an abridgement of the Census figures is presented in the following paragraphs. The cut of lumber as reported by the Census is shown on page 3 of the report. Certain other forest products are not elsewhere included and are shown in paragraphs which follow.

Coeperage.

Cooperage as a whole includes three commodities—staves, heading and hoops. Two classes of cooperage are recognized, tight and slack. The former includes barrels and kegs intended to conformer includes barrels and kegs intended to contain liquids; the latter those not meant for liquids. The principal commodities shipped in tight cooperage are oils, alcoholic liquors, molasses, vinegar, and cider. Alcoholic liquors demand the highest grade barrels. The wood of which they are made must be dense or the liquor will leak through the pores. White oak is one of the most serviceable materials for barrels of this kind. Some woods to porous for use in transporting alcohol are satisfactory for molasses and certain oils. Slack cooper-

TABLE XXV.

	Quantity	illy	Average	Total	Grown In Missouri	Grown out of Missourl feet
	feet	per	per	f. o. b.	feet B. M.	B. M.
Kinds of wood.	B. M.	cent	1000 ft.	factory \$ 58.310	1,965,000	1.268,800
Red gum		39.94	\$ 18.03		224,000	668,700
White oak		11.03	30.74	27,444		425,010
Hickory		10.19	25.00	20,626	400,000	
Sugar maple		7.63	59.99	37,060	17,100	600,650
Cottonwood		6.00	24.58	11,949	51,000	435,000
Shortleaf pine	364,836	4.51	23.32	8,508	11,600	353,236
Cypress		3.99	27.02	8,735	-	323,300
Red oak	258,900	3.20 .	18.35	4,751	210,000	48,900
Silver maple		2.61	59.21	12,485	139,500	71,350
Douglas fir		2.22	38.89	7.000	******	180,000
White ash	# 00 F 00	2.08	24.82	4,182	90,500	78,000
White pine	400 450	2.08	50.41	8,476	***************************************	168,150
Sweet birch		1.54	31.60	3.950	www.ned.compleme.com	125,000
White elm	FC 000	.69	21.41	1.199	41,000	15,000
	4 4 0 0 0	.55	30.31	1,358	17,500	27,300
Yellow poplar	00'000	.45	40.53	1,459	11.000	25,000
Basswood	24 000	.38	19.00	589	31.000	
Sycamore	00 050	.37	57.48	1.740	10,000	20.270
Black walnut		.19	56.86	879		15,460
Redwood		.14	19.00	209	11,000	
Hackberry	11,000	.09	157.14	1.100	2,400	4.600
Black willow	7,000			550	2,100	5,000
Black cherry	5,000	.06	110.00		***************************************	5,000
Mahogany	5,000	.06	150.00	750		5,000
Totals	8,096,326	100.00	\$ 27.58	\$ 223,309	3,232,600	4,863,726

Summary by Industries of Woods Used in Misseurl.

Table XXVI is a summary of all the wood-using industries in Missouri. It is a counterpart of Table I, which is a summary by species. Both tables present the same totals but interpret them in difpresent the same totals but interpret them in different ways. The first shows how much of each wood is used, the cost, etc.; the last shows how much wood of all kinds is demanded by each one of the 24 industries of Missouri. Fifty-six woods are listed in Table I and 24 industries in Table XXVI. In this enumeration "miscellaneous" is classed as an industry, though it is only a grouping of many items. It is numbered 25. The highest average price was paid for aeroplane woods, the lowest for that made into excelsior. The box and crate industry demanded the largest amount of wood, aeroplanes the least. Excelsior and valise makers drew the largest per cent of their material from the State, and five drew none—laundry apfrom the State, and five drew none—laundry appliances, sporting and athletic goods, patterns, frames and molding and aeroplanes,

age may be divided into several classes. Palnts, sugar, flour, cement and other powdery commodities require barrels almost water tight or the contents will sift through; but crockery, petatoes, fruits and articles of that kind go without loss in barrels with large openings between the staves.

In 1909 slack cooperage was listed in Missouri as follows:

as follows:

STAVES. 141,079,000

Elm Ash Sycamore Maple Cottonwood	18,870,000 7,250,000 3,287,000 2,419,000
Total	196,081,000
Red gum Ash Maple	1,435,000 85,000
Cottonwood Elm Total	20,000

SUMMARY BY INDUSTRIES OF WOODS USED IN MISSOURI.

TABLE XXVI.

	Quantity annua feet	lly per	Average cost per	f. o. b.	Grown ln Missouri per	Grown out of Missouri per
Industries	B. M.	cent	1000 ft.	factory	cent	cent
Boxes and crates, packing	.111.664,699	25.19	\$ 16.41	\$ 1,832,483	25.95	. 74.05
Planing mill products	. 73,765,677	16.64	13.92	1,026,698	96.04	3.96
Sash, doors, blinds and general						05.00
millwork	69,130,643	15.60	36.55	2,526,647	14.67	85.33
Car construction	51,493,627	11.62	30.20	1,555,304	.76	99.24
Vehicles and vehicle parts		7.83	34.92	1,211,701	37.96	62.04
Furniture		6.35	27.05	761,852	32.53	67.47
Handles		4.43	18.39	361,222	54.58	45.42
Fixtures		2.31	37.24	381,618	12.50	87.50
Miscellaneous		1.83	27.58	223,309	39.93	60.07
Caskets and coffins		1.74	19.99	153,860	3.90	96.10
Cigar boxes		1.30	18.85	108,529	45.17	54.83
Trunks and vallses		.98	24.76	108,063	31.47	68.53
Excelsior		.88	11.32	44,200	97.31	2.69
Laundry appliances		.76	22.15	75,090	-	100.00
Woodenware and noveltles		.71	25.94	81,455	4.57	95.43
Agricultural implements		.70	32,24	99,630	7.50	92.50
Dalrymen's, poulterers' and						
apiarists' supplies	000	.58	11.73	30,012	86.18	13.82
Sporting and athletic goods		.22	37.79	36,244	***************	100.00
Instruments, musical	# O 4 # O #	.12	46.92	24,872	15.09	84.91
Patterns	447 440	.09	64.57	26,937	************	100.00
Welghing apparatus		.07	23.14	6,922	. 3.34	96.64
Frames and molding		.03	35.00	4,596	***************************************	100.00
Printing material		.02	68,90	7,580	4.55	95.45
Aeroplanes		•	71.57	1,138	***************************************	100.00
Totals	443,272,993	100.00	\$ 24.12	\$10,689,962	35.80	64.20

	HOOFS.	
Elm		43,723,000
Red gum		2,500,000
	THE RESERVE OF THE PARTY OF THE	
Total		46,223,000

The output of tight cooperage staves in 1909 was 22,420,000 and of heading 557,744 sets.

LATH. 19.931.000 51,932,000 SHINGLES. \$105,923

TANNING MATERIAL.

Tanbark:		
Tons	Species	Value
1,103	Hemlock	\$14,339
15	Chestnut	60
2	Myrobalan	98
Tanning Extracts:		
Pounds	Species	Value
1,298,767	Querbracho	\$41,631
102,420	Chestnut	1,996
1,000	Hemlock	40
	Veneers.	

Most of the veneer made in Missourl is rotary cut. It is usually measured by log scale and the output in that State in 1909 was as follows:

Uses of Wood by Species.

There is no universal wood-that is, one fit for everything that is made of wood, but some have ranges of uses so wide and varied that they are in general demand. Such a wood is white oak, yet it is not suitable for a shoe last, a spool, a pattern, a wooden limb or a violin. Other woods are in practice restricted to a few uses which they in practice restricted to a few uses which they fill so well that by a sort of common consent they are set apart for those special uses; for instance, paper birch for spools, persimmon for shuttles, locust for small hubs and tree nails, and Spanish cedar for cigar boxes. It is interesting and instructive in a manufacturing State like Missouri structive In a manufacturing State like Missouri to bring together all the commodities made of a certain wood, in all the industries, and present them in a single list. This is done in the pages which follow. The species are arranged alphabetically so that any one of them may be easily found. The commodities under each species are also arranged alphabetically for a like reason. It should not be supposed that the uses given include all that the species is fit for. The list gives only uses reported in Missouri. In another State the same wood might have a list of uses much shorter or much longer, depending upon supply and the or much longer, depending upon supply and the extent to which wood manufacturers are diversified in that region. An example will suffice. In Missourl sugar maple is reported in the manufacture of 61 articles, and yet in Michlgan its uses are three times as many; but in Missouri short-leaf pine has twice as many uses as the same wood has in Michigan.

Manufacturers in Missouri report the use of 56 species of wood in that State. Without doubt several others are used and are not separately reported. There are more than a dozen commercial oaks contributing to the lumber cut of Missouri, but several are called simply oak, or, if they belong to the white oak group, they are listed as white oak; or if to the red oak group they are designated as red oak or yellow oak. Among the oaks which almost certainly enter generally into the manufactured products of Missouri, though not separately reported, are the

following: Cow oak. Chinquapin oak,

Swamp white oak,

Scarlet oak. Water oak, Shingle oak. Willow oak,

Some of these are generally classed by lumbermen as white and others as red oak. It is usually easy to distinguish the species of the two groups by observing the acorns. White oaks ripen their acorns in one year; red oaks require two. Hickories are grouped in the same way. With most mill men blekory is bickory and no identification of species is attempted. In practice not much harm results, because the hickories are all good, although there are different degrees of fitness for special pur-poses. There are seven commercial hickories in the State and all of them are used for similar purposes. They are:

Bitternut hickory Shellbark hickory, Water hickory Shagbark hlckory,

Mockernut hickory. Pignut hickory, Small pignut hickory,

There are two woods which are classed as mahogany in manufacture. By some they are kept separate, and others consider them as one. Botanists draw a clear distinction. The mahogany that has been in the American and European market for two hundred years or more is the American species. two hundred years or more is the American species, the genuine mahogany. It grows in Mexico. Central America, Northern South America, the West Indies and a small quantity in Florida. It all grows in America. Except that a little has been planted in other countries, notably in the East Indies, where a small amount is cut for market. The other wood that passes in commerce as mahogany comes from South Africa and is botanically a different species though America, Northern South America, the West Indies and a small quantity in Florida. It all grows in disc cultivators, bother countries, notably in the East Indies, where a small amount is cut for market. The other wood that passes in commerce as mahogany comes from South Africa and is botanically a different species, though it is a very fine wood and many consider it in every way equal to American mahogany. There are a sleeve boards, spindles, stair railing, tanks, thresh-

number of other woods which sometimes pass for ing machines, windmills, window frames, window mahogany, some foreign which are sold in their screens, window silis.

natural color, others American, which must first be Douglas Fir. stained to give them the mahogany color. Among home woods most frequently passing for mahogany (first being stained) are yellow poplar, sweet birch, black cherry and red gum. Some success has attended efforts to stain California eucalyptus in imitation of mahogany. The so-called white mahogany is prima vera and is listed under its proper name in this report name in this report.

The uses for which the several woods are reported in the lists which follow should not be understood to include all the uses for which the woods are suitable. In many instances, classes or ranges of uses only can be shown. For example, white oak listed for furniture includes many articles and kinds of furniture. It would be impracticable to name all of them. In the same way, when cottonwood is listed for boxes that is deemed sufficient without specific mention of each kind of the score or hundred sorts. mention of each kind of the score or hundred sorts of boxes for which this wood is used in Missouri. It will thus be understood that no greater completeness is claimed for the lists of uses than that they indicate the scope and range of usefulness which has been found for the different woods of the State.

Basswood.

Agricultural implements, automobiles, bank fix-tures, baskets, bottle packing, boxes, bread boards, carriage panels, caskets, cigar boxes, corn planters, crates, cultivators, drawer bottoms, excelsior, fanning mills, go-carts, grain separators, grass seeders, hobby horses, ironing boards, kitchen cabinets, kichen abies, meat boards, moiding, music cabinets, picture frames, refrigerators, sample cases, show cases, sleeve boards, soap boards, stretching horses, table tops, trays, trunks, wheelbarrows.

Beech.

Agricultural implements, baskets, boxes, brush backs, chairs, coat hangers, electro base blocks, fanning mill frames, fixtures, furniture, hames, handles, hand sleds, hobby horses, meat boards, planes, pulleys, refrigerators, showcases, stepladders, trunk slats, washing machines, weighing machines, wheelbarrows, woodenware.

Black Cherry.

Bases for electros, furniture, interior finish, models, musical insruments, parquetry, patterns, saw handles, store fixtures, trays (for jeweiry).

Black Pine.

Cigar boxes.

Black Spruce.

Aeroplanes, automobiles, blinds, ceiling, doors, finish, fixtures, musical instruments, picture frames, shelving, siding, sounding boards, violin tops.

Black Walnut.

Automobiles, ballot boxes, bank fixtures, carvings, furniture, gun stocks, bandles, interior finish, knebs, molding, music cabinets, passenger cars, pianos, picture frames, showcases, steering wheels, wooden novelties.

Black Willow.

Boxes, crates, drawer bottoms, meat boxes, office fixtures, pantry shelves, wagon beds, wooden

Boxwood.

Engraving blocks, toois.

Bur Oak.

Bookcases, cars, chairs, fixtures, furniture, hay presses, interior finish, molding, stairs, threshing machines, wagons.

Butternut.

Furniture, interior finish, molding, novelties, screen doors, window frames.

Chestnut.

Burial boxes, caskets, coffins, fixtures, furniture, interlor finish, mirror frames, molding, musical instruments, pianos, picture frames, showcases, toys.

Circassian Wainut.

Bank fixtures, chairs, finish, furniture, knobs, molding, panels, pianos, picture frames, steering weeels, stools.

Cottonwood.

Agricultural implements, baskets, blacksmith bellows, bookcases, bottle packing, buggy bodies, boxes, cart trees, chairs, clothes racks, crates, dough boards, drawer bottoms, doors, egg cases, excelsior for mattresses, fanning mills, fixtures, ice boxes, interlor finish, Ironing boards, kitchen tables, lad-ders, lawn swings, mirror frames, molding, panels, picture frames, poultry coops, refrigerators, saddle trees, sash, shelving, siding, sleeve boards, threshing machines, towel racks, veneer cores, wagon beds, washboards, washing machines, wood-

Cypress.

Agricultural implements, alfalfa renovators, bee-

Douglas Fir.

Bank fixtures, bottle packing, car beams, car siding, ceiling, corn huskers, doors, drills (grain), drug cabinets, extension ladders, flooring, furniture, grain separators, hay-press plungers, hay-press sweeps, hothouse benches, hothouse sash, ice boxes, interior finish, mantels, newel posts, passenger cars, plumbers' woodwork, poles (flag), potato planters, porch celumns, porch railing, refrigerators, shelving, showcases, sideboards, siding, standing desks, tanks, vehlcle tongues, wagon beds, wagon tongues, weighing machines, windmills, window frames, window sash, window sitls.

Ebony.

Bass viol pegs, brush backs, cello finger-boards, guitars, lodge furniture, mandolins, piano keys, violin finger-boards, violin pegs.

English Walnut.

Gun stocks.

Hackberry.

Cart trees, handles, saddle trees, stitching horse jaws, wagon boards.

Hickory.

Agricultural Implements, automobile wheels, ax handies, axles, buggy poles, buggy shafts, cant hook handies, cultivators, double trees, dowels, eveners, grain separators, hammer handles, hubs, huskers, ladders, limbs (artificial), mallets, neck yokes, oxbows, pike poles, pitmans, rules, separators (grain), shellers, singletrees, spokes, wagon gears, wagon poles, wheelbarrows, whip handles, windmill rods.

Holly.

Brush backs, noveltles, parquetry.

Locust.

Agricultural implements, hubs, tree nails.

Longleaf Pine.

Agricultural machinery, awning poles, bank fixtures, bean boxes (scales), boxes, car material, cart shafts, ceiling, chicken coops, columns (porch), cornice crates, door frames, doors, drug cabinets, eveners, extension ladders, fanning mills, fixtures, fiooring, handcars, hay presses, huskers, ice boxes, interior finish, kitchen furniture, passenger cars, plumbers' woodwork, potato diggers, refrigerators, sash, shoecases, siding, siios, spindles, stair horses, stair rails, stair steps, stepladders, tanks, tent poles, threshing machines, wagon beds, wagon poles. threshing machines, wagon beds, wagon poles, weighing machines, windmills, window frames, winthreshing dow sash, window sills.

Longleafed Willow.

Artificial limbs.

Mahogany.

Airship propeller, airship wheels, automobile handraiis, automobile dashboards, cookcases, bookracks, burial boxes, cabinets, carvings (caskets), caskets, chairs, china closets, coffins, counter tops, filing cabinets, fixtures, furniture, hall grasses, hali trees, Interior finish, mandolin, mirror frames, moldtrees, meetor mass, mandom, mirror trames, modi-ing, office fixtures, panels, parquetry flooring, pat-terns, pews, pianos, picture frames, plumbers' wood-work, pulpits, showcases, sleeping cars, telephone boxes, turned work, umbreila stands, violins, wall cases, wardrobes.

Northern White Cedar.

Street car ceiling.

Norway Pine.

Screens, window frames.

Paper Birch.

Tobacco pipe stems.

Pecan.

Wagon crossbars.

Post Oak.

Locomotive pilots, sign posts, signs (railroad), wagon stocks.

Prima Vera.

Musical instruments,

Red Cedar.

Burial boxes, caskets, ciothes chests, coffins, furniture, office fixtures, wardrobes, window sills.

Red Gum.

Ballot boxes, bank fixtures, baskets, bookcases, boxes, china closets, cigar boxes, clothing cabinets, coffee drums, counter tops, crates, desks, doors, drawer bottoms, dressers, filing cabinets, furniture, garment hangers, hobby horses, hall trees, handles, interior finish, mirror frames, mission furniture, molding, musical instruments, office fixtures, chairs, panels, parlor furniture, pedestals, pianos, picture frames, plumbers' woodwork, refrigerators, saddle trees, shipping drums, shoo-flies, typewriter tables, veneer bottle packing, window frames, ward-

Agricultural implements, automobiles, balusters, hookcases, bookracks, boxes, brackets, cabinets, ceiling, chalr stock, chair closets, cupboards, desks, door frames, door knobs, doors, eveners, fanning mills, farm wagons, filing devices, flooring, furniture, ice boxes, interior finish, lawn furniture, moiding, Morris chairs, musical instruments, newels, office, partitions, papels, parquetry floors, passanger fice partitions, panels, parquetry floors, passenger

butcher blocks, butter molds, bass viol sides, brake blocks, cart trees, cello ribs, cello necks, chairs, churns, coat hangers, corn shellers, corn planters, dishes, dowels, fixtures, flooring, furniture, go-carts, guitar necks, handles, hay presses, Indian clubs, interior finish, ironing boards, mallets, mandolins, medicine chests, mission furniture, office fixtures, organs, parquetry floors, pianos, porch swings, potato planters, pulleys, road rollers, rules, saddle trees, separators, showcases, stitching horse jaws, stone fixtures, threshing machines, tool handles, trunks, type cases, violin necks, wagon axles, washing machines, weighing machines, wheelbarrows, ing machines, weighing machines, wheelbarrows, whip handles, woodenware.

Sugar Pine.

Agricultural implements, bank fixtures, blinds, ceiling, door frames, doors, musical instruments, office fixtures, organ pipes, panels, patterns, sash, seed boxes, tanks, window frames.

Sweet Birch.

Agricultural implements, automobiles, bookcases, boxes, brush backs, chair seats, crating, desks, druggist cabinets, electric bases, filing cases, fixtures, flatiron handles, frames, furniture, garment hangers, hall racks, ice boxes, interior finish, jewelry cabinets, kitchen tables, lawn swings, mandolins, musical instruments, office fixtures, opera chairs, panels, parquetry floors, pianos, plane handles, plumbers' woodwork, showcases, store seats, tops for counters, turnings, wall cases, wardrobes.

Sycamore.

Barber poles, baskets, bookcases, boxes, cart trees, chiffoniers, china closets, cigar boxes, desk drawers, furniture, ice boxes, mirror backing, molding, music cabinets, kitchen furniture, office fix-tures, panels, picture frames, refrigerators, saddle trees, shelving, tobacco boxes, tomato cases, trunks, vehicle bodies, veneer backing, veneer bottle packlng, wagon bottoms.

Baskets, bedspring frames, boxes, cigar boxes, furniture, laundry appliances, musical instruments, street car ceiling, tobacco boxes, washboards, window frames, woodenware.

finish, lintels, molding, panels, picture frames, sash, washing machines, window frames, window sills.

Yellow Poplar.

Automobile panels, bakers' tools, bank fixtures, bookcases, boxes, built-up panels, cabinets, carriage bodies, dumbwaiter cars, furniture, interior finish, ironing boards, musical instruments, office fixtures, pipe organ bellows, pipe organ chests, stair horses, wagon panels, washboards, woodenware.

Yucca.

Bottle packing veneer, sugar splints.

LIST OF CO-OPERATORS.

The Missouri manufacturers whose names and addresses follow supplied data used in the compllation of this report:

Directory.

Below is a list of Missouri wood-using manufacturers who supplied the data contained in this report. Those manufacturing several products classified under different industries will appear in the list, with their addresses, under more than one in-

AEROPLANES.

McCallum Aeropiane & Mfg. Co., Kansas City. Aeronautic Supply Co., St. Louis. M. A. Heimann Mfg. Co., St. Louis. AGRICULTURAL IMPLEMENTS.

M. A. Heimann Mfg. Co., St. Louis.

AGRICULTURAL IMPLEMENTS.

Jenkins Hay Rake & Stacker Co., Chillicothe. Fileming & Sons Mfg. Co., Kansas City.

Tulip Wood.

Musical instruments.

Tupelo.

Baskets, bedspring frames, boxes, cigar boxes, urniture, laundry appliances, musical instruments, low frames, woodenware.

Vermillion.

Musical instruments.

Western Red Cedar.

Blinds, doors, fixtures, frames, furniture, interior inish, lintels, molding, panels, picture frames, sash, washing machines, window frames, window sills.

. Western White Pine.

Blinds, ceiling, cornice, doors, finish, furniture,

Blinds, ceiling, condense, veneer bottle pack.

Blinds, ceiling, condense, veneer bottle pack.

Blinds, ceiling, condens

FIXTURES.

High's Planing Mill, Independence,
Central Cabinet & Mfg. Co., Kansas City.
Jas. R. Flynn, Kansas City.
Gambrel Bros., Kansas City.
House Wrecking Salvage & Lumber Co., Kansas City.
Huback Cabinet Co., Kansas City.
Kansas City Cabinet Works, Kansas City.
Kansas City Cabinet Works, Kansas City.
Koch Butchers Supply Co., Kansas City.
Koch Butchers Supply Co., Kansas City.
Leeds Show Case & Fixture Works, Kansas City.
Western Cabinet & Fixture Mfg. Co., Kansas City.
Whitcomb Cabinet Co., Kansas City.
H. Erlich & Sons Mfg. Co., St. Joseph.
American Fixture & Show Case Mfg. Co., St. Louis.
Armstrong Cork Co., St. Louis.

cars, pews, pipe organa, plows, pulpits, refrigers
tors, riddles, road rollers, sieve trius, socken, state
vork, irred-ters, swings, tables telephore boxes,
tree-flies markhose, organistic telephore boxes,
tree-flies markhose,
tree-f

BOXES, TOBACCO.

Himmelberger-Harrison I umber Co., Cape Girardeau,
W. W. Norman, Hunterville.
Kansas City Box Co., Kansas City.
B. F. Rounds Co., Kansas City.
M. R. Sadler, Kansas City.
A. G. Wiedmann Cigar Box Mfg. Co., Kansas City.
Moser Cigar & Paper Box Factory, St. Louis.
St. Louis Cigar Box Co., St. Louis.

CAR CONSTRUCTION.

St. Louis & San Francisco Railroad Co., Cape Girardeau.

St. Louis & San Francisco Railroad Co., Chaffee.
W P. Scott, Charter Oak.
St. Louis & San Francisco Railroad Co., Kansas City.
St. Louis & San Francisco Railroad Co., Kansas City.
St. Louis & San Francisco Railroad Co., Monett.
American Car & Foundry Co., St. Charles.
American Car & Foundry Co., St. Louis.
American Car & Foundry Co., St. Louis.
American Car & Foundry Co., St. Louis.
St. Louis Car Co., St. Louis.
St. Louis Car Co., St. Louis.
St. Louis Car Co., St. Louis,
St. Louis Car Co., St. Louis,
St. Louis Car Co., St. Louis,
Swift & Co., South St. Joseph.
Frisco Car Works, Springfield.
CASKETS AND COFFINS. Louis & San Francisco Railroad Co., Cape Girar-

CASKETS AND COFFINS.

St. Joseph Casket Co., St. Joseph.
Kiegel Casket Co., St. Louis.
Missouri Casket Co., St. Louis.
Mound Coffin Co., St. Louis.
F C. Riddle & Bro. Casket Co., St. Louis.
St. Louis Coffin Co., St. Louis.
DARYMEN'S.

DARYMEN'S. DAIRYMEN'S, POULTERERS', AND APIARISTS' SUPPLIES,

Buffalo Stave Co., Cardwell.
The Pemiscot Land & Cooperage Co., Caruthersville.
Leahy Mfg. Co., Higginsville.
The Adams Washer Co., Kansas City.
W. P. Sheets, Frinceton.
Alfred Thieme, Westplains.

EXCELSIOR.

Blue Valley Bedding Co., Kansas City. Excelsior Products & Mfg. Co., Kansas Atv. F. Burkart Mfg. Co., St. Louis, Jacob Kaiser & Co., St. Louis. FIXTURES.

Benderscheid Mfg. Co., St. Louia.
Blumer Cabinet Co., St. Louis.
The Brecht Co., St. Louis.
The Brecht Co., St. Louis.
Century Woodworking Mfg. Co., St. Louis.
Claes & Lehnbeuter Mfg. Co., St. Louis.
Comfort-Meredith Co., St. Louis.
William G. Frye Mfg. Co., St. Louis.
M. A. Heimann Mfg. Co., St. Louis.
M. A. Heimann Mfg. Co., St. Louis.
Heimann Miller Mfg Co., St. Louis.
Heimann Miller Mfg Co., St. Louis.
Hollrah-Dieckmann Refrigerator & Fixture Co., St. Louis.
Koken Barbers Supply Co., St. Louis.
Loughman Cabinet Co., St. Louis.
Loughman Cabinet Co., St. Louis.
Mirror Hinge & Cabinet Co., St. Louis.
Multiplex Display Fixture Co., St. Louis.
C. Nelson Mfg Co., St. Louis.
H. Pauk & Sons Mfg. Co., St. Louis.
St. Louis Bank Fixture Co., St. Louis.
St. Louis Butchers Supply Co., St. Louis.
St. Louis Butchers Supply Co., St. Louis.
Schoenlau-Steiner Trunk Top & Veneer Co., St. Louis.
St. E. E. Seidel Mfg. Co., St. Louis.
Staude & Rueckoldt Mfg. Co., St. Louis.
The Union Sample Case Co. St. Louis.
Western Refrigerator & Mfg. Co., St. Louis.

Louis.
Jos. Dickmann, Sedalia.
S. P. Johns Planing Mill, Sedalia.
Landers & Davis Mfg. Co., Springfield.
Moore Mfg. Co., Springfield.
Springfield Furniture Co., Springfield.
FRAMES AND MOULDING.

Kansas City Mirror Mfg. Co., Kansas City N. M. Friedman & Co., Martinsburg. American Frame Mfg. Co., St. Louis. FURNITURE.

FURNITURE.

M. D. Miesner Lumber Co., Altenberg.
G. A. Ohlbert Furniture Shop, Altenburg.
Himmelberger-Harrison Lbr. Co., Cape
Girardeau.
Jas. R. Flynn, Kansas City.
L. F. McClure, Kansas City.
E. Roemer, Kansas City.
V. K. Sammons, Kansas City.
Sanitary Folding Bed & Míg. Co., Kansas
City.

City.

City.

Towne Butcher's Supply Co., Kansas City.

C. Trieb Cabinet Works, Kansas City.

Vebergs Cabinet & Stair Works, Kansas

C. Trieb Cabinet Works, Kansas City, Vebergs Cabinet & Stair Works, Kansas City, Vebergs Cabinet & Stair Works, Kansas City, Winkler Furniture Co., Lexington. H. F. Slemens, St. Joseph.
John H. Talge Lounge Co., St. Joseph.
Aude Furniture Co., St. Louis.
A. P. Bohlinger Table Co., St. Louis.
Central Furniture Co., St. Louis.
Central Furniture Co., St. Louis.
Comfort-Meredith Co., St. Louis.
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E. Ernst Furniture Co., St. Louis.
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E. Ernst Furniture Co., St. Louis.
L. Friederich & Bro. Furn. Co., St. Louis.
Gravois Pianing Miii Co., St. Louis.
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Holtgrewe-Vornbrock Furn. Co., St. Louis.
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Harry L. Hussman, St. Louis.
Koenig Furniture Co., St. Louis.
Koenig Furniture Co., St. Louis.
Koenig Furniture Mig. Co., St. Louis.
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Leroi Furniture Mig. Co., St. Louis.
F. H. Logeman Chair Mig. Co., St. Louis.
Meier & Pohlmann Furn. Co., St. Louis.
Meier & Pohlmann Furn. Co., St. Louis.
St. Louis Furn. Workers' Assn., St. Louis.
St. Louis Furn. Workers' Assn., St. Louis.
St. Louis Furn. Workers' Assn., St. Louis.
Schoenlau-Steiner Trunk Top & Veneer Co., St. Louis.
Springfield Furniture Mig. Co., St. Louis.
Springfield Furniture Co., St. Louis.
Springfield Furniture Co., St. Louis.
Wolf & Kraemer Furn. Co., St. Louis.
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Girardeau. George C. Peattie. Caruthersville. J. W. Putnam Mfg. Co., Charleston. Charter Oak Handle & Lbr. Co., Charter

Charter Oak Handle & Lbr. Co., Charter Oak.
Jackson Mfg. Co., Chillicothe.
Graves & Stamp, Des Arc.
I. X. L. Handle Co., Dexter.
Elur Oak Handle Co., Dexter.
Elur Oak Handle Co., Hawk Point.
Huntsville Handle Mfg. Co., Huntsville.
La Pierre-Sawer Handle Co., Jackson.
The Central Mfg. Co., Kansas City.
J. W. Opie Brush Co., Kansas City.
T. J. Brumback Mfg. Co., Memphis.
Hanna & Young Handle Co., Foplar Bluff.
Hartwell Bros., Poplar Bluff.
Hartzell Handle Co., Poplar Bluff.
Fulkerson Bros. Handle Co., Puxico.
Keller & Tamm Mfg. Co., St. Louis.
R. J. Schlemker Broom Factory, St.
Louis.
Western Refrig. & Mfg. Co., St. Louis.
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Thos. Cusack Co., Kensas City.
Gambrel Bros.. Kansas City.
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City.
J. W. Opie Brush Co., Kansas City.
J. W. Opie Brush Co., Kansas City.
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Smith & Sons Mfg. Co., Kansas City.
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Western Brush Mfg. Co., Kansas City.
Acme Woven Wood Lathe Co., Poplar

Oil Weil Supply Co., Poplar Bluff,
St. Joseph Pump Mfg. Co., St. Joseph.
H. F. Siemens, St. Joseph.
American Sign Co., St. Louis.
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The Goodenough Advertising Co., St. Louis.
Gus J. Gruendler Mfg. Co., St. Louis.
Hardware & Woodenware Mfg. Co., St. Louis.
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William A. Miller Elevator Mfg. Co., St.
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William A. Miller Elevator Mfg. Co., St.
Louis.
W. H. Newby Sign Co., St. Louis.

Wilham A. Miller Elevator Mig. Co., St. Louis.
W. H. Newby Sign Co., St. Louis.
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The Ruemmeli-Dawley Mfg. Co., St. Louis
L. M. Rumsey Mfg. Co., St. Louis
St. Louis Boat & Engline Co., St Louis
St. Louis Last Co., St. Louis.
St. Louis Last Co., St. Louis.
St. Louis Well Mach. & Tool Co., St.
Louis.

St. Louis Last Co., St. Louis.
St. Louis Well Mach. & Tool Co., St.
Louis.
Southwestern Electric Co., St. Louis.
P. G. Stout Sign & Adv. Co., St. Louis.
West St. Louis Mach. & Tool Co., St.
Louis.
A. Wissler, St. Louis.
Worlds Fair Sign Co., St. Louis.
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Wigging Ferry Docks, South St. Louis.

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Mulder Pattern & Model Works, Kansas City.
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American Car & Fdry. Co., St. Charles.
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Eanner Iron Works, St. Louis.
Central Pattern & Novelty Co., St. Louis.
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Louis.
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Reuter-Jones Mfg Co., St. Louis.
The Ruemmeli-Dawley Mfg. Co., St. Louis
St. Louis Pattern & Model Works, St.
Louis.
South Side Fattern Works. St. Louis.

St. Louis Pattern & Model Works, St. Louis. South Side Fattern Works, St. Louis. United Rys. Co. of St. Louis, St. Louis. Wagner Electric Mfg Co., St. Louis. West St. Louis Mach. & Tool Co., St. Louis.

Louis.
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Charleston Saw & Planing Mill, Charleston.
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De Forest & Sons, Licking.
D. M. Meadows, Licking.
A. D. Squires, Low Wossie.
J. Q. D. Whitener Land & Lbr. Co., Marquand.

D. M. Meadows, Licking.
A. D. Squires, Low Wossie.
J. Q. D. Whitener Land & Lbr. Co., Marquand.
D. J. Landers Lbr. Co., Mountain Grove.
S. H. Shaver, Mountain View.
Knott Lumber Co., New Madrid.
Norwood Lumber Co., New Madrid.
Norwood Lumber Co., Norwood.
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J. A. Schroeder, Otterville,
W. A. Brown, Pine,
Chas. H. Duckett, Pomona,
Hargrove & Ruth Lbr. Co., Poplar Bluff.
E. C. Haines & Sons, Portageville.
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Boeckeler Lumber Co., St. Louis.
Salem Lumber Co., Salem,
Matthews Lbr. & Mig. Co., Sikeston.
John F. Trentmann, Washington.
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Henry Gale Lumber Co., West Plains.
Ozark Land & Lumber Co., West Plains.
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Montague Engraving Co., St. Louis.
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St. Louis Electrotype Fdry. Co., St. Louis.
St. Louis Photo-Engraving Co., St. Louis.
St. Louis Platemaker's Supply Co., St.
Louis,
St. Louis Platemaker's Supply Co., St.
Louis,
Sanders & Melsheimer, St. Louis.

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O. McBride & Co., Campbell.
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Carthage Planing Mill, Carthage.
Carthage Sash & Door Co., Carthage.
Lang & Bro. Mfg. & Merc. Co., Farmington.

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Williams Cabinet Works, Joplin.
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Walla Leviston. Kansas City.
Geo. Lovejoy Planing Mill, Kansas City.
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Decker Bldg. & Mfg. Co., St. Louis.
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Globe Farquet Floor Mfg. Co., St. Louis.
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Hopmann Cornice Co., St. Louis.
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Huttig Sash & Door Co., St. Louis.
Lecoutour Bros. Stair Mfg. Co., St. Louis.
Lehnbeuter-Deickman Mfg. Co., St. Louis.
Lehnbeuter-Deickman Mfg. Co., St. Louis.
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Marvin Planing Mill Co., St. Louis.
Marvin Planing Mill Co., St. Louis.
Meschanics Planing Mill Co., St. Louis.
Messouri Fire Door Cornice Co., St. Louis.
Missouri Fire Door Cornice, St. Louis.
Geo. Noll. St. Louis.
N. St. Louis Planing Mill Co., St. Louis.
Chas. A. Olcott Planing Mill Co., St. Louis.
Phoenix Planing Mill Co., St. Louis.
Frost & Sons, St. Louis.
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St. Louis Fire Door Co., St. Louis.
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TRUNKS.

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VEHICLES AND VEHICLES PARTS.
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William B. Holbeck, Atlanta,
Jos. Brischee, Bloomsdale,
Roeder & Weyland, Boonville,
Winch Spoke Co., Branson.
O. McBride & Co., Campbell,
La Crosse Wagon Stock Mfg. Co., Cape
Girardeau.
W. P. Scott, Charter Oak,
Graves & Stamp, Des Arc.
I. X. L. Handle Mfg. Co., Dexter,
The Reuter Hub & Spoke Co., Dexter,
T. L. Wright Lumber Co., Doniphan.
Miller Wagon Co., Edina.
Clark-Gay Mfg. Co., Eminence,
Lang & Bro. Merc. & Mfg. Co., Farmington.

ton.

Hannibal Wagon Co., Hannibal.

Hawk Point Machine Shop, Hawk Point.

John Kliever, Hawk Foint.

Horn & Sons, Hunnewell.

Ealdwin Bros. Mfg. Co., Ironton.

La Pierre-Sawyer Handle Co., Jackson.

Capital City Wagon Co., Jefferson City.

John H. Rodeman, Jefferson City.

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Beggs Wagon Co., Kansas City.

Plamond Seat & Body Co., Kansas City.

Feldmeyer & Schaake. Kansas City.

Hesse Carriage Co., Kansas City.

Hesse Carriage Co., Kansas City.

Hesse Carriage & Wagon Co., Kansas City.

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A. B. Fisher, New Madrid.

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Fhrhard Mfg. Co., St. Charles.

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Conrad Tanner & Sons, St. Joseph.

Chris Albrecht, St. Louis.

Banner Buggy Co., St. Louis.

Felix I., Baumann, St. Louis.

Henry Bob, St. Louis.

Henry Bob, St. Louis.

Henry Bob, St. Louis.

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Cooper Carriage Woodwork Co., St. Louis.

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Cooper & Tamm Mfg. Co., St. Louis.

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Walz Bros., St. Louis.
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WEIGHING APPARATUS.

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Simplex Novelty Co., St. Louis.

Theiling-Latham Mfg. Co., St. Louis.

J. H. Laukenau, Sedalia.



The Wood-Using Industries of Alabama

By
JOHN T. HARRIS, Statistician,
And
HU MAXWELL, Expert,
Forest Service,
United States Department of Agriculture.

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New Orleans, Louisiana,

May 1, 1912.

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THE LEWIS TRADE JOURNAL



WOOD USING INDUSTRIES OF ALABAMA

Bureau of Wood Utilization of Forest Service Tells of Plants Already Established and Opportunities for New Enterprises; Division of Various Woods among Existing Manufactures.

NOTE.

The following report was prepared by John T. Harris, statistician, and Hu Maxwell, expert, under the direction of H. S. Sackett, chief of the Office of Wood Utilization, United States Forest Service. It is published and thus made available to the public through the courtesy of the Lumber Trade Journal, New Orleans, La. New Orleans, La.

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PREFACE

The state of Alabama embraces 33,000,000 acres, of which about 24,000,000 are classed as wooded land, 9,000,000 farm land, and 500,000 water surface In this division the water surface alone remains fairly constant, while the proportionate amounts of wood and agricultural land change from year to year. In some instances, old fields are lapsing into forest, but in many more instances the wooded areas are being converted into farms. In its original condition the whole region now included in Alabama was wooded, the exceptions being so few as to be

unimportant. Clearings were made in a small way by the native Indians who cultivated corn, pumpkins, and melons; and about 200 years ago more extensive clearings were begun by the first European settlers. From that time until the present, the primeval forests bave steadily given way to cotton, grain and tobacco. For a long time the timber was an encumbrance, as was the case in so many other parts of the United States where the ground was wanted for crops. A little was used for fences, bridges, and buildings, but there being no manufacturing, most of the timber cut in clearing farms was burned either for fuel, or in log heaps. Although Alabama has anchorage and sea coast, the early people built few ships, and sought no over-sea trade. As early as 1777, however, naval stores were manufactured to a small extent at Mobile, the chief product being tar.

The soft woods; that is, pines and cypresses, grow in all regions of Alabama theorems.

The soft woods; that is, pines and cypresses, grow in all regions of Alabama, though not everywhere equally dispersed; but the pine belt, where the finest forests of longleaf pine are found is about fifty miles wide and lies in the southern part of the where equally dispersed; but the pine belt, where the finest forests of longleaf pine are found is about fifty miles wide and lies in the southern part of the state on lands usually flat and sandy. The general elevation of this belt is not much above sea level. Next above this, northward in the state, is the cotton belt, which consists of broad, rolling prairies, with many strips of timber still remaining. The soil is black and fertile and the region is crossed by many streams. Still north of this is the mineral belt, where coal and iron are mined and constitute the chief wealth of the region at this time. Timber of some kind is found all over the hills, beneath which the minerals lie. This timber has been and still is of much value in mining operations, though in this report little mention is made of it for the reason that most mine timbers are used in the rough—as pit posts, props, tles, lagging, etc.—and this report deals with manufactured products only. Considerable areas of pine in this part of Alabama were stripped many years ago by charcoal burners who found sale for their products at the iron furnaces. The mining of iron in this region was stimulated during the civil war by demands for the metal in the South when supplies from other parts of the country were difficult to procure. The confederate ship, Tennessee, was built of Alabama iron; and large cannon foundries obtained their supplies from the same mines. Much of the iron was smelted with charcoal made from pine cut in the vicinity. To this day charcoal pits are common in the region and hills are still being cleared of pine (some other woods also) to meet the demand. Still north of the mineral belt in Alabama lies the cereal belt, where grains constitute the leading crops. This region embraces the fertile lands of the Tennessee river valley, extending entirely across the state, east and west. When the primeval forests covered the country, this was a remarkable hardwood region; but the fertility of the soil tempted the early settlers to cut the woods this region some of the best hardwoods of Alabama are still found.

are still found.

Alabama is well supplied with facilities for shlpping its forest products by land and water. Railroads are numerous, and they handle in a satisfactory manner the business that comes to them. The state's rivers give 1,500 miles of inland navigation, without counting the streams too small for steamers, yet large enough for a raft or for floating logs. Mobile is the gateway to the sea, and to the maritime countries of the world. It has a splendid harbor, connected by a twenty-six-foot channel with the Gulf of Mexico. The harbor always presents a busy scene, and it is seldom without two or more foreign vessels loading for distant ports. It is the confident belief of the business men of Mobile, and of the whole state, that the completion of the Panama canal will add immensely to Mobile as a shipping port and port of entry, and that new markets for the products of forest and factory will be opened on the western coast of Central and South America, as well as in the Orient.

The output of the sawmills in Alabama in 1910,

according to the federal census of that year, which is the latest thus far published, was 1,465,623,000 feet. The cut was made up of eighteen species. It should be explained, however, that in some instances two or more species are grouped as one. For example, all pine is listed under the common name "yellow pine," though at least five species are included, viz., longleaf, shortleaf, loblolly, Cuban and spruce. The same method was pursued in tabulating oak lumber in the census returns, All is classed simply as oak, though it is well known that more ing oak lumber in the census returns. All is classed simply as oak, though it Is well known that more than one species—perhaps half a dozen species—are included. The compilers of census statistics pursue that method because it is impossible to list each species of oak or pine separately, as many mills which convert them into lumber make no distinction between species. The drain upon Alabama's pine has been very heavy. In 1910 it constituted ninety per cent of the whole sawmill output. It is, therefore, evident that any lessening of the available pine supply will affect in a visible way, the state's total lumber output.

The state's timber resources are yet very large, though the drain in the past has been heavy. De-

The state's timber resources are yet very large, though the drain in the past has been heavy. Decline in value need not follow decline in output. Closer utilization and preparation of the product for other markets, may more than make good all losses due to a smaller total output. This can be brought about by converting more of the rough lumber into finished product; that is, prepare it for markets which will pay more for it, and by that means sell a less quantity of forest products for more money. Farmers are learning to make more profit from a small tract of land by intensive cultivation than was realized from large tracts under the old way of growing one thing and selling it in the rough. Timber men can follow the same plan and do as well. Lumber sold as it comes from the sawmill is one commodity only; manufactured into furniture, boats, vehicles, finish, and the like, it becomes a number of products, each of which has a market of its own. market of its own.

This study of the utilization of wood in Alabama

was undertaken by the United States Forest Service in the hope that it would assist manufacturers and timber owners in the state in converting the wood into commodities which will be most profitable. The figures brought together and shown in the various tables should not be regarded as dry statistics, for each table tells a story of progress and success. It is an exhibit of diversified industries with the forest as the raw material and the finished products as the saleble commodity. The consus figures for forest as the raw material and the finished products as the salable commodity. The census figures for 1910 (1,465,623,000 feet) show the timber converted in a year into lumber. The tables in this report show that nineteen industries in the state use 726,816,900 feet of rough lumber a year; and that 105,000,000 more is simply planed and is sold in that form, while the remainder is apparently disposed of in the rough form. About 36,000,000 of the 726,816,900 feet demanded by manufacturers is brought into Alahama from other states; and about 770,000,000 Alabama from other states; and about 770,000,000 feet of lumber cut yearly in Alabama is used in the rough or is shipped outside the state for further manufacture.

It is a well-known economic principle that the community, region, or state which produces abundance of raw material and converts it into finished ance of raw material and converts it into finished products ready for use, is more prosperous than the region which sends its half-finished product away from home to be completed. It is unnecessary to show by argument and figures the value of manufacturing concerns to a region; the facts are self-evident. Alabama is producing abundance of lumber, but about half of it is not being further manufactured in the state. Some of it, of course, is demanded for use in the rough form; but there is no reason why all necessary manufacturing can not be done why all necessary manufacturing can not be done in the state, thus employing home people, and keeping the money at home. Cheap power is abundant, and facilities for shipping the finished products are adequate.

WOODS USED IN ALABAMA.

Manufacturers in Alabama report the yearly use of thirty-eight woods, ranging in amounts from

484,130,000 feet for iongleaf pine to 500 feet for cherry, and in average cost per 1,000 feet, delivered at the factory, from \$131.24 for mahogany to \$10 for basswood and sycamore. It is reasonably certain that several additional species are in use though not sepaseveral additional species are in use though not separately reported. Among the oaks, doubtless yellow oak (Quercus velutina) and water oak (Quercus nigra) are in use, for they are plentiful and of good form in some parts of the state. One birch is listed, but probably three at least are in use, the sweet birch (Betula lenta), yellow birch (Betula lutea) and river birch (Betula nigra). Several species of hickory are generally grouped as one; two cypresses bo-

tanlcally distinct are considered one at the sawnalli; two or three elms grouped under a common name; hackberry and sugar berry are not distinguished apart, and doubtless other woods are grouped and given a common name, or else they may be lost sight of entirely in the lumber yard. It is not customary for lumbermen and manufacturers to distinguish as carefully between species as botan-ists do, nor, for practical purposes is it necessary to do so. However, each wood possesses an individuality of its own, and has certain qualities and characters which differ from those of all other woods, and it may be expected that as woods become more

valuable, and their fitness for specific purposes shall be more carefully studied, the custom of using them indiscriminately and without regard to their names, will gradually pass away. Perhaps not much change should be expected in the grouping and names of old familiar species; but a large number of less plentiful and less known woods are coming into use to meet special requirements or to take the place of woods which are becoming scarce. It will soon become necessary to apply names to these in order that the trade may intelligently handle them. Alabama has at least twice as many useful woods as are shown in Table 1 which follows:

TABLE 1. SUMMARY OF KINDS OF WOOD USED IN ALABAMA.

Kinds of wood.	Quantity used annu	ally	Average cost	Total cost	Grown in Ala-	Grown out of
Common name— Botanicai name—	Feet B. M.	Per cent.	per 1,000 ft.	f. o. b. factory	bania, per cent.	Ala., per cent.
Longleaf pinePinus palustris	484.130.000	66.61	\$11.92	\$5,770,692	93.92	6.08
Shortleaf pine Pinus echinata	165,148,500	22.72	11.56	1,909,434	99.03	.97
Red gumLiquidambar styraciflua	18,666,200	2.57	11.62	216,989	94.52	5.48
White oakQuercus alba	12,380,800	1.70	20.14	249,674	95.25	4.75
Yeliow poplarLiriodendron tuilpifera.	12,275,500	1.69	15.59	191,409	97.60	2.40
TupeloNyssa aquatica	7,932,000	1.09	10.23	81,159	97.35	2.65
Red oakQuercus rubra	5,943,500	.82	18.91	100,504	94.83	5.17
Hickory Hicoria	5,281,000	.73	21.03	111,055	99.34	.66
Lobloily pinePinus taeda	2,850,000	.39	11.86	33,800	100.00	.00
White ashFraxinus americana	2,330,500	.32	21.29	49,610	77.13	22.87
Cypress	1,823,000	.25	15.05	27,430	88.21	11.79
Spruce pinePinus glabra	950,000	:13	14.71	13,975	68.42	31.58
Post oakQuercus minor	860,000	.12	19.07	16,400	99.30	.70
Dogwood	750,000	.10	14.20	10,650	60.00	40.00
Cuban pine	725,000	.10	11.26	8,162	100.00	.00
White elm Uimus americana	570,000	.08	14.89	8,490	100.00	.00
Evergreen magnolia Magnolla foetida	515,000	.07	10.15	5,225	100.00	.00
Black gumNyssa sylvatica	486,000	.07	10.53	5,120	100.00	.00
Chestnut Castanea dentata	485,000	.07	15.55	7,540	13.40	86.60
CottonwoodPopulus deltoides	481,500	.07	18.96	9,108	100.00	.00
BirchBetula	375,000	.05	27.57	10,340	.00	100.00
PersimmonDiospyros virginiana	326,000	.04	15.03	4,900	100.00	.00
BeechFagus atropunicea	320,000	.04	10.36	3,315	96.88	3.12
Willow oakQuercus phelios	259,000	.04	20.80	5,386	46.33	53.67
White pinePinus strobus	221,000	.04	41.27	9,120	.00	100.00
MahoganySwietenia mahogani	158,600	.03	131.24	20,815	.00	100.00
Sweet magnolia Magnolia glauca	148,000	.02	11.10	1,643	100.00	.00
Red cedarJuniperus virginiana	130,000	.02	23.46	3,050	61.54	38.46
Black wainut Juglans nigra	62,500	*	36.64	2,290	.00	100.00
Pin oakQuercus palustris	60,000		40.00	2,400	.00	100.00
Texan oakQuercus texana	59,900		38.40	2,300	90.15	9.85
Hackberry Celtis occidentalis	50,000		15.00	750	100.00	.00
Sugar maple Acer saccharum	35,000		17.57	615	71.43	28.57
BasswoodTilia americana	10,000	*	10.00	100	.00	100.00
Green haw Crataegus viridis	9,900	*	15.00	150	100.00	.00
Sycamore Piatanus occidentalis	7,000	*	10.00	70	100.00	.00
Wild chinaSapindus marginatus	1,000	* * -	15.00	15	100.00	.00
Cherry Prunus serotina	500		100.00	50	.00	100.00
gard gard			20000			
Totals* *Less than 1/100 of 1 per cent.	726,816,900	100.00	\$12.24	\$8,893,735	94.99	5.01

Longleaf Pinc.—In quantity this is by far the most important wood used by manufacturers in Alabama. It has needles longer than those of other pines associated with it; its sap is thinner in pro-portion to the heart wood than is that of any other pine; and in strength and stiffness it ranks among the best and above most other timbers of the state. the best and above most other timbers of the state. It is one of the slowest growing pine of the South, and for that reason it is not likely to figure as much in future supply as some of its associates which grow faster, thereby producing a new forest in a shorter time. The original stands of this species are of fine form for lumber, they shade the ground so effectively that they suppress the seedlings of most other trees, and thus they have held their place for long periods of time in nearly pure forests. But long periods of time in nearly pure forests. But when the old stand is removed by lumbermen, or is thrown by storm, and the sunlight enters, the longleaf seedlings are unable to maintain their place under the pressure of competition from more vigor-ous species (loblolly and Cuban pines in particular) and the former longleaf forest is gradually replaced by other kinds of trees. The encroachment of farms upon the longleaf forest, however, is doing as much as any other cause, or all other causes combined, to end the supremacy of the longleaf pine. The land where this tree is at its best is not the most fertile in the region, but it has been found well suited for root crops, and in many instances for orchards, and as the lumberman takes the pine off, the farmer and the fruit grower enter into possession. For this reason, and for the reason already stated, that the young longleaf plne is often unable to compete in the struggle with other species for possession, it may be expected that the cutting of this species will practically come to an end when the primeval for-ests have been removed. It has been and still is a most valuable resource, but its importance may be expected to decline in the future.

Shortleaf Pine .- Men engaged in the lumber business often group two or three pines under the name ahorticaf. Loblolly and Cuban pine are liable to be

so classed, though botanically they are quite distinct species from the shortleaf (Pinus echinata). In Table 1 shortleaf stands next to longicaf in quantity and that is doubtiess its proper rank in Alabama; but there is little doubt that much loblolly and Cuban pine have been reported as shortleaf. The needles of shortleaf pine are usually three to five inches long; those of lobiolly six to nine inches; the Cuban eight to twelve inches, while those of longleaf pine are sometimes as much as eighteen inches in length, though usually considerably shorter. Shortleaf pine has thick sapwood, except in large and old trees. It grows rapidly during its first large and old trees. It grows rapidly during its first forty to sixty years, and more slowly afterwards. It reproduces vigorously, and quickly takes possession of openings in the forest. The wood is weaker and softer than longleaf, but for some purposes—notably for doors, frames and interior finish—it is preferred to longleaf by many, while for floors, beams and long, heavy timbers, longleaf usually gives better service. The shortleaf pine is found in practically ali parts of Alabama, but is not equally distributed over the state, being scarcer in some localities than in others. iocalities than in others.

distributed over the state, being scarcer in some localities than in others.

Loblolly Pine.—This pine shows a disposition to take complete possession of ground when it finds conditions favorable, such as abandoned farms, or tracts from which other forest trees have been removed. This is the tree which, within the past century, and particularly in the past fifty years, has occupied so much abandoned farm land in Virginia, North Carolina, and further south and west. It grows rapidly, and young trees, up to a foot or more in diameter, are largely sapwood. It is a large contributor to the lumber supply of the South, and the fact that less than 3,000,000 feet are credited to it in Aiabama, as shown in Table 1, is pretty strong evidence that it has gone to market under some other name, most probably as shortleaf.

Spruce Pine.—In "Timber Pines of the Southern United States," by Charles Mohr, published in 1897, an apology for including this tree was thought nec-

essary; for it was considered of little or no commervalue at that time, and it was given place among the timber pines "in order to dispel for the future its confusion with some of these trees." The opinion concerning spruce pine held at that time has been much modified since; and though the species is not abundant, the lumber is considered excellent. Of all the southern pines, the wood of this tree has been pronounced the nearest approach to white pine. The tree grows rapidly, is nearly all sourced until The tree grows rapidly; is nearly all sapwood until the trunk reaches maturity; and it thrives in the shade better than any of the pines with which it is associated. The wood is in demand for doors, sash associated. The wood is in demand for doors, sash and frames; it is white and clean, and holds its shape well. The tree's leaves are among the shortest of the pines. Charles Mohr, whose unfavorable opinion has been referred to, predicted that when forestry methods came into practice in the South, the spruce pine would be found worthy of attention. White Pine.—This tree does not grow in commercial quantities in Alabama, and what is used comes from the Lake states or from the mountains of eastern Tennessee. Kentucky, or western North Caro-

ern Tennessee, Kentucky, or western North Carolina. A western wood (Pinus ponderosa) is making

lina. A western wood (Pinus ponderosa) is making its appearance in some southern shops and factories under the name of white pine or California white pine. It belongs to the yellow pine group. It was not separately reported in Alabama.

Cuban Pine.—This valuable tree belongs to the southern yellow pine group and is much used, though it generally goes to market under some other name—sometimes as longleaf, occasionally as shortieaf, but more frequently as iobiolly. The standing tree resembles longleaf, but the appearance of the wood—its thick sap and small heart—resembles loblolly. In strength it is little or not at all inferior lolly. In strength it is little or not at all inferior to longleaf. The tree reproduces vigorously, spreading upon open land; it grows rapidly and comes to merchantable size much sooner than longleaf; and it promises to become one of the most important timber trees of the state. Judging from its geo-graphical location in this country, the Cuban pine

seems to have spread northward through the peninsula of Florida into the adjacent regions further north, and it is still spreading rapidly by taking advantage of openings in the forests of other species, made by lumbermen.

Cypress.—Alabama is not a large producer of cypress when compared with Louisiana, Florida, Mississippi, and some other states. This tree thrives best in swamps, and Alabama has no large tracts of such land. Two species of cypress grow in this state, but they are so nearly alike that few recognize any difference between them.

difference between them.

Magnolia.—Two species of magnolia are in use—
the evergreen and the sweet. The former is more
abundant, the trees of greater size, the leaves are
longer, and the flowers much larger, being from six
to eight inches across; the sweet magnolia being
only two or three inches. The wood of the evergreen magnolia bears some resemblance to yellow
poplar, though the heart is often much darker;
while the wood of the sweet magnolia (the heartwood) is a rich brown that polishes well, and when
carefully selected and finished, it is one of the handsomest woods of the southern forests.

carefully selected and finished, it is one of the handsomest woods of the southern forests.

Red Cedor.—A very small part of the total cut of
cedar in Alabama is shown in Table 1, because that
represents only what passes through shops and manufacturing plants, while the bulk of the cedar is
used for poles and posts. In northern Alabama the
railroad yards are filled with cedar poles and posts,
the former for telephone and telegraph lines the the former for telephone and telegraph lines, the latter for fences. Many are shipped to other state. Pencil manufacturers search so diligently for cedar that it is not unusual to see a train load of old cedar fence rails on the way to market, there to be converted into pencils. In some instances buyers of verted into pencils. In some instances buyers of cedar build a new post and wire fence in exchange for the old cedar rails. This is a remarkable change from twenty-five years ago. There are two species of red cedar in Alabama, but they are so similar that few persons recognize the difference, and in the market no distinction is made. Red cedar holds its ground with remarkable vigor. If it were not such a slow-growing tree it would be one of the most valuable in this country. It is found in more than half of the United States, but it thrives best in the South. In a region extending from eastern Tennessee, northern Georgia, and eastern Kentucky to central and western Texas, it is not unusual to see this cedar in tens of thousands, taking possession of stony ridges, sterile hillsides, sandy flats, and steep ravines. Posts by millions are now cut from land stony ridges, sterile hillsides, sandy flats, and steep ravines. Posts by millions are now cut from land where fifty or seventy-five years ago few cedars grew. This statement applies to a wider region than Alabama, but as much to that state as to any other. If left growing for a long period of years—a century or more—these cedars would attain a size fitting them for use in the manufacture of pencils, chests and furniture, but the ordinary land owner does not want to wait so long and he cuts his trees when they are large enough for posts and poles. The when they are large enough for posts and poles. The mature cedars that stood in old forests have nearly all been cut to meet demand in the past. Houses, barns, mills, bridges, and fences were formerly often built in part or whoily of cedar. That, of course, is no longer possible.

often built in part or wholly of cedar. That, of course, is no longer possible.

Hickory.—Seven or eight species of hickory are grouped as one in Alabama and are reported by manufacturers simply as hickory. That is the practice in ail hickory regions, because it has been found impossible, or at least impracticable, to separate and distinguish between the different hickories. Among those growing in Alabama are bitternut, nutmeg, pecan, paleleaf, pignut, mockernut, shagbark, and water hickory.

Birch.—The remarks concerning hickory apply also to birch, except that fewer species are used in Alabama, and all that was reported came from outside the state. The birches which possess attractive color and grain, and for that reason are demanded for furniture and finish, consist principally of two species—sweet birch (Betula lenta) and yellow birch (Betula lutea). Both are northern trees, extending southward along the Appalachian Mountain ranges to North Carolina and Tennessee. Birch that is cut in the Lake States is usually yellow birch, though sweet birch is lumbered in that region also; while birch from Pennsylvania, Maryland, West Virginla, and nelghboring regions is likely to be the sweet species, though yellow birch is cut also. Several other birches grow in the United States and are valuable for certain purposes, but the majority sweet species, though yellow birch is cut also. Several other birches grow in the United States and are valuable for certain purposes, but the majority of them show little color, grain or figure in the wood. No one of them is reported for use in Alabama. The river birch (Betula nigra) grows in considerable abundance along the streams of that state and is doubtless put to use though not reported. It is a plain but substantial wood.

Yellow Poplar.—In addition to supplying its own shops and factories with nearly twelve million feet of yellow poplar, the state of Alabama is now exporting large numbers of poplar logs to Europe. The logs are stripped of bark to reduce weight and lessen the space they will occupy in the holds of ves-

the space they will occupy in the holds of ves-s. This splendid timber tree reaches the southern

limit of its commercial range in Alabama.

Gum.—Table 1 lists the wood of three species of gum in Alabama, red, black and tupelo. Two other gums grow in the state and doubtless are made use of, though not reported. They are the water gum (Nyssa biflora) and sour tupelo (Nyssa ogeche).

The Oaks.-In Table 1 six oaks are listed, white, red, post, willow, pin and Texan. This separates the oaks into species, with the amount of each used, with as much accuracy as available information will allow; but its absolute accuracy is doubtful. It is reasonably certain that more than six kinds of oak are used by Alabama manufacturers, and it is probable that several ware ground under one or more are used by Alabama manufacturers, and it is probable that several were grouped under one or more names. Water oak, yellow oak, and live oak are fairly abundant in Alabama, yet do not appear in the table, while red oak (Quercus rubra) barely enters the northeastern corner of the state, yet it was largely reported. The most likely explanation is that some of the oaks, which do not appear under their own names, were reported as red oak. In compiling this report, the figures furnished by manufacturers were used, but an explanation is deemed facturers were used, but an explanation is deemed necessary because of the various names by which the same oak may be known and reported. White the same oak may be known and reported. White oak and red oak are two general terms by which many lumbermen report oaks of various species. Those which have pointed-lobed leaves and ripen their acorns in two years are generally called red oak, and those with one-year acorns and round-lobed leaves are known as white oak. There are should be according to the control of the control ieaves are known as white oak. There are about fifty oaks in the United States, and at least onethird are found in Alabama. Among them are white oak, red oak, post oak, overcup oak, chestnut oak, chinquapin oak, cow oak, Durand oak, ilve oak, Texan oak, yeliow oak, Spanish oak, black jack oak.

water oak, shingle oak, and willow oak.

Dogwood.—This is not a timber tree as the term is usually understood, but is cut in considerable quantity and is usually bought and sold by the cord.

Elm.—Manufacturers reported the use of only one

elm in the state, the white elm. That is the com-mon and most abundant elm in the United States, and it grows in practically all the states east of the Rocky Mountains. Alabama has two other species of eim, both serviceable for manufacturing purposes, and doubtless both are in use. They are wing elm and slippery elm; the latter may be known by its mucilaginous inner bark, and the former by the flat keels on the twigs and sometimes on the large limbs and trunk of the tree. When this elm is not

iimbs and trunk of the tree. When this elm is not in leaf, the peculiar appearance of the flat twlgs will not fall to attract attention.

Chestnut.—In Alabama the chestnut approaches the southern limit of its range.

Cottonwood.—This wood does not occupy an important place in Alabama, either as rough lumber or as a finished product. Only thirteen mills in the state cut it in 1910, while there were 110 in Mississippl, 126 in Arkansas and 300 in Missouri.

Persimmon.—The persimmon is not cut for gen-

Persimmon.—The persimmon is not cut for general lumber but for special commodities, principally shuttle blocks, and golf sticks.

Mahogany.—The mahogany used in Alabama was

manogany.—The manogany used in Alabama was grown in West Indies, Mexico and Central America. Another wood usually classed as manogany and largely demanded by manufacturers of furniture and finish in this country comes from Africa.

Green Haw.—This wood is seldom reported by wood-using industries. It may reach eight or ten inches in diameter of trunk. The wood is light in color, resembling ironwood.

Wild Cherry.—This is not a foreign tree brought.

Wild Cherry.—This is not a foreign tree brought Into this country, as its name might imply. It grows from Georgia to Arizona, but probably will never attain to any more importance in the timber supply than it now holds. It is sometimes called soap berry because substances extracted from the roots and the fruit have been used for soap. The

true soap berry is a closely related species.

Hackberry.—This tree grows in practically all sections of the state, and is often bought and sold as

Black Walnut.-A little black walnut is used in Alabama, but none of it is state-grown. This wood was once popular for many purposes, but it has lost some of its popularity in recent years. If it were demanded now in as large amounts as formerly, the price would be very high, for the wood is scarce, and no unculled forests exist from which

new supplies may be drawn.

Spanish Moss (Dendropogon usenoides).not a wood, but as a product of the forest it is enti-tied to mention. It is gray in winter but light green in spring and summer, and hangs in long festoons from the branches of trees. It is most abundant in swamps, and on the flood plains of rivers. On dry uplands it is scarce or absent. In localities which, because of warmth and dampness, favor its growth, it frequently covers trees so completely that most of the branches are invisible. Although the growth has the appearance of moss, and is nearly always spoken of as such, it is not really a moss, but a plant of the pineapple family, and it bears leaves, flowers and fruit. It is not even a parasite, accord-

ing to the opinion of most botanists who have studied it; that is, it takes no substance from the tree on which it grows. It is an air plant, deriving its subsistence from the air and the rain and dew. It is propagated either by seeds or by small parts of a parent plant blown by wind against the trunk or branches of the tree. Small rootlets develop at first and secure the young plant in its new position by tying it to the tree's bark; but afterwards the root-lets disappear and the plant haugs on the tree much as clothes might hang across a line. It grows in strands and festoons which may attain a length of several feet, usually three or four, but occasionally more than ten.

Early settlers attempted to convert the moss into provender for farm stock, but with little success, though it was said that deer in winter would eat It. It has long been employed as filling for mat-tresses, cushions, and horse collars. It is prepared for such use by curing and ginning it, by which process the gray or green leaves and bark are re-moved, and a black thread-like material, resembling horsehair, remains. In late years another use for it has been found, and the market is said to be good. The moss is dyed bright colors, generally green or blue, and is sold for store decorations where woodiand scenes are to be imitated. It is sent to market in crates or bales.

In Table 1 the third column of figures gives the average price paid at the factories for each of the species. Where the amount is large and the buyers many, the cost shown in the table may be accepted as representative but in some instances the amount of wood is rather small, and perhaps the whole quantity was purchased by two or three factories, and the cost may appear too high or too low. This may be explained by the circumstances under which the purchases were made. If the wood is wanted for a special purpose, none but a very high grade may answer, and the price will be unusually high. Or, if a very low grade will do, the cost may be unusually low. In some instances in Alabama black walnut was bought for less than twenty dollars a thousand feet. Without an explanation that price thousand feet. Without an explanation that price would seem ridiculous, but it becomes reasonable if it is stated that the purchase was in the log, and the it is stated that the purchase was in the log, and the logs were small, nearly all sapwood, and suitable only for boxes or some other common purpose. In Table 1, pin oak costs \$40 a thousand, Texas oak \$38.40, while red oak costs only \$18.91, and white oak \$20.17. On the face of it, the prices seem absurd for it is well known that ordinarily pin oak and Texan oak are not worth more than white and red oak. But the two latter woods were purchased in millions of feet each, and the costs are averages of many sales; while only a few thousand feet of pin and Texan oak were bought, and for particular purposes demanding extra high quality. The statistics as compiled for these tables in this report show what was actually reported by manufacturers. show what was actually reported by manufacturers. If in a few instances apparent inconsistencies are found in cost, they may generally be attributed to the smallness of the amount bought, or to the fact that it was of unusual quality or dimensions.

Planing-Mill Products.

This is very much the largest wood-using industry in Alabama, and accounts for eighty per cent. of all the wood reported. When the further fact that ninety-six per cent of all shown in Table 2 consists of two species, longleaf and shortleaf pine, consists of two species, longleaf and shortleaf pine, is considered, the importance of these species becomes apparent. The principal commodities included in this industry are flooring, molding, ceiling, siding and other finish for interior and exterior of buildings. The average cost of the rough lumber when it reaches the planer is low, \$11.72; and its low cost is chiefly due to the fact that most of the operators of planing mills are owners of saymitis. operators of planing mills are owners of sawmills also, and the cost of the lumber is figured upon the are considered and the cost of the lumber is lighted upon the price of stumpage (often for less than such stumpage can now be bought), the delivery of the logs to the mili and the sawing. Estimated in that way, the average cost is shown to be very low. In many cases, no profit is included and sometimes not even the depreciation of the plant.

the depreciation of the plant.

A number of large mills in Alabama employ convict labor under contract with the state, paying \$25 to \$30 per man per month. The effect on production is apparent. The mills are kept going in dull sea sons, for the expense goes on and must be met, with the result that overproduction is stimulated. In some of the Southern states, cotton planters are asked to reduce their acreage when there is danger of too much cotton being grown. The sawmills might adopt the same policy, but those who are under contract to pay for convict labor can not join the others in curtailing output, for the labor charges the others in curtailing output, for the labor charges go on and must be earned by operating the plants. The sentiment among business men in some parts of the state is pretty strong that the state should employ its convicts upon public roads where their labor will be less likely to conflict with private enterprise, and sound business principles.

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TABLE 2.

PLANING MILL PRODUCTS.

Kinds of Wood-	Quantity used an	nually.	Av. cost	Total cost	Grown in	Grown out of
Atmus of Wood	Feet B. M.	% p∈		f. o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
Longleaf pine	415,176,000	71.01	\$11.77	\$4,885,353	386,919,000	28,257,000
Shortleaf pine	146,164,500	25.00	11.42	1,669,509	145,164,500	1,000,000
Red gum	8,882,000	1.52	10.87	96,571	8,832,000	50,000
Yellow poplar	6,950,000	1.19	12.83	89,168	6,850,000	100,000
Loblelly pine	1,900,000	.32	11.63	22,100	1,900.000	
White oak	1,683,000	.29	17.79	29,933	1,516,000	167,000
Cypress	1,030,000	.18	15.09	15,540	1,015,000	15,000
Spruce pine	850,000	.15	15.26	12,975	550,000	300,000
Red oak	755,000	.13	16.08	12,140	588,000	167,000
Tupelo	500,000	.09	10.00	5,000	500,000	
Cuban pine	300,000	.05	10.83	3,250	300,000	
White pine	140,000	.02	45.00	6,300		140,000
Black gum	100,000	.02	12.00	1,200	100,000	
Chestnut	85,000	.01	11.06	940	65,000	20,000
Sweet magnolia	74,900	.01	11.52	863	74,900	
White ash	31,500	*	12.38	390	1,500	30,000
Birch	20,300	*	34.48	700		20,300
Beech	20,000	-	13.25	265	10,000	10,000
Basswood	10,000		10.00	100		10,000
Sugar maple	9,800	*	24.49	240		9,800
Sycamore	2,000	*	10.00	20	2,000	
Totals	584,684,000 *Less than 1	100.00 /100 of 1	\$11.72 per cent.	\$6,852,557	554,387,900	30,296,100

Sash, Doors, Blinds and General Millwork.

Many commodities other than those named in the Many commodities other than those named in the caption of the table are the products of this industry, though sash, doors, blinds and interior and exterior finish are the principal ones. The lathe plays an important part in this industry, and its output consists of spindles for grills, balusters for stairs and porches, and larger pieces such a columns, and newel posts. Brackets, pedestals and capitals are also among the usual products. As in Table 2, longleaf and shortleaf pine surpass in quantity all the other woods and together constitute over ninety-one other woods and together constitute over ninety-one per cent. of the total.

The average cost is low for an industry which turns out many products of high class, but the gen-

eral average is affected by the cheapness of the two largest items, longleaf and shortleaf pine. Sweet magnolia and black gum are the cheapest shown in

magnolia and black gum are the cheapest shown in Table 3. The first of these, when well selected and properly finished, is a very handsome wood, though it is little known. The rich brown of its heartwood will compare favorably with black walnut.

The yellow poplar's cost is so low as to suggest that most of the purchases were in log form, and even then its cheapness is not wholly accounted for. This wood and white pine usually range very nearly the same in price under similar circumstances; but here the pine's is more than four times the cost of the poplar. The latter was bought in small quantities, and the former in larger amounts. small quantities, and the former in larger amounts.

TABLE 3.

SASH, DOORS, BLINDS, AND GENERAL MILLWORK.

Kinds of Wood-	Quantity used as	nnually.	Av. cost	Total cost	Grown in	Grown out of
	Feet B. M.	% P	er 1000 ft.	f. o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
Longleaf pine	47,195,000	70.08	\$12.94	\$ 610,713	46,100,000	1,095,000
Shortleaf pine	14,589,200	21.66	12.33	179,898	13,989,000	600,200
White oak	1,310,500	1.95	21.01	27,529	1,268,000	42,500
Yellow poplar	1,125,000	1.67	15.37	17,296	990,000	135,000
Red oak	1,087,500	1.61	16.34	17,775	1,080,000	7,500
Tupelo	1,057,000	1.57	11.48	12,134	847,000	210,000
Red gum	381,800	.57	12.62	4,820	381,800	
Cypress	358,000	.53	15.20	5,440	358,000	
Beech	100,000	.15	10.50	1,050	100,000	
Blrch	54,800	.08	48.17	2,640		54,800
Sugar maple	25,200	.04	14.88	375	25,200	
White ash	25,000	.04	15.00	375	25,000	
Sweet magnolla	13,000	.02	10.00	130	13,000	
Mahogany	10,000	.01	160.00	1,600		10,000
White pine	8,000	.01	65.00	520		8,000
Black gum	6,000	ajt.	10.00	60	6,000	
Black walnut	2,000	*	30.00	60		2,000
Totals	67,348,000 *Less than 1	100.00 /100 of 1	\$13.10 per cent.	\$882,415	65,183,000	2,165,000

Packing Boxes and Crates.

The boxes made in Alabama, and shown statistically in Table 4, are used chiefly for marketing the products of the orchard and truck garden, though egg cases were made in large numbers. The principal articles manufactured were hampers, grape bas The princikets, berry boxes, cabbage crates, fancy boxes, and crates in which to ship smilax, holly, and moss. Fifty thousand feet of the cottonwood listed in the table was of the species known as swamp cotton-

wood. It is a wood less plentiful than the common cottonwood and is also in less demand which accounts for its low price. Black walnut at \$18 is cheap, even for logs, but the box makers probably made use of logs so small and containing so large a percentage of white sapwood that few other industries would buy them. The average cost of lumdustries would buy them. The average cost of lumber as shown in Table 4, runs regularly not much above or below the average of \$10.89, the extreme range being from \$9 to \$18 for the fifteen species.

TABLE 4.

BOXES AND CRATES PACKING.

Kinds of wood—	Quantity used an:	nually.	Av. cost	Total cost	Grown in	Grown out of
	Feet B. M.	% pe	er 1000 ft.	f. o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
Red gum	8,517,000	37.95	\$11.80	\$100,525	7,585,000	932,000
Longleaf pine	6,450,000	28.74	10.00	64,500	6,450,000	
Tupelo	3,200,000	14.26	10.94	35,000	3,200,000	
Shortleaf pine	2,050,000	9.13	10.05	20,600	2,050,000	
Yellow poplar	810,000	3.61	12.16	9,850	810,000	
Evergreen magnolia	500,000	2.23	10.00	5,000	500,000	
Cuban pine	300,000	1.34	9.00	2,700	300,000	
Cottonwood	200,000	.89	9.25	1,850	200,000	
Black gum	165,000	.74	9.00	1,485	165,000	
Spruce pine	100,000	.45	10.00	1,000	100,000	
White elm	60,000	.27	14.00	840	60,000	=
Sweet magnolia	50,000	.22	10.00	500	50,000	
White ash	25,000	.11	14.00	350	25,000	
Black walnut	10,000	.04	18.00	180	10,000	
Sycamore		.02	10.00	50	5,000	
Totals	22,442,000	100.00	\$10.89	\$244,430	21,510,000	932,000

Car Construction.

Several railroads have repair shops in the vicinity Several railroads have repair shops in the vicinity of Birmingham and much of the wood shown in Table 5 is employed in car repair, and much is used for street-car building. In car construction, a large part of the lumber employed is in the rough form, that is, it has not been run through planers and other machines; but some of the material is carefully dressed and finished by skilled workmen. Eleven woods are employed in this industry, but two of them—black walnut and cherry—are in quite small amounts and are used as finish for passenger two of them—black walnut and cherry—are in quite small amounts and are used as finish for passenger coaches. A large part of the white ash reported is for street-car finish and some of it for finish of passenger cars. Longleaf and shortleaf pine meet demand in many parts of car construction; sills, siding, decking, braces, and the like. White and red oak are employed for sills and other rough work where strength is required, and they also give good service as coach finish. Yellow poplar is an allround car wood, but the best of it goes into finish, particularly into broad panels for passenger coaches. It may be successfully stained to imitate other woods. The excellent finish which it is capable of taking gives it a place which few other woods can taking gives it a place which few other woods can fill, and for many years it has been considered one of the best woods for certain parts of car construction. Mahogany was the most expensive wood used, and it was made into finish for coaches.

Vehicles and Vehicle Parts.

Hickory is the most important wood in the vehicle manufacturing business in Alabama, as it is in all other parts of the United States. Half a dozen species of hickory are employed, but one name applies to all without distinction. A hickory log consists of thick, white sapwood and dark colored heart wood. Company applies has long held that the same sists of thick, white sapwood and dark colored heart wood. Common opinion has long held that the sapwood is superior to the heartwood for vehicle construction. Tests made by the United States Forest Service a few years ago, however, demonstrated that the difference in quality between hickory heartwood and sapwood is less than had been generally supposed, and that, for certain purposes, the heartwood is as satisfactory as the sap. The wooden parts of small vehicles are often entirely of hickory, with the exception of the body or box; but such is parts of small vehicles are often entirely of hickory, with the exception of the body or box; but such is less often the case with heavy wagons. For shafts, poles, spokes, rims, axles, double trees and single trees ,hickory has no superior in the manufacture of buggies and carriages. Large wagons and carts substitute oak for some of these parts, and several oaks are suitable. The Alabama manufacturers reported white oak, red oak, Texan oak, post oak, pin oak and willow oak. The bodies of carriages and buggles and the beds of farm and business wagons are made of woods which are reasonably light, will take paint readily, will not split easily or warp badly in changes of temperature and weather, and which are not excessive in cost. Those most generally used in Alabama are yellow poplar, red gum, ly in changes of temperature and weather, and which are not excessive in cost. Those most generally used in Alabama are yellow poplar, red gum, shortleaf and longleaf pine, and cottonwood. White ash, which is the most expensive wood reported in this industry, is made into bolsters, poles, sills, frames, and felloes. It is a strong, stiff wood. A large part of the total of more than 7,500,000 feet of vehicle wood reported in Alabama is used for repairs in small shops in all parts of the state. Some vehicles are made in shops of that kind. The larger establishments usually make semi-finished, roughturned vehicle stock, and pass it on (generally sending it out of the state) to be finished and made into vehicles. vehicles

The discussion under Table 1 of cost of woods when bought in small amounts or for special purposes will apply to some of the woods of Table 6. Three oaks, at the bottom of the table, cost more per thousand than the average would have shown, had they been purchased in larger amounts. White ash at \$45.94 is the costliest wood reported in the vehicle industry. It is not usual for ash to be the most expensive wood in the vehicle industry, and in order to make comparisons between its cost in Alabama and in certain other states where similar studies have been made, the following average costs

North Carolina\$	27.88
Illinois	36.23
Kentucky	
Massachusetts	
Alabama	
Wisconsin	

This comparison conveys the impression that there is no regular price for ash. Maryland vehicle makers pay nearly twice as much as those of North Carolina, while Alabama and Wisconsin pay nearly the same. Nevertheless, there is usually a reason back of every price, but it is not always easy to find. It is pretty sure to depend on grades and dimensions a good deal more than on distances of transportation. For instance the Illinois makers of heavy wagons paid \$36.23 for their ash and the light wagon makers paid \$51.85.

TABLE 5.

CAR CONSTRUCTION.

Kinds of wood—	Quantity used an	nually.	Av. cost	Totai cost	Grown In	Grown out of
	Feet B. M.	% pe	r 1000 ft. f	o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
Longleaf pine	7,094,000	38.10	\$16.72	\$118,586	7,022,000	72,000
White oak	4,826,300	25.92	20.94	101,072	4,826,300	
Yellow poplar	2,471,000	13.27	20.97	51,805	2,411,000	60,000
Red oak	1,450,000	7.79	19.22	27,875	1,450,000	
Shortleaf pine	1,100,000	5.91	16.82	18,500	1,100,000	
White ash	963,000	5.18	23.29	22,425	910,000	53,000
Loblolly plne	450,000	2.42	17.67	7.950	450,000	
Mahogany	138,600	.74	129.62	17,965		138,600
Cuban pine	125,000	.67	17.70	2,212	125,000	
Cherry	500	*	100.00	50		500
Black walnut	500	*	100.00	50	• • • • • •	500
Totals	18,618,900 *Less than 1/	100.00	\$19.79 per cent	\$368,490	18,294,300	324,600

TABLE 6.

VEHICLES AND VEHICLE PARTS.

Kinds of wood-	Quantity used an	nually.	Av. cost	Total cost .	Grown In	Grown out of
	Feet B. M.	% I	er 1000 ft.	f. o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
Hickory	3,060,000	40.34	\$22.53	\$68,930	3,060,000	
White oak	1,405,000	18.52	26.60	37,370	1,279,000	126,000
Post oak	760,000	10.02	20.00	15,200	754,000	6,000
White elm	500,000	6.59	15.00	7,500	500,000	
Red oak	450,000	5.93	22.00	9,900	450,000	
Yellow poplar	320,000	4.22	35.31	11,300	320,000	
Red gum	250,000	3.30	25.00	6,250	250,000	
Shortleaf pine	200,000	2.64	17.00	3,400	200,000	
White ash	160,000	2.11	45.94	7,350	160,000	
Cottonwood	150,000	1.98	35.00	5,250	150,000	
Longleaf pine	149,900	1.98	16.34	2,450	149,900	
Willow oak	60,200	.79	43.19	2,600	54,200	6,000
Pin oak	60,000	.79	40.00	2,400	-	60,000
Texan oak	59,900	.79	38.40	2,300	54,000	5,900
Totals	7,585,000	100.00	\$24.02	\$182,200	7,381,100	203,900

Excelsior.

The raw material for this industry is nearly all in the form of cordwood and longleaf pine constitutes nearly ninety per cent. of the total. There are only a few plants in the state; but their output is increasing and the manufacturers consider the

prospects very good for further development. As furniture and other industries increase, the excelsior output will be augmented. The excelsior makers use cheaper material than any of the wood users of the state which employ wood as a raw material. There is comparatively little waste.

TABLE 7.

EXCELSIOR.

Kinds of wood-	Quantity used an	nually.	Av. cost	Total cost	Grown in	Grown out of
	Feet B. M.	% p	er 1000 ft.	f. o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
Longleaf pine		89.47	\$8.00	\$40,800	5,100,000	
Loblolly pine	500,000	8.77	7.50	3,750	500,000	
Cottonwood	100,000	1.76	9.00	900	100,000	• • • • •
Totals	5,700,000	100.00	\$7.97	\$45,450	5,700,000	

Chairs.

The manufacturers of chairs are not usually mak-The manufacturers of chairs are not usually makers of furniture in general, and for that reason chair making is often considered a separate industry. There are, of course, many kinds of chairs, and the processes and customs followed in manufacturing all are not the same; but in making stock for chairs standard sizes are more common than with other branches of furniture making. Some mills saw chair stock exclusively, such as backs,

bottoms, legs, and other parts. These parts are then shipped to the chalr factory to be finished and the chairs completed. Oak, consisting principally of white and red, are reported in Alabama more largely than all other woods together—in fact, they amount to four times as much as all the others. It is probable that much of the wood reported as red oak is really yellow, Texan, and willow oak, since it all is state-grown, and the true red oak is very scarce in Alabama.

TABLE 8.

CHAIRS.

Kinds of wood-	Quantity used an	nually.	Av. cost	Total cost	Grown in	Grown out of
	Feet B. M.	% p	er 1000 ft.	f. o. h. factory.	Ala., ft. B. M.	Ala., ft. B. M.
White oak	2,000,000	39.91	\$14.99	\$30,000	2,000,000	
Red oak	1,999,800	39.91	15.00	30,000	1,999,800	
Hickory	210,000	4.19	11.67	2,450	200,000	10,000
White ash	201,000	4.01	10.05	2,020	201,000	
Red gum	200,300	4.00	10.00	2,000	200,300	
Beech	200,000	3.99	10.00	2,000	200,000	
Birch	199,900	3.99	10.01	2,000	•••••	199,900
Totals	. 5,011,000	100.00	\$14.06	\$70,470	4,801,100	209,900

Boxes, Tobacco.

The material shown in Table 9 was used in the The material shown in Table 9 was used in the manufacture of cigar boxes. In most parts of this country the makers of such boxes draw largely from Spanish cedar brought from Cuba and other countries south of us, but in Alabama no Spanish cedar was reported. The red cedar in the table is the same as that used in making lead pencils, cedar chests, etc. Tupelo, the principal wood used, may be stained to imitate cedar, but the odor which is a valuable property of the cedar is not easily imitated when other woods are used. Tupelo, being a white wood, shows stenciling well.

Agricultural Implements.

A large amount of cotton ginning machinery is manufactured in Alabama, but other agricultural implements are made in a small way only. Considerable wood is used, however, in shops in all parts of the state where farm machinery is repaired. Blacksmith and wheelwright shops do most of the work of that kind. In the manufacture of ginning machinery, certain woods are preferred for specific purposes. White pine at \$40 a thousand is used for brushes; red gum and cottonwood are made into purposes. White pine at \$40 a thousand is used for brushes; red gum and cottonwood are made into brush heads; yellow poplar is for pressers and feeders; white ash, white oak, and shortleaf pine

for pressers; and longleaf plne for frames and other

for pressers; and longleaf plne for frames and other parts.

The hickory which appears in Table 10 was demanded by shops which make repairs, but turn out little or no new machinery. Shortleaf pine and white oak also are used in repair work. The abundance of coal and Iron in Northern Alahama, and the supply of suitable woods in many parts of the state would suggest that Alahama might profitably manufacture much of the farm machinery annually demanded in the state; but it does not appear that a serious beginning in that direction has yet been made. made.

Furniture.

Less than 2,000,000 feet of wood is made into furniture in Alabama yearly. That is a small amount for a state so rich in timber. There are single towns in Illinois, Michigan and Wisconsin that use more. Two million feet lacks much of being sufficient to supply Alabama's home market with plain furniture. The column in Table 11 which shows the average cost of the furniture woods used in the state is worthy of more than passing notice because the prices are remarkably low, not of one or two woods only, but of every one of the fourteen in the table. It is worthy of note, also, that ten of the fourteen woods and eighty per cent of the total quantity reported were cut in Alabama. The conclusion is logical that if furniture wood can be had in Alabama at an average cost at the factory of only \$13.90 per 1,000 feet, it ought to be possible to build up a large business in manufacturing furniture in that state. The prices pald for material by furniture makers in some of the other states, where furniture is manufactured in large amounts, show that Alabama offers decided advantages in the matter of cost of material. It ought to offer inducements in the matter of cheap and abundant power equal to those of any other state or region. Following are average prices paid for rough lumber by furniture manufacturers in some of the states: Less than 2,000,000 feet of wood is made into fur-

North Carolina	18 23
Wisconsin	27 17
Massachusetts	28.36
Maryland	29 32
Kentucky	30.73
Illinois	34 40

A comparatively large amount of the raw material shown in Table 11 was bought in log form, which accounts in part for the low cost; but if the sawmill charges are added the cost is still below that in any of the states above listed. It would appear, therefore, that Table 11 suggests opportunities for the development of large business in furniture making in Alabama—cheap material to which should be added cheap power.

The woods listed in the table are all substantial. Four are oaks, all suitable for outside, visible parts of good furniture; longleaf pine is serviceable for all interiors of furniture and for cheaper kinds of outside work. Red gum, if skilfully worked, is one of the hest furniture woods in the United States, and a great future is promised for it. Some of the species listed in the table helong in the class of cabinet woods, provided their beauties are brought out by skilled workmen and modern methods. Persimmon (the heartwood), and the two magnolias, particularly sweet magnolia, deserve places as such.

White ash is the leading handle wood in Alabama, followed closely by hickory. The latter goes largely into ax, hammer, and pick handles; the former into handles for farm tools, such as hoes, shovels, rakes, and pitchforks. Yellow poplar, shortleaf pine, and red gum are reported as hoe-handle material, but the small quantity of each used seems to indicate that these woods are not entirely satisfactory for such handles. The cheapness of all the woods reported in this industry is due to purchases in the log form. No cause is shown why yellow poplar is the cheapest of the list, as it usually is an expensive wood.

Sporting and Athletic Goods.

The raw material for this industry is generally received at the factory in the form of bolts. Nearly all of the manufacturing output is semi-finished stock for golf sticks. The hickory goes principally into shafts, while the persimmon is generally turned into rough blocks for golf-stick heads. Only two or three individuals attempt to turn out a finished product and they only aim to supply local golf clubs. The hickory and persimmon stock is in great demand both at home and abroad and a large amount is shipped out of the state.

Shuttles, Spools and Bobbins.

The raw material for shuttles, spools, and bobbins is received at the factories in the form of bolts, and is often bought and sold by the cord. Dogwood and persimmon are manufactured into rough shuttle

Kinds of wood

blocks to be finished later and fitted for service in cotton and woolen mills. Formerly nearly all shuttles were made of Turkish boxwood, as it is the best known material for this service, but for more than twenty years the price of boxwood has been so high that the buyers of shuttles cannot afford it. The sapwood of dogwood and persimmon are the most satisfactory substitutes that have yet been found, though trials have been made of numerous other woods. The shuttle used in the power looms. other woods. The shuttle used in the power looms must stand violent jars as it is thrown back and forth in the process of weaving. Many woods which have been tried have splintered in a short time. Others wear rough and become useless. Still oth-

ers, because of softness, wear out too quickly and are rejected on that account. The usual shuttle is about seventeen inches long, and it is expected to give 2,000 hours of actual service. The shuttles are used in pairs and both must have nearly or exactly used in pairs and both must have nearly or exactly the same weight, or they can not do the work required. They must not be too heavy or excessively light. It is, therefore, not an easy matter to find all the required qualities in one wood. Though shuttles, spools, and bobbins are usually grouped as one industry, no spools and bobbins were reported in Alabama; but 50,000 feet of hickory was made into picker sticks which are employed in weaving to assist in throwing the shuttles back and forth. forth.

TABLE 9.

BOXES, TOBACCO.

Kinds of wood-	Quantity used annually.		Av. cost	Total cost	Grown in	Grown out of
	Feet B. M.	% 1	per 1000 ft.	f. o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
Tupelo		96.87 3.13	1	\$28,200 2,000	3,100,000 50,000	50,000
Totals	3,200,000.	100.00	\$9.44	\$30,200	3,150,000	50,000

TABLE 10.

AGRICULTURAL IMPLEMENTS.

Klnds of wood—	Quantity used an	nually.	Av. cost	Total cost	Grown in	Grown out of
	Feet B. M.	% per	r 1000 ft. f	. o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
Longleaf pine	1,100,000	43.65	\$20.00	\$22,000	1,100,000	
Shortleaf pine	1,000,000	39.68	16.90	16,900	1,000,000	
Yellow poplar	180,000	7.14	25.00	4,500	180,000	
Red gum	100,000	3.97.	22,10	2,210	100,000	
White oak	60,000	2.38	35.00	2,100	20,000	40,000
White pine	30,000	1.19	40.00	1,200		30,000
Cottonwood	20,000	.80	31.00	620	20,000	
Hickory	20,000	.79	40.00	800	20,000	
White ash	10,000	.40	35.00	350	10,000	
Totals	2,520,000	100.00	\$20.11	. \$50,680	2,450,000	70,000

TABLE 11.

FURNITURE.

Kinds of wood-	Quantity used annually. Av		Av. cost	Total cost	Grown in	Grown out of
	Feet B. M.	% p	er 1000 ft.	f. o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
Longleaf pine	625,000	33.35	\$12.22	\$7,640	597,500	27,500
White oak		18.14	15.96	5,426	199,000	141,000
Yellow poplar	251,000	13.39	16.51	4.145	251,000	
Red oak	-167,200	8.92	13.98	2,338	56,200	111,000
Willow oak	165,800	8.85	14.02	2,324	54,800	111,000
Post oak	100,000	5.34	12.00	1.200	100,000	
Red gum	55,000	2.94	11.36	625	55,000	
Hackberry	50,000	2.67	15.00	750	50,000	
Tupelo	50,000	2.67	11.00	550	50,000	
Persimmon	25,000	1.33	15.00	375	25,000	
Evergreen magnolia	15,000	.80	15.00	225	15,000	
Sweet magnolia	10,100	.54	14.85	150	10,100	
White elm	10,000	.53	15.00	150	10,000	
Green haw	9,900	.53	15.15	150	9,900	
Totals	1,874,000	100.00	\$13.90	\$26,048	1,483,500	390,500

TABLE 12.

HANDLES.

Outom tites and a

Milius of wood—	Quantity used an	nually.	Av. cost.	Total cost	Grown in	Grown out of
	Feet B. M.	% per	r 1000 ft. f.	o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
White ash		53.04	\$17.87	\$16,350	465,000	450,000
Hickory		44.35	13.86	10,600	765,000	
Yellow poplar		.89	9.80	150	15,300	
Shortleaf pine		.87	10.00	150	15,000	
Red gum	14,700	.85	10.20	150	14,700	
Totals	1,725,000	100.00	\$15.88	\$27,400	1,275,000	450,000

TABLE 13.

SPORTING AND ATHLETIC GOODS.

Kinds of wood—	Quantity used an		Av. cost	Total cost		Grown out of
	Feet B. M.	% pe	er 1000 ft. f.	o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
Hickory Persimmon	1,151,000 1,000	99.91 .09	\$23.26 25.00	\$26,775 25	1,151,000 1,000	
Totals	1,152,000	100.00	\$23.26	\$26,800	1,152,000	•••••
		TABL	- 44			

TABLE 14.

SHUTTLES, SPOOLS, BOBBINS, ETC.

Kinds of wood—	Quantity used an: Feet B. M.			Total cost f. o, b, factory.		Grown out of Ala., ft. B. M.
Dogwood	300.000	68.18 27.27 4.58	\$ \$14.20 7 15.00	\$10,650 4,500 1,000	450,00 0 300,000 25,000	300,000
Totals	1,100,000	100.00	\$14.68	\$16,150	775,000	325,000

Fixtures.

The manufacturers of fixtures pay more for the rough material which passes through their woodworking machines than is paid by any other manufacturers of wood commodities in Alabama. High-class lumber is demanded and much of it must be in extra wide pieces. Fixtures, as considered in this report, consist of counters and showcases for stores, bars for saloons, desks and counters for banks, cabinets and shelving for stores, partitions for offices, and certain kinds of furniture built in place and not intended to be moved about as ordinary furniture may be. The wood for counter and desk tops and for panels being frequently of unusual width, is often worked into the desired form by hand. It usually reaches the manufacturer in the rough form, but it has been carefully kiln-dried. Large cabinets, perhaps occupying the entire side of a store, are built by measure and in sections in the factory, and in that form they are taken to the place intended for them and are there set in positions. No very chear wood was reported in this place intended for them and are there set in position. They are too large to handle except in sections. No very cheap wood was reported in this industry in Alabama, but some, as black walnut, birch, and mahogany, cost much more than red gum, chestnut and plne. The beautiful and expensive woods are outside material that is visible in the finished articles, while cheaper and plainer woods go into braces, shelving, drawer bottoms, and other interior parts which ordinarily are not visible. Nearly one-third of the wood reported was not grown in Alabama. Alabama

Refrigerators and Kitchen Cabinets.

A few refrigerators are made, but nearly all of the material shown in Table 16 goes into equipment for the kitchen, the principal commodities being safes, tables, and shelving, and half of all the wood used is longleaf pine. Many articles are wholly made of this wood, but in others the shelving and other interior parts are of red gum, yellow poplar, and tupelo. The three oaks listed in the table were employed for outside parts in some of the better class articles made. Some of the red gum and yellow poplar was made into panels, and in some instances such panels were built up of thin sheets of veneer. The table shows that nearly all the wood employed in this industry was grown in Alabama, and that it was all purchased at a low price. It may be noted that ash is not reported in this industry. In most states it is an important wood in the manufacture of refrigerators and kitchen and the manufacture of refrigerators and kitchen and pantry furniture

Caskets and Coffins.

Few coffins and caskets are manufactured in Alabama, particularly the better and expensive kinds, but are shipped into the state from outside factories. The rough lumber listed in Table 17 was nearly all manufactured into boxes in which caskets are placed. Without this explanation, the table is misleading. The only woods made into coffins and caskets were longleaf and shortleaf pine, and cypress, the total amount being only 70,000 feet, not ten per cent of the whole quantity shown in the table. Woods reported in the coffin and casket industry are generally expensive, and their cheapness in Alabama is explained by the fact that most of that reported was manufactured into rough boxes. In rural communities many of the coffins in which the dead are burled are made by local carpenters and cabinet makers, and statistics covering that part the dead are burled are made by local carpenters and cabinet makers, and statistics covering that part of the business can not be collected and included in a report like this. In quantity chestnut is the leading wood in Table 17. It is the leading casket wood in many regions, for custom has given it the place, though there is no reason other than the demand of custom why chestnut should hold that position.

Ship and Boat Building.

Ship and Boat Building.

The boat-building industry in Alabama is not large, considering the abundance of good timber that may be drawn upon, and the long lines of navigation which the rivers afford (about 1,500 miles). Mobile, with its fine harbor, is favored by nature as a ship-building point. The wild China which is reported in this industry in a small amount, is recommended as finish for yachts. It is not, however, a tree that promises any great development for its form is poor, and comparatively few trunks are of sufficient size to make even an indifferent saw log. The wood of different trees varies much in color and also in grain, the difference probably being due to the rate of growth. Wood of light color has much the appearance of ash, though if the growth has been slow the texture of the grain is not so coarse as that of ash. The popular belief that the tree came originally from China and has spread in this country does not appear well founded, for the species grows in a wild state from Georgia and Florida westward to Arizona and Northern Mexico. The tree is sometimes confused with the China tree (Melia azedarach), to which it bears as much resemblance in appearance as in name. All the wood used by Alabama boat builders grew in the state.

TABLE 15.

FIXTURES.

Kinds of wood-	Quantity used ann	ualiy.	Av. cost	Total cost	Grown in	Grown out of
	Feet B. M.	%	per 1000 ft.	f. o. b. factory.	Aia., ft. B. M.	Aia., ft. B. M.
White oak	500,000	49.02	2 \$25.00	\$12,500	450,000	50,000
Longleaf plne	200,000	19.61	22.50	4,500	200,000	
Birch	100,000	9.81	50.00	5,000		100,000
Red gum	50,300	4.93	3 20.00	1,000	10,300	40,000
Chestnut	50,200	4.92	2 19.92,	1,000		50,200
Biack walnut	50,000	4.90	0 40.00	2,000		- 50,000
Yeliow poplar	49,700	4.87	7 25.15	1,250	49,700	
Mahogany	10,000	.98	3 125.00	1,250		10,000
Shortleaf pine	9,800	.96	18.06	177	9,800	0
Totals	1,020,000	100.00	\$28.11	\$28,677	719,800	300,200

TABLE 16.

REFRIGERATORS AND KITCHEN CABINETS.

Kinds of wood-	Quantity used	annualiy.	Av. cost	Total cost	Grown in	Grown out of
	Feet B. M.	%	per 1000 ft.	f. o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
Longleaf pine	500,000	49.8	5 \$13.00	\$6,500	500,000	
Red gum	205,000	20.4	4 12.62	2,588	205,000	
White oak	156,000	15.5	5 14.38	2,244	134,000	22,000
Yellow poplar	50,000	4.99	9 20.00	1,000	50,000	
Red oak	34,000	3.39	9 14.00	476	12,000	22,000
Willow oak	33,000	3.2	9 14.00	462	11,000	22,000
Tupelo	25,000	2.49	9 11.00	275	25,000	
Totals	1,003,000	100.00	\$13.50	\$13,545	937,000	66,000

TABLE 17.

CASKETS AND COFFINS.

Kinds of wood-	Quantity used ann					Grown out of
	Feet B. M.	%	per 1000 ft.	f. o. b. factory.	Aia., ft. B. M.	Ala., ft. B. M.
Chestnut	349,800	39.30	\$16.01	\$5,600		349,800
Longleaf pine	225,200	25.30	13.14	2,960	225,200	
Cypress	225,000	25.28	14.44	3,250	25,000	200,000
White pine	40,000	4.50	20.00	800		40,000
Red cedar	30,000	3.37	35.00	1,050	30,000	
Shortleaf pine	20,000	2.25	15.00	300	20,000	•••••
Totals	890,000	100.00	\$15.69	\$13,960	300,200	589,800

TABLE 18.

SHIP AND BOAT BUILDING.

Kinds of wood—	Quantity used and	nualiy.	Av. cost	Totai cost	Grown in	Grown out of
	Feet B. M.	% pe	er 1000 ft. f	o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
Cypress	210,000	41.10	\$15.24	\$3,200	210,000	
Longleaf plne	200,000	39.14	15.00	3,000	200,000	
White oak	100,000	19.57	15.00	1,500	100,000	
Wiid china	1,000	.19	15.00	15	1,000	
Totals	511,000	100.00	\$15.10	\$7,715	511,000	

Woodenware and Noveities

Table 19 represents the smallest industry in Alabama separately reported and tabulated. The output consists chiefly of palis and tubs made of black gum. A number of small commodities, grouped under the name "noveities" and made of longleaf pine complete the industry. In most states where wood-

using has been studied, woodenware includes wash-boards, ironing boards, bread boards, chopping bowls, vegetable cutters, pie platters, and many more, but in Alabama these articles are not report-ed. The state has much timber that might be work-ed into commodities which are widely used. The industry is in its first stages, but no reason is ap-parent why it may not expand to large proportions.

WOODENWARE AND NOVELTIES.

Kinds of wood-	Quantity used annually.		Av. cost	Total cost	Grown In	Grown out of
	Feet B. M.	% r	per 1000 ft. d	. o. b. factory.	Ala., ft. B. M.	Ala., ft. B. M.
Black gum		65.57		\$2,000	200,000	
Longleaf pine	105,000	34.43	14.19	1,490	102,500	2,500
Totais	305,000	100.00	\$11.44	\$3,490	302,500	2,500

Miscellaneous.

Table 20 represents odd commodities in quantities too small to deserve mention as separate industries, but they are important and some of the items which are now small may in the future grow to represent valuable industries. The table includes the manu-facture of mine rollers, tanks, mirror and picture backs, patterns, picture frames and picture-frame molding, trunks and sample cases, show-wlndow material, and street-sweeping compounds. White pine at \$100 per 1,000 feet is one of the highest-priced woods reported in the state. It is carefully selected from the best stock and is thoroughly seasoned. The cottonwood reported was in the veneer form and was used by trunk makers. soned. The cottonwood reported was form and was used by trunk makers.

TABLE 20

MISCELLANEOUS.

Kinds of wood—	Quantity used a Feet B. M.			Total cost f. o. b. factory.	Grown in Aia ft. B. M.	Grown out of
Yellow poplar	53,500	41.8		\$945	53,500	
Hickory		19.53	20.00	500	25,000	
Black gum	15,000	11.73	2 25.00	375	15,000	
Cottonwood	11,500	8.99	9 42.43	488	11,500	
Red gum	10,100	7.89	9 24.75	250	10,100	
Longleaf plne	9,900	7.73	3 20.20	200	9,900	
White pine	3,000	2.3	4 100.00	300		3,000
Totals	128,000	100.00	\$23.89	\$3,058	125,000	3,000

SUMMARY.

Table 21 is a recapitulation of the nineteen in-Table 21 is a recapitulation of the nineteen industry tables. It represents the same woods that are presented in Table 1, and the amounts are the same in both tables, but the presentation is different in tables 1 and 21. In the former table each one of the woods is put down according to species and the amount of that species is shown; in table 21 the figures are made out for the industries and without regard to species.

Percentage of Woods Used by Industries.

Some industries use much more of one wood than of another; no one uses all and some demand only two or three. Twenty-one species are found in planing-mili products, and no other industry demands that many. Occasionally an industry takes the whole quantity of a wood used in the state; for example, all of the basswood manufactured in Alabama went into planing-mili products; all the cherry in car construction; all the backberry and green haw in furniture; and all the wild China in the construction of boats. Table 22 shows how the various woods demanded by manufacturers in Alabama are distributed among the industries. Some industries use much more of one wood than

Cost of Woods by Industries.

Table 23 is the companion or counterpart of table 22. The first shows how the species are apportioned among the industries, the second gives the cost of each wood to the industry that uses it. It is apparent from a glance at the table that all industries parent from a glance at the table that all industries do not pay the same price for the same species. One may pay twice as much as another, but the cost is not governed by chance, for in all cases where great difference exists in the cost of a certain wood, satisfactory reasons may be found for it. One may buy the wood in the log; the other may demand it in the form of carefully selected kiln-dried lumber. One may want very high-grade material, another very low-grade. Red gum in the table shows ten average prices among as many industries, and yellow poplar eleven. Basswood, hackberry, green haw and wild china, which are used by only one industry each, have only one price each. A study of the table should make it clear that the prices of lumber in Alabama are not arbitrarily fixed by any man or set of men, but that every buyer purchases the kind he of men, but that every buyer purchases the kind he needs at the lowest price he can, and every seller disposes of the kind he has to the buyer who will pay most for it. The totals show nineteen average prices, no two industries paying the same.

Lessening Waste.

Of late years the problem of lessening waste has attracted serious attention in all industries that use wood as raw material for manufacturing. Considerable progress has been made toward the problem's solution, but much yet remains. While collecting statistics in Alabama for this report, ali manufacturers who furnished information were asked to give their experience in reducing waste about their establishments. The replies made it plain that manufacturers are interested in this matter and that it is no new problem to them. Most of them have made progress toward its solution.

There are four general classes of wood waste:

First, that which occurs in the woods, and consists chiefly of tops of trees for which logs have been cut. Unnecessarily high stumps are in this class, also the needless destruction of small timber in getting out the merchantable sizes, and the abandoning of small and defective logs.

Second: The waste about the sawmill, consisting for the most part of slabs and sawdust. To this may

Second: The waste about the sawmill, consisting for the most part of slabs and sawdust. To this may be added the ends cut from boards to make them of

even length.

Third: Waste at the factory. This consists of sawdust, shavings and small blocks and edgings cut from lumber in process of manufacture into finished

commodities.

Fourth: The waste which results from the wrong

Fourth: The waste which results from the wrong use of wood—using more than need be or a better grade or more costly kind that is necessary.

Some of these wastes are unavoidable at times and under certain circumstances. No business man can, be reasonably expected to save when saving costs more than wasting. As much as can be expected of any operator in the lumber business or in any line of manufacturing is to save whatever can be made to pay, and to study the situation to make sure that no opportunity to save is allowed to pass.

Woods Waste.—In favored localities in some of the northern states, hardwood distillation plants make a profit from defective logs and tree tops abandoned in the woods by lumbermen. What would otherwise be left to rot is converted into saiable commodities, such as charcoai, acids, etc. This cannot be done in all piaces. Conditions must be favorable. Alabama's woods waste is largely pine, but it might be saved in the same way as hardwoods in the North. Reports, however, do not indicate that much progress has been made in saving it. Large

SUMMARY OF WOODS USED BY INDUSTRIES IN ALABAMA.

Industries—	Quantity used an Feet B. M.	nualiy.	Av. cost	Total cost f. o. b. factory.	Grown in Alabama, %	Grown out of Alabama, %
Planing-mill products*.	584,684,000	80.44	\$11.72	\$6,852,557	94.82	5.18
Sash, doors, blinds, etc.	67,348,000	9.27	13.10	882,415	96.79	3.21
Boxes and crates, pack-	01,010,000	0.2	4 (2.5) (3.5)			
ing	22,442,000	3.09	10.89	244,430	95.85	4.15
Car construction	18,618,900	2.56	19.79	368,490	98.26	1.74
Vehicle and vehicle	10,010,000	- 2.00	20110	*		
parts	7,585,000	1.04	24.02	182,200	97.31	2.69
Excelsior	5,700,000	.78	7.97	45,450	100.00	
Chairs	5,011,000	.69	14.06	70,470	95.81	4.19
Boxes, tohacco	3,200,000	.44	9.44	30,200	98.44	1.56
Agricultural implements	2,520,000	.35	20.11	50,680	97.22	2.78
Furniture	1.874,000	.26	13.90	26,048	79.16	20.84
Handles	1,725,000	24	15.88	27,400	73.91	26.09
Sporting and athletic	2,120,000					
goods	1,152,000	.16	23.26	26,800	100.00	
Shuttles, spools, bob-	1,100,000	***				
bins, etc.	1,100,000	.15	14.68	16,150	70.45	29.55
Fixtures	1,020,000	.14	28.11	28,677	70.57	29.43
Refrigerators and kit-	1,020,000				COLUMN THE RESERVE	
chen cabinets	1.003,000	.14	13.50	13,545	93.42	6.58
Caskets and coffins	890,000	.12	15.69	13,960	33.73	66.27
Ship and hoat building.	511,000	.07	15.10	7,715	100.00	F. F
Woodenware and novel-		191 91				
ties	305,000	.04	11.44	3,490	99.18	.82
Miscellaneous	128,000		- 23.89	3,058	97.66	2.34
Totals	726.816.900	100.00	\$12.24	\$8,893,735	94.99.	5.01

^{*}Exclusive of 105,000,000 feet of dressed stock which is planed for purpose of saving freight.

*Exclusive of 105,000,000 feet of dressed stock distillation plants are expensive, and it is doubtful if small plants will pay with present processes.

Mill Waste.—Much progress has been made in Alahama toward converting mill waste from loss to profit by distillation. Rosin and turpentine are produced. The unoccupied field is still large. Machines for making lath and shingles now use large quantities of slahs and defective logs which formerly were burned. It cannot be called waste when slabs and sawdust are burned under the boilers to produce power, if that is the cheapest method of obtaining power. The notion held by many, that to burn wood is to waste it, is true only at certain times and places. Many times the mill waste's greatest value is as fuel and then not to burn it would be to waste it. Wood-working factories waste less than is popularly supposed. The owners give much thought to the matter of saving odds and ends. It is an exceptional case if a piece of wood is thrown away if it can be converted into anything is thrown away if it can be converted into anything

that will seii. The vexing problem is to find uses for small pieces. The cost of working them into salable articles is frequently greater than the value of the finished commodities. To manufacture under such conditions is waste, not conservation. Many persons who see cartloads of odd-sized blocks and scraps from a wood-working factory on the way to scraps from a wood-working factory on the way to the waste heap ask why the pieces are not made into matches, toothpicks, shoe pegs, clothespins and articles of that kind. In most cases the reason is that it is impossible to do it at a profit. Small commodities are generally made by expensive machines which cannot work small and irregular pieces of wood. It does little good to complain of wrong use unless a practicable remedy is pointed out.

Substitution etc.—The general public scarcely are

Substitution, etc.—The general public scarcely appreciates the saving due to the substitution of cheap woods for those more expensive, and to the practice of making a smaller quantity answer where a lar-ger quantity was formerly used. The latter point is well illustrated in the box business. A packing box large enough to hold four or five bushels was once made of inch boards. Much thinner lumber is now found sufficient; or such a box is made of built-up veneer in sheets not more than a quarter of an inch thick, reinforced at the corners. It requires less than half the material of the oid inch-board box, and it is as serviceable. The saving is fifty per cent or more. The furniture factory saves in the same way. Solid oak or mahogany pieces of former times are seldom made now. A sheet of veneer, one-twentieth of an inch thick, takes the place of the two-inch plank of former times. If it is a table that is being made, the frame is constructed of cheap wood, and it is overlaid with veneer. The article is as handsome and as substantial as if made of solid expensive wood. Costly wood is saved and cheap wood is substituted for it. The saving brought about in this country by that process alone is so great that it can scarcely be estimated. If the old method had continued, the high-grade woods long ago would have become so costly that they would now be practically out of use. One of the most effective agents in the conservation of wood in this country has been the substitution of cheap and plentiful woods for the scarce and costly. It has saved in two ways: the expensive material has been made to last longer, go farther and remain cheap enough to be within the reach of the people; been made to last longer, go farther and remain cheap enough to be within the reach of the people; and the plentiful woods—formerly not used at all and therefore of no commercial value—have been made available, given a value, and changed from a useless encumbrance to a marketable product.

Substitution in the uses of wood has gone much farther than the building of frames or cores of cheap lumber and covering them with costly veneer. In many instances the veneer is of cheap wood, so prepared by the skill of the woodworker that it resembles costly wood, and is not only as handsome but for all practical purposes is as good. Take the one instance, Circassian walnut, as an example. This one instance, Circassian walnut, as an example. This is a heautiful cabinet wood brought from the mountain fastnesses of Asiatic Turkey and southeastern Russia at so great an expense that even the wealthy seldom only it in other form than veneer, and the ordinary purchaser foregoes the pleasure of owning furniture or finish of that wood. "Circassian walnut" furniture and finish are now in great demand in this country; yet most of what is seen is a product of the southern states—Missouri, Arkansas, Kentucky, Tennessee, Mississippi, Alabama and others. It is red gum, which, when carefully selected and cut into veneer, may be finished to resemble so closely Circassian walnut that few can tell the dif-

PERCENTAGE OF THE DIFFERENT KINDS OF WOOD USED BY EACH INDUSTRY. TABLE 22.

Kinds of Wood-	Agricultural Implements	Boxes and crates	Boxes	Car construc- tion	Caskets and coffins	Chairs	Excelsior	Fixtures	Furniture	Handles	Miscellaneous	Planing mill products	Refrigerators an	Sash, doors, blinds & genl millwork	Ship and boat building	Shuttles, spools, bobbins, etc	Sporting and Athletic goods	Vehicle & vehicle parts	Woodenware and Novelties
Basswood												100.00							
Beech						62.50						6.25		31.25					
Birch						53.33		26.67				5.33		14.67					
Black gum		33.95									3.09	20.58		1.23			`		41.15
Black walnut		16.00		.80				80.00						3.20					
Cherry				100.00															
Chestnut					72.16			10.31				17.53							
Cottonwood	4.15	41.54					20.77				2.39							31.15	
Cuban plne		41.38		17.24								41.38							
Cypress					12.34							56.50		19.64	11.52				
Dogwood																100.00			
Evergreen magnolia		97.09							2.91										
					****				100.00										
Hackberry									100.00					• • • •					
Hickory	.38			45.50		3.98	1001			14.49	.47					.95	21.79	57.94	
Loblolly pine		* 00		15.79	• • • •	• • • •	17.54		10		*	66.67		0.75	• • • • •				
Longleaf pine	.23	1.33		1.47	.05		1.05	.04	.13			85.76	.10	9.75	.04			.03	.02
Mahogany				87.39				6.30	7.67		• • • • •			6.31		00.00	91		• • • •
Persimmon	* * * * *								7.67							92.02	.31	100.00	
Pin oak									11.63							• • • •		88.37	
Red cedar			76.92		23.08														• • • •
Red gum	.54	45.63				1.07		.27	.29	.08	.05	47.58	1.10	2.05				1.34	
Red oak			• • • • •	24.40	• • • • •	33.65			2.81			12.70	.57	18.30				7.57	
Shortleaf pine	.61	1.24		.67	.01			.01		.01		88.50		8.83				.12	• • • •
Spruce pine		10.53										89.47		0.00		· · · · ·			
Sugar maple		10.00										28.57		71.43					
Sweet magnolla		33.78							6.76			50.68		8.78				• • • •	
Sycamore		71.43										28.57						• • • •	
Texan oak																		100.00	
Tupelo		40.34	39.08						.63			6.30	.32	13.33					
White ash		1.07		41.32		8.63				39.26		1.35		1.07				6.87	
317h 14 a al		10.53				• • • •			1.75					2.01				87.72	
White oak				38.98		16.15		4.04	2.75			13.59	1.26	10.59	.81			11.35	
White pine	13.57				18.10						1.36	63.35		3.62					
Wild china															100.00				
Willow oak									64.09				12.74					23.17	
Yeliow poplar	1.47	6.60		20.13				.41	2.04	.12	.44	56.62	.40	9.16				2.61	
																			- Paris 198

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AVERAGE COST OF THE DIFFERENT KINDS OF WOOD USED BY EACH INDUSTRY, -TABLE 23.

Kinds of Wood-	Agricultural Implements	Boxes and crates	Boxes tobacco	Car construc- tion	Caskets and coffins	Chairs	Excelsior	Fixtures	Furniture	Handles	Miscellaneous	Planing mill products	Refrigerators and kitchen cabinets	Sash, doors, blinds & genl miliwork	Ship and boat building	Shuttles, spools, bobbins, etc	Sporting and Athletic goods	Vehicle & vehicle parts	Woodenware and Novelties
Basswood	.\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$10.00	\$	\$	\$	\$	\$	\$	9
Beech						10.00						13.25		10.50					
Birch		.,				10.01		50.00				34.48		48.17					
Black gum		9.00									25.00	12.00		10.00					10.00
Biack walnut		18.00		100.00				40.00						30.00					
Cherry				100.00															
Chestnut					16.01			19.92				11.06							
Cottonwood		9.25		47.50			9.00				42.43							35.00	
Cuban pine		9.00		17.70	11.11							10.83							
Cypress			• • • •		14.44							15.09		15.20	15.24	****			
Dogwood		10.00							15.00							14.20			
Evergreen magnolia		10.00							15.00										
Green haw									15.15									• • • •	
Hickory						11.67			15.00	13.86	20.00					90.00			
Lobloily pine				17.67		11.01	7.50					11.63		****		20.00	23.26	22.53	
Longleaf pine		10.00		16.72	13.14		8.00	22.50	12.22		20.20	11.77	13.00	12.94	15.00		****	1004	1410
Mahogany				129.62				125.00				11.11	10.00	160.00				16.34	14.19
Persimmon									15.00					100.00		15.00	25.00		• • • • •
Pin oak																10.00		40.00	• • • •
Post oak									12.00									20.00	
Red Cedar			20.00	36.00														20.00	
Red gum	. 22.10	11.80				10.00		20.00	11.36	10.20	24.75	10.87	12.62	12.62				25.00	1
Red oak				19.22		15.00			13.98			16.08	14.00	16.34				22.00	
Shortleaf pine	. 16.90	10.05		16.82	15.00			18.06		10.00		11.42		12.33				17.00	
Spruce pine		10.00										15.26							
Sugar maple												24.49		14.88					
Sweet magnolia		10.00							14.85			11.52		10.00					
Sycamore		10.00										10.00							
Texan oak		10.04	0.10						44.00			10.00						38.40	
Tupelo		10.94	9.10	92.90		10.05			11.00	17.07		10.00	11.00	11.48					
White ash		14.00		23.29		10.05			15.00	17.87		12.38		15.00		****		45.94	
White elm		14.00		20.94		14.00		25.00	15.00			17.70	1490	91.01	15.00		* * * *	15.00	
White pine		• • • •			20.00	14.99		25.00	15.96		100.00	17.79 45.00	14.38	21.01	15.00			26.60	• • • •
Wild china													• • • •	65.00	15.00				
Willow oak									14.02				14.00		15.00			42 10	
Yellow poplar		12.16		20.97				25.15	16.51	9.80	17.66	12.83	20.00	15.37				43.19	• • • •
	000 11	@10.00	0.044	010.70	015.00						-00.00		20.00	10.01				35.31	

Average cost\$20.11 \$10.89 \$ 9.44 \$19.79 \$15.69 \$14.06 \$ 7.97 \$28.11 \$13.90 \$15.88 \$23.89 \$11.72 \$13.50 \$13.10 \$15.10 \$14.68 \$23.26 \$24.02 \$11.44

ference. It may also be finished to resemble oak, cherry, birch, maple and black walnut; and it is as durable and as handsome. The use of the substitute, cherry, birch, maple and black walnut; and it is as durable and as handsome. The use of the substitute, which is plentiful and cheap, saves the small supply of woods scarce and costly. No one who is ahle and willing to buy the genuine is prevented from doing so; yet, if substitutes did not conserve the supply, the scarce woods would soon disappear, and no one could buy them. Substitution is in this case, therefore, a measure of conservation, for it puts plentiful woods into use and prolongs the smail supply of costly woods; and it also brings fine articles within reach of the many and saves money for both the manufacturer and the buyer. In most cases the chief difference between a plain plentiful wood and a figured costly and scarce one, is beauty. In the costly wood, nature did the figuring, but man has learned the art of staining, shading, and graining some of the plain woods until he has equaled the best that nature has done in that line, and this has led to a wider use for some of the woods which we have in abundance, and is contributing much to the solution of one of our most vexatious waste problems. It never has been difficult to curtail the waste of costly woods, for men will save when there is money in it; but the hard problem has been and is to save the cheap and plentiful. If buyers cannot be found for them in their natural condition, it is economy to change and beautify them by science and art until they can enter the markets which formerly belonged exclusively to costly cabinet woods. Create a demand for a wood and its waste problem will disappear.

Forest Conditions. disappear.

Forest Conditions.

The plow generally follows the iumberman in Alabama; that is, when the merchantable timber has been removed from a tract the land is cleared for agricultural purposes. This rule has many exceptions, however, and more in the hardwood region than where plue is the prevailing timber. When land is cleared for farms, it is out of consideration as a future source of lumber supply. In past time much farm land was exhausted by tillage, was abandoned, and some sort of forest growth took possession. That is not likely to occur in the future. Farmers are learning better than to wear their land out and abandon it. The timber of the future will come from lands not suitable for agriculture, rough tracts, swamps and poor soil. Land of that kind will grow timber nearly as well as any other. It may be expected that the owners of such land will see to it that the best-paying kinds of timber will have prefthat the best-paying kinds of timber will have preference over poor kinds. Fast-growing, weli-shaped species will be encouraged, and small, ragged kinds will not be. By following that method the yield per acre will be much increased. Up to the present time little attention has been given to matters of forestry in Alabama. The old stands have been cut, and if young trees can gain a foothold they have been permitted to do so; but not much has been done to assist the best species. A gradual change in this matter may be expected. One of the first and most needed steps will consist in better fire control so that vigorous seedlings will not be deand most needed steps will consist in better fire control so that vigorous seedlings will not be destroyed, and scrub growth enabled to take their place. All kinds of pine in Alabama grow from seeds only, not from sprouts; and if seedlings are destroyed and large trees have been removed, there can be no renewal of the pine forest and hardwoods -too often of a poor quality-will gradually take possession of the ground.

The establishment of woodlots has not yet taken much hold in Alabama. The woodlot is a piece of ground set apart on the farm for growing trees. Sometimes the trees are planted, but usually a natural stand is protected and allowed to grow. Such lots are an important source of lumber supply in some of the older states where the forests have been largely cut. It may be expected that Alabama farmers will soon give their attention to this matter and will see that the rough corners of their farms are set to work growing timber. Each must decide for himself what kinds will do best on his lands. In most cases loblolly pine will do well. It grows rapidly, and thrives in dense stands. Several of the oaks will pay. The willow oak is probably the fastest grower on land that suits it. Cottonwood increases in size rapidly and makes good lumber. On The establishment of woodlots has not yet taken creases in size rapidly and makes good lumber. On thin, rocky land, red cedar is probably the best tree to grow for fence posts; but on fertile iand catalpa, osage orange (called mock orange) and locust might pay better.

DIRECTORY.

Below is a list of Aiabama wood-using manufac-turers who supplied the data contained in this re-port. Those manufacturing several products classi-fied under different industries will appear in the list, with their addresses, under more than one industry.

Agricultural Implements.

Continental Gin Company, Birmingham. W. T. Sisson, Tallahassee.

Boxes and Crates, Packing.

Randolph Lumber Company, Birmingham. Keego Veneer Company, Brewton. Martin Veneer Company, Brewton. Bridgeport Woodenware Manufacturing Company, Bridgeport. N. B. Hail & Sons, Decatur.

Jervis Lumber Company, Decatur. Beavens-Jackson Lumber & Veneer Company, Ev-

Beavens-Jackson Lumber & Veneer Company, Evergreen.

Huntsville Fiber & Veneer Works, Huntsville.
Jerome H. Sheip, Mobile.
D. M. Wheeler, Mobile.
Southern Sash & Door Company, Montgomery.
J. H. Hibbie & Son, Piedmont.
Sylacauga Pianing & Lumber Company, Sylacauga Southern Climax Basket Company, Troy.
Troy Veneer & Crate Company, Troy.

Boxes. Tobacco.

Martin Veneer Company, Brewton. Jerome H. Sheip, Mobile. Jerome H. Sheip, Montgomery.

Car Construction.

Alabama Great Southern Railway, Birmingham. Birmingham Railway, Light & Power Company,

Birmingham.
Louisville & Nashville Railway, Birmingham. Southern Railway, Birmingham.
T. H. Biake, Cortelyou.
W. R. Flowers Lumber Company, Dothan.
Twin Tree Lumber Company, Maplesville.
Western Railway of Alabama, Montgomery.
Lindsey Lumber Company, Poliard.

Caskets and Coffins.

Alabama Coffin & Casket Company, Birmingham. Mobile Casket Company, Mobile. Montgomery Coffin Company, Montgomery.

Chairs.

Biock Spring Bed Company, M. Corinth Chair Company, Mobile. I. B. Crowe & Sons, Wadiey. Mobile.

Dressed Stock.

Youngblood & Co., Adville. James Moore, Aldrich. Empire Lumber Company, Andaiusia.

Allison Lumber Company, Bellamy,
Blrmingham Railway, Light & Power Company,
Birmingham.

Kaul Lumber Company, Birmingham. Lathrop Lumber Company, Birmingham. Bridgeport Woodenware Manufacturing Company,

Latbrop Lumber Company, Birmingham.
Bridgeport Woodenware Manufacturing Company,
Bridgeport.
J. A. McKinney, Centerville.
Alexander & Simmons, China.
A. A. Jones, Columbia.
C. Arnold & Son, Cullman.
J. A. Blackwell, Deatsville.
A. D. Mills, Deatsville.
Enterprise Lumber Company, Dothan.
W. B. Perdue, Elba.
Florida & Alabama Land Company, Falco.
Himrod-McKay Lumber Company, Flatwood.
Coosa Lumber Company, Gadsden.
Tatom-Bonham Lumber Company, Geneva.
Star Lumber Company, Gordo.
Black Warrior Lumber Company, Knoxwood.
Jackson Lumber Company, McShan.
Manchester Lumber Company, Manchester.
Durden Lumber Company, Manchester.
Durden Lumber Company, Manchester.
Durden Lumber Company, Montgomery.
W. B. Coats, Myrtlewood.
Geo. M. Crump, Ohatchie.
Bay Point Lumber Company, Pinewood.
Lindsey Lumber Company, Pilard.
Henderson-Boyd Lumber Company, Richburg.
Simpson & Harper, Samson.
Jackson-Tinney Company, Talladega.
Roland G. Spearman & Co., Talladega.
Geo. Edgeworth & Sons, Vernon.
Vida Lumber Company, Vida.
Vinegar Bend Lumber Company, Vinegar Bend.

Excelsior.

Mobile Excelsior Works, Mobile. D. M. Wheeler, Mobile. J. F. George & M. C. Thomas, Webb.

Fixtures.

Hill & Horton, Mobile. Cramton Lumber Company, Montgomery. Montgomery Show Case Company, Montgomery.

Evans Bros., Birmingham. The Southern Manufacturing Company, Birmingam.
Keego Veneer Company, Brewton.
Austin & Gentry Lumber Company, Coffee Springs
The Dreher Manufacturing Company, Cullman.
W. R. Flowers Lumber Company, Dothan.
Stralton Bros., Greensboro.
Block Spring Bed Co., Mobile.
Hill & Horton, Mobile.
Opelika Lumber Company, Opelika.
Jackson-Tinney Company, Talladega.
W. E. Hanchey, Troy.
I. B. Crowe & Sons, Wadley.

Handles.

William Geisen Handle Mfrs., Cullman. Alabama Hardwood Company, Montgomery. E. S. Wittel & Son, Shortleaf. S. J. Caldwell, Jr., Union Springs.

Miscellaneous.

Blrmingham Railway, Light & Power Company, Blrmingham Rallway, Eight & Four Company, Birmingham.
Birmingham Trunk Factory, Birmingham.
Keego Veneer Company, Brewton.
Evergreen Decorating Company, Evergreen.
Huntsville Fiber & Veneer Works, Huntsville.
Gilbert Trunk Company, Montgomery.
W. H. Cox, Stanton.

Planing-Mill Products.

James Moore, Aldrich.
John Moore, Aldrich.
Herzfeld Lumber Company, Alexander Clty .
Andalusia Manufacturing Company, Andalusia.
Empire Lumber Company, Andalusia.
A. Dishmon, Anniston.
L. N. & E. T. Downing, Anniston.
Houser Lumber Company, Anniston.
W. L. Little, Anniston.
H. C. Lynch, Anniston.
R. A. Berry, Arab.
The Athens Planing Mill Company, Athens.
Miller Ice & Lumber Company, Athens.
W. M. Carney Mill Company, Athens.
W. M. Carney Mill Company, Athens.
Whitewater Lumber Company, Autaugaville.
A. P. Wiggins, Babbie.
Central Lumber Company, Bessemer.
Acme Coal & Lumber Company, Birmingham.
Evans Bros., Birmingham.
Jenkins Lumber Company, Birmingham.

T. H. Johnston & Co., Birmingham.
Kaul Lumber Company, Birmingham.
Lathrop Lumber Compny, Birminghm.
Peerless Lumber & Manufacturing Company, Birmingham. mingham. Ingham.
Randolph Lumber Company, Birmlngham.
Bentley Lumber Company, Brantley.
Cedar Creek Mill Company, Brewton.
Lovelace Lumber Company, Brewton.
J. A. McKinney, Centerville.
W. T. Smith Lumber Company, Chapman.
Alexander & Simmons, China.
R. S. McWilliams, Clairmount Springs.
J. W. Stanfield Lumber Company, Clanton.
Smith & Herlong, Clayton. R. S. McWilliams, Clairmount Springs.
J. W. Stanfield Lumber Company, Clanton.
Smith & Herlong, Clayton.
Austin & Gentry Lumber Company, Coffee Springs
Kelly Planing Mill, Coffee Springs.
A. A. Jones, Columbia.
T. H. Blake, Cortelyou.
A. D. Mills, Deatsville.
Jervis Lumber Company, Decatur.
W. R. Flowers Lumber Company, Dothan.
A. D. Donaldson, Elba.
W. B. Perdue, Elba.
W. P. Windham, Elba.
Neal & Beatty, Elmore.
Arnold Lumber Compny, Ensley.
Ensley Woodworking Compny, Ensley.
W. W. A. Lumber Compny, Ethridge.
Eufaula Lumber Company, Eufaula.
F. M. Deer, Evergreen.
Florida & Alabama Land Company, Falco.
H. H. Hitt Lumber Company, Falkville.
Himrod-McKay Lumber Company, Florence

nce.
Richardson Lumber Company, Florence.
The Alger-Sullivan Lumber Company, Foshee.
Independent Lumber Company, Fremont.
The Scotch Lumber Company, Fulton.
D. B. Gantt & Bro., Gantt.
Garden City Hickory Company, Garden City.
Tatom Bonham Lumber Company, Geneva.
N. M. Rhodes Mill & Mercantile Company, Georgiana giana.

Tatom Bonham Lumber Company, Geneva.
N. M. Rhodes Mill & Mercantile Company, Georiana.
J. R. Carr, Gordo.
G. B. Howard, Goshen.
Willcox Mill Company, Greggville.
Henry Kraeke, Guntersville.
Lammon & Sons, Hartford.
C. D. Martin, Jacksonville.
Bell & Hollman, Kennedy.
Black Warrior Lumber Company, Lamison.
Klondyke Lumber Company, Livingston.
Jackson Lumber Company, Loekhart.
Halladay Lumber Company, McShan.
Melrose Lumber Company, McShan.
Melrose Lumber Company, Mgazzine.
Manchester Lumber Company, Magazine.
Manchester Lumber Company, Manchester.
Twin Tree Lumber Company, Maplesville.
The Marbury Lumber Company, Maplesville.
The Marbury Lumber Company, Mobile.
Dauphin Lumber Company, Mobile.
Dauphin Lumber Company, Mobile.
Dixie Lumber Company, Mobile.
The Robinson Land & Lumber Company, Mobile.
Verona Lumber Company, Montgomery.
Elrod Lumber Company, Montgomery.
Elrod Lumber Company, Montgomery.
Elrod Lumber Company, Montgomery.
Highland Park Lumber Company, Montgomery.
Highland Park Lumber Company, Montgomery.
Hall-Leftwich Lumber Company, Montgomery.
Hall-Leftwich Lumber Company, New Brecton.
E. C. Payne Lumber Company, New Decatur.
C. P. Ward, Odenville.
Geo. M. Crump, Ohatchie.
Griffin Bros., Ohatchie.
Griffin Bros., Ohatchie.
Griffin Bros., Ohatchie.
Griffin Bros., Ohatchie.
Opelika Lumber Company, Pine Hill.
Bay Point Lumber Company, Poley.
Lindsey Lumber Company, Prentice.
S. M. Long, Range.
N. J. Barton, Red Bay.
Henderson-Boyd Lumber Company, Rideburg.
E. E. Jackson Lumber Company, Riverside.
Frank Andrews, Samson.
Henderson Lumber Company, Samson.
Simpson & Harper, Samson.
Henderson Lumber Company, Samson. J. R. Carr, Gordo. G. B. Howard

Scottsboro Planing Mill, Scottsboro.
Batterson & Plumley, Selma.
E. M. Byrne, Selma.
W. C. Dyer, Stanton.
Hauser & Wheeler, Stevenson.
Laubenthal Lumber Company, Sunflower.
Robert Edwards, Sylacauga.
R. L. Rumsey, Sylacauga.
Sylacauga Planing & Lumber Company, Sylacauga
Jackson-Tinney Company, Talladega.
Roland G. Spearman & Co., Talladega.
J. V. Wallis & Co., Talladega.
D. W. Boatright, Tallassee.
Thomaston Lumber Company, Thomaston.
Thomasville Manufacturing, Electric Light & Power Company, Thomasville.
Cochran Lumber Company, Toinette.
W. E. Hanchey, Troy.
Strickland Bros. Machine Company, Tuscaloosa.
Turner & Baker, Vernon.
Vida Lumber Company, Vida.
Vinegar Bend Lumber Company, Vinegar Bend.
I. B. Crowe & Sons, Wadley.
McClure Lumber Company, Wagar.
Tinney Lumber Company, Wagar.
Tinney Lumber Company, Waldo.
I. P. O. Wharton, Wilsonville.
Geo. N. & J. M. McDonald, Winfield.
E. W. Gates Lumber Company, Yellow Pine.

Refrigerators and Kitchen Cablnets.

Refrigerators and Kitchen Cablnets.

The Southern Manufacturing Company, Birmingham.

The Dreher Manufacturing Company, Cullman. Stralton Bros., Greensboro.

Sash, Doors, Blinds and General Millwork.

Lindsey & Shlflet, Adamsville.
Herzfeld Lumber Company, Alexander City.
Houser Lumber Company, Anniston.
The Athens Planing Mill Company, Athens.
Attalla Lumber Company, Attalla.
J. A. Cullors, Auburn.
Whitewater Lumber Company, Autauguaville.
Evans Bross Birmingham. Evans Bros., Birmingham.
Jenkins Lumber Company, Birmingham.
Kingston Planing Mill Company, Birmingham.
Peerless Lumber & Manufacturing Company, Birmingham. ingham.
Randolph Lumber Company, Birmingham.
Cedar Creek Mill Company, Brewton.
Austin & Gentry Lumber Company, Coffee Springs
Cullman Lumber Company, Cullman.
Jervis Lumber Company, Decatur.
Cureton Sash & Door Company, Dothan.
W. R. Flowers Lumber Company, Dothan
Arnold Lumber Company, Ensley.
F. M. Deer, Evergreen.
Acme Lumber & Manufacturing Company, Florace. nce.
Houghton Column Company, Florence.
Richardson Lumber Company, Florence.
Garden City Hickory Company, Garden City.
Straiton Bros., Greensboro.
G. A. Plummer, Huntsville.
C. D. Martin, Jacksonville.
Bell & Holloman, Kennedy.
Dauphin Lumber Company, Mobile.
Hieronymous Dock & Lumber Company, Mobile.
Hill & Horton, Mobile. Dauphin Lumber Company, Mobile.
Hieronymous Dock & Lumber Company, Mobile.
Hill & Horton, Mobile.
Mobile Column Company, Mobile.
F. C. Turner & Co., Mobile.
Verona Lumber Company, Mobile.
S. Y. Bocacki, Montgomery.
Cramton Lumber Company, Montgomery.
Enterprise Planing Mill Company, Montgomery.
Highland Park Lumber Company, Montgomery.
J. H. Brewer, Moulton.
W. A. Andrews, Opelika.
Opelika Lumber Company, Opelika,
Ozark Hardware & Lumber Company, Ozark.
Paint Rock Planing Mill, Paint Rock.
Butts Lumber Company, Phoenix.
S. M. Long, Range.
J. C. Hannah & Sons, Reform.
Lathrop-Hatten Lumber Company, Riverside.
Batterson & Plumley, Selma.
Dallas Lumber Company, Selma.
A. E. Reimer, Selma.
Schuh-Mason Lumber Company, Sheffield.
N. C. Dyer, Stanton.
Hauser & Wheeler. Stevenson

Sheffield Hub & Column Company, Sheffield. N. C. Dyer, Stanton. Hauser & Wheeler, Stevenson. W. T. Sisson, Tallassee. Thomasville Manufacturing, Electric Light & Power Company, Thomasville. W. E. Hanchey, Troy. Tuscaloosa Column Company, Tuscaloosa. Tinney Lumber Company, Waldo. Shuttles, Spools, Bobbins, Etc.

W. Reece. Decatur. Hallett Manufacturing Company, Mobile. Alabama Hardwood Company, Montgomery.

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Sporting and Athletic Goods.

W. Reece, Decatur. Hallett Manufacturing Company, Mobile. Innis Golf Club Company, Montgomery.

Vehicles and Vehicle Parts.

Hale Buggy Company, Anniston. Cruse & Coleman, Birmingham. Jervis Lumber Company, Decatur. H. H. Hitt Lumber Company, Falkville. Florence Wagon Works, Florence. Garden City Hickory Company, Garden City.
Globe Carrlage Works, Montgomery.
J. H. Hibble & Son, Piedmont.
The Selma Spoke Company, Selma. Sheffield Hub & Column Company, Sheffield. M. R. Campbell, Stevenson. J. F. Mitchell, Stevenson. D. W. Boatright, Tallassee.

Woodenware and Novelties.

Andalusia Manufacturing Company, Andalusia. Randolph Lumber Company, Birmingham. W. R. Flowers Lumber Company, Dothan.

USES OF WOOD.

Manufacturers and others in Alabama report uses for the different woods as follows:

Basswood.

Balusters, blinds, cabinets, casing, doors, interior finish, mantels, sash, shelving, stairwork, trams.

Beech.

Chairs, door frames, drawer sldes and bottoms, finish, flooring, interior finish, siding, window frames.

Ceiling, chairs, doors, flxtures, flooring, interior finish, magazine racks, music cabinets, partition, sash.

Baseboards, bookcases, ceiling, coaches (passenger), furniture, hat racks, interior finish, molding, partition, stands, tables.

Black Gum.

Boxes (packing), crates (berry), finish, grape baskets, interior trim, mlne rollers, novelties, palls, tubs, woodenware.

Black Wainut.

Chests, china closets, drug cabinets, fancy boxes, finish, fixtures, kltehen cupboards, showcases, stair-

Chestnut.

Cars (freight), celling, coaches (passenger), doors, interior trlm, mantels, molding, partitlon, sash.

Cottonwood.

Baskets, box covers, boxes (packing), brush heads, excelsior, ginning machinery, sample cases, trays, trunks, vehicle parts.

Cuban Pine.

Boxes, cars (freight), ceiling, coaches (passenger), flooring, interior finish, peach crates, siding.

Cypress.

Boats, boxes (packing), caskets, chair rounds, coffin boxes, columns, interior finish, chips (outside trim), silos, tanks, vats.

Dogwood.

Bobbins, golfshaft heads, shuttles, spindles, spools.

Evergreen Magnolia.

Bookcases, chairs, desks, furniture, hat racks. stands, tabourets, umbrella stands.

Chair rounds, furniture stock, lawn furniture, racks, rustic chairs, stands, table legs.

Hackberry.

Furniture backs, lawn furniture, racks, rakes, rustle chairs, stands.

Hickory.

Axles, buggy poles, chairs, doubletrees, farm implements, felloes, gearing, golfstick shafts, handles, pickersticks, reaches, rims, singletrees, spokes, sucker rods, sweeping fiber, tool handles, vehicle stock.

Lobiolly Pine.

Agricultural implements, boxes, cars (freight), cars (railroad), ceiling, coaches (railway), excel-

finish, flooring, interior trim, kitchen safes, molding, newels, porch posts, sash, shiplap, siding, wagon boxes.

Longleaf Pine.

Boats, boxes, buffets, cablnets, cars (rallroad), china closets, coaches (railway), coffins, columns, crates, doors, englne parts, excelsior, fixtures, flooring, furniture, gln machlnery, Interior finish, kitchen safes, mantels, medicine cabinets, novelties, sash, school desks, ships, sideboards, siding, tables, turned steek, was a boxes, readen were medicine. noveltles, turned stock, wagon boxes, woodenware.

Mahogany.

Cablnets, coaches (passenger), finish, fixtures, interlor trim, magazine racks, music cabients, street

Persimmon.

Bobblns, golfstick heads, shuttles, spindles, spools.

Pin Oak,

Bolsters, felloes, gearing, poles (wagon), spokes, vehlcle stock.

Post Oak.

Buggies, chairs, furniture, hubs, vehicle stock, wagon poles.

Red Cedar.

Boxes (clothes), boxes (fancy), boxes (tobacco), cablnets, chests, china closets, faucets, novelties, sideboards, wardrobe shelves.

Red Gum.

Agricultural implements, baskets, beds, boxes, brush heads, bureaus, celling, chairs, crates, desks, dressers, egg crates (tops and ends), finish, fixtures, flooring, furniture, gin brush rlbs, gins, grape baskets (tops and ends), hampers (clothes), handles, kitchen safes, mine rollers, partitlon, shooks, sldlng, tables, wagon boxes.

Red Oak.

Car construction, celling, coaches, counters (store), engine repairs, flooring, interior finish, newels, porch posts, siding, vehicles.

Boxes (packing), cars (railroad), caskets, celling, coaches (railway), columns, cornices, cotton glns, crates (tops and bottoms), doors, fixtures, flooring, handles, interior finish, molding, partition, sash, siding furned stock vehicles, which we have the control of ing, turned stock, vehicles, wagon boxboards.

Spruce Pine.

Baskets, hoxes, celling, crates, flooring, interior finish, panels, partition, slding.

Sugar Maple.

Baseboards, cabinets, ceilling, columns, finish (interlor), flooring, handles, mantels, molding, panels, partition, siding.

Sweet Magnolia.

Boxes (berry), crates (berry), furniture, grape baskets, Interior finish, racks.

Sycamore.

Boxes (packing), crates, flooring, interior finish. shooks.

Texan Oak.

Felloes, gearing, hubs, wagen poles.

Beds, boxes (packing), boxes (tobacco), columns, dressers, egg crates (sides and hottoms), finish, flooring, furniture backs, kitchen cabinets, mantels, noveltles, panels, refrigerators, safes, trainways.

Box ends, cars, chair legs, engine parts, gin machinery, handles, poles, vehicle stock.

White Elm.

Baskets, boxes, crates, furniture stock, hampers (clothes), hubs, packing (fruit), trunk slats, vehicle stock.

White Oak.

Agricultural implements, axles, bank fixtures, Agricultural implements, axles, bank fixtures, beds, boats, bolsters (wagon), brackets, cabinets, cars, casing, ceiling, chairs, coaches (rallway), columns, cornices, cots, desks, doors, doubletrees, dressers, felloes, finlsh fixtures (office) fixtures (store), flooring, gearing, gin machinery, mision furniture, panels, partition, poles (wagon), safes, sash, ships, siding, single trees, spokes, stands, tables, vehicle-stock stock.

White Pine.

Agricultural Implements, blinds, cablnets, caskets, columns, doors, flooring, interior finish, sash, turned stock.

Wild China.

Boat finish, Interior trim, laundries, lawn furniture, novelties.

Willow Oak.

Furniture, kitchen safes, panels, partitions, stands, tables.

Yellow Poplar.

Agricultural implements, bed slats, box ends (fruit), boxes (packing), brackets, cabinets, cars, celling, china closets, coaches (rallway), colonial columns, cots, desks (drawer bottoms), doors, finish, fixtures, flooring, furniture, gins (feeders and press-ers), handles, kitchen safes, mirror backs, molding, partition, pins, sash, scrolls, shelves, stairs, trunk trays, wagon (boxboards).

. APPENDIX.

The Bureau of the Census, in co-operation with the Forest Service, collects and publishes year by year statistics showing the output of lumber, lath, shingles, cooperage, veneer, and certain other forest products in the United States and in the separate products in the United States and in the separate states. That work is independent of the studies of the manufactures which the Forest Service has made in several of the states. The latter supplements the former, and care is taken that work done by the Bureau of the Census, is not duplicated. The Forest Service begins where the Census leaves off—after lumber leaves the sawmill. There are certain products which are in their finished form when they appear in the Census figures, and for that reason they are outside the scope of the Forest Service's study, because they are not subject to further manustudy, because they are not subject to further manufacture. If, however, a state's wood-using industries are to be fully presented, it becomes necessary to include some of the census statistics. Such is one of the purposes of this appendix. The figures which the census gives are for all states, but such only as relate to Alabama are here presented and in condensed form.

The statistics are for the year 1910, which are the

latest avallable.

Alabama's cut of shingles for that year was 142, 810,000, principally of cypress and pine, and of an average value of \$2.86 per thousand at the mill.

Lath were manufactured to the number of 40,982,000 and of the value of \$1.88 per thousand at the mill. Waste, consisting of slabs and defective logs, is largely worked into lath, and various woods are taken, but in Alabama the yellow pines constitute most of this material.

Nearly 27,000,000 feet (log measure) of veneer is made yearly in Alabama, for various species of wood, but most of lt ls yellow pine, red gum, tupelo, mag-nolia and cottonwood. Expensive hardwoods, such as white and red oak, black walnut and mahogany, are the materials of which the highest classes of veneers are made. There are three methods of manufacturing the commodity: rotary-cut, sawed and sliced. Most of it in Alabama is rotary-cut. A log a few feet long is placed in a lathe and is turned rapidly against a strong knife which peels off a thin rapidly against a strong knife which peers on a thin ribbon of wood the length of the log, round and round until the log is cut down to a small central piece called the core. The part sliced off may consist of one piece probably one bundred feet long, resembling a bolt of cloth. It is usually about as thick as a sheet of pasteboard. The veneer thus cut thick as a sheet of pasteboard. The veneer thus cut is made into small boxes, crates and baskets for shipping fruits and vegetables; or, if it goes to a furniture factory, it is made into panels or other pieces by gluing several sheets one upon another until the desired thickness is obtained. Sometimes a thin sheet of veneer is glued upon a thick piece of some other wood, and the veneer becomes the lightly outer part. Much furniture and introduce fig. visible outer part. Much furniture and interior finish is made in that way. The finished article appears to be solid wood, but it really is a thin layer of outside veneer upon some cheaper wood. This cheaper wood, which is concealed by the veneer glued upon it, is called "backing" or "core." The word "core" has, therefore, two meanings when glued upon it, is called "backing" or "core." The word "core" has, therefore, two meanings when used in connection with veneer. It may mean the wood upon which the veneer is glued, or it may mean the central remnant of a log from which ven-

eer has been cut by the rotary process.

Some veneers are sawed much as ordinary lumber is cut on a sawmill, but special machinery is used. is cut on a sawmill, but special machinery is used. The most important part is the extra thin saw which cuts the veneer with the least possible waste In sawdust. Veneer of this kind is generally made from valuable, well-seasoned hardwoods, while rotary-cut veneer is made from logs, generally in the green state, and usually steamed to soften them. The rotary-cut veneer is often in sheets several feet wide and many yards long; but the sawed veneer is generally less than a foot in width, and runs about like ordinary lumber in length. The sawed product often shows the grain of the wood—quarter-sawed if the wood permits it. Sliced veneer is cut from the side of the log, like that which is sawed, but a knife is used in place of a saw, and the machine by which the slicing is done is very strong and rigid. One of the advantages of slicing over sawing is that the slice weeker no sawdust. the slice wastes no sawdust.

Annual Lumber Cut.

The cut of lumber in Alabama, hy species, in 1910, was as follows:

Yellow pines1	,322,950,000
Oaks	67,485,000
Yellow poplar	26,701,000
Red cedar	13,693,000
Red gum	10,541,000
Tupelo	6,227,000
Hickory	5,079,000
Cypress	3,340,000
Maple	2,231,000
Ash	2,146,000
Cottonwood	1,683,000
Chestnut	637,000
Elm	561,000
Beech	497,000
Basswood	461,000
Black walnut	332,000
Sycamore	207,000
Birch	7,000
All others	870,000

Softwood Distillation.

One-third of all the softwood distillation in the United States in 1910 was in Alabama. Four large plants consumed 64,963 cords of wood. This does not include a little charcoal hurning in old-style pits in various parts of the state. Pits of that kind make charcoal only and other products are wasted. The modern distillation plant saves a number of products. Two processes are in use, known as "steam distillation" and "destructive distillation." In the former, the turpentine and heavy oils of pine are forced from the wood by subjecting it to the "steam distillation" and "destructive distillation." In the former, the turpentine and heavy oils of pine are forced from the wood by subjecting it to the action of hot steam. The wood is not converted into charcoal by that process. "Destructive distillation" is so called because it destroys the wood, and converts it into turpentine, tar and charcoal. Dry heat is the agent of destruction. In Alahama the longleaf pine is most used in distillation, but shortleaf and Cuban pines are profitable in this industry. There is much difference in the yield of different woods. Only one-half of the material employed in the distillation processes is "body wood" logs. The rest is what otherwise would be wasted, such material as sawdust and edgings.

The collection of resin from standing trees is not included in the statistics of wood distillation. The resin is drawn from the trees by wounding the bark and outer layers of wood while the tree stands. The old way—still largely in use—was to cut a deep notch in the tree (often two or more notches) called a box; the bark and some of the wood was then cut away above, and the resin exuded fro mthe wounded

wood and ran down into the box, from which it was collected from time to time. A new method is coming into use, by which the tree is less severely injured. No box is cut in the trunk, but the bark is removed over a small space, and a tin "gutter" or "apron" is applied to collect the resin and lead it to a tin or other receptacle. At the present time in Alahama about five trees are worked by the old process to one by the new. In 1909 the state produced 2,840,000 gallons of spirits of turpentine, and 310,000 barrels of rosin. The rosin is what is left over, when the spirits of turpentine have been separated by distillation. The substance as it exudes from the tree is resin. The stills ordinarily used are simple apparatus, and no special scientific knowledge is needed to operate them. In the whole United States the output in 1909 of spirits of turpentine was 28,989,000 gallons, and of rosin 3,264,000 barrels. Most of it is produced in the southern states. Alabama's output both of spirits of turpentine and of rosin is declining. Other states are declining also, owing to the depletion of large areas of longleaf pine forests. wood and ran down into the box, from which it was pine forests.

Cooperage.

Alabama in 1909 produced 12,978,000 tight cooperage staves; that is, staves for harrels and kegs which are meant to contain liquids. Its output of staves for slack cooperage (barrels and kegs not meant to contain liquids) was 14,977,000, all of which were pine. Four milion sets of pine heading were produced, and an equal number of hoops. By CLARK W. GOULD, Forest Agent, And HU MAXWELL, Expert, Forest Service, United States Department of Agriculture. FORESTRY

COLLEGE OF AGRICULTURE
UNIVERSITY OF CALIFORNIA

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SATES.

The Wood Using Industries of Mississippi.

Bureau of Wood Utilization of Forest Service Makes Complete Report Showing Wonderful Resources of State and Necessity for Additional Lumber Consuming Factories Near to Sources of Raw Material.

NOTE.

The following report was compiled by C. W. Gould, Forest Agent, and Hu Maxwell, Expert, under the direction of H. S. Sackett, Chief, Office of Wood Utilization, Forest Service, United States Department of Agriculture. It is published and thus made available to the public through the courtesy of the LUMBER TRADE JOURNAL, New Orleans, Louisiana.

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INTRODUCTION.

The greatest length of Mississippi is 332 miles, greatest width 189, and area 46,810 square miles, of which 470 square miles are water. Its width along the gulf coast is eighty-five miles.

The state's surface consists of swamp land, prairie, and hills, but at no point is the elevation much above 800 feet, and a considerable portion of it is only a few feet above sea level. The most elevated region lies in the northeastern part of the state, and the lowest along the gulf coast. The central and the northeastern regions contain the prairie; along the Mississippi river are bluffs ranging in height up to 500 feet but usually not so high; while height up to 500 feet, but usually not so high; while in what is known as the Delta region is much land subject to occasional overflow when the Mississippi reaches flood stage in the early spring. The gen-eral surface of the state, however, is undulating and

hilly. In some parts of it the soil is very deep, sandy and loose, and where ravines cut into it, washing and erosion are apt to be great. One of the problems which the people are called upon to meet is the checking of this erosion. It seems to be worse in abandoned lands which were long cultivated and then left comparatively bare and unproceed against the impact of heavy rains and the vated and then left comparatively bare and unprotected against the impact of heavy rains and the cutting power of torrents. This trouble is not serious in the low, flat, swamp regions. The small amount of clay in much of the soil causes a lack of binding material and increases the liability of the surface to wash. This disadvantage concerns agricultural interests more than forestry, but it also has much to do with the growing of trees on waste land. At any rate, a tree cover on such land has the effect of lessening erosion by breaking the impact of heavy rains and also by binding the soil with interlacing roots. Thick sod serves that purpose as well as trees. well as trees

The principal low-lying region of the state is included in the Yazoo delta, in the western part, along the Mississippi. It embraces about 7,000 square miles, extending from near the Tennessee line southward. It is a tract of great fertility—one of the richest in the United States, and its soil is of great depth. The surface is diversified with swamps, lakes, bayous, rivers, sloughs, cane brakes, forests, prairies, but it all averages very low. Geological agencies for ages have been raising the bed of the Mississippi by depositing sediment in the channel and upon the banks, thus elevating the river above the level of its flood plain, and causing much stagnant or sluggish water in the region. Extensive systems or sluggish water in the region. Extensive systems of dikes or levees have been built to confine rivers of their channels, and much of the land once so often subject to overflow as to be of little use for agriculture, has been reclaimed, and only in periods of excessive floods is it now inundated. The Delta region has had and still has great forest resources.

Bordering immediately on the gulf, or rather on Bordering immediately on the gulf, or rather on Mississippi Sound, which is a body of comparatively shallow water separated from the Gulf by a chain of low islands ten or twenty miles off the coast, is a narrow strip of flat marsh, only a few feet above high tide, and much of it subject to overflow when strong winds are on shore. This area represents the encroachment of land on the sea by the washing in and deposit of sediment from the higher country. In prehistoric times, according to the opinions of geologists, the Gulf of Mexico extended hundreds of miles inland along the low plain of the Mississippi miles inland, along the low plain of the Mississippi valley, and covered the Delta of the Yazoo. The process of filling the gulf has gone on during ages and still continues, though very slowly, and the land just rising out of the water is covered with grass and rushes. When this land is sufficiently dry, forests take procession of it ests take possession of it.

For a long time Mississippi was greatly handicapped in a commercial way because it had no deepwater harbor on its eighty-five miles of coast. The slow and long-continued process of the land sediment encroaching upon the water has filled the sounds and bays and made them shallow, destroying deep harbors if they once existed. On the coast of Ship Island, about twelve miles off the mainland, a deep harbor has many times been put to use; but in loading lumber, and other commodities, it was formerly necessary to carry the cargo in small vessels from the shallow bays on the coast to Ship Island harbor and there trans-ship to seagoing vessels. That was expensive and caused delay. In Island harbor and there trans-ship to seagoing vessels. That was expensive and caused delay. In recent years, however, the United States Government has dredged a channel six miles long connecting Gulfport with Ship Island, to the great advantage of the commerce of Mississippi, especially the lumber export trade. The deep harbor at Ship Island possesses historical interest from the fact that it was made headquarters for the Gulf Blockading Squadron during the Civil War, and Important naval and military expeditions started from that point.

A large part of Mississippi's lumber shipments by water are sent from Mobile in Alabama; but the construction of important trunk-line railroads through with numerous branch lines and feeders, has placed the principal forest resources of the state within reach of various and excellent markets. The Mississippi is navigable for small vessels all the time and for the largest much of the time, and other streams carry boats and rafts and supply means

for reaching many markets.

The Commissioner of the Bureau of Corporations The Commissioner of the Bureau of Corporations reported in 1911 that privately-owned timber in Mississippi, including both hard and soft woods, aggregated 95,300,000,000 board feet. As there is little timber belonging to the state or to the government, the figures given represent practically the whole amount. The annual cut of forest products of all kinds in Mississippi indicates that the state's timber supply will last about thirty years at the present rate of cutting. The estimated forested area is about seventy per cent of the whole, or 32,000 square miles. Generally, the shortleaf pine is in the north, the longleaf and Cuban pine in the south, the loblolly in nearly all of the state, except the swampy regions, and the minor species of pine in a few localities. The hardwoods are scattered in nearly all regions. Red gum and cypress are most abundant in the Delta region; both are of much value, the cypress being a soft wood and red gum hard. In the southeru part, particularly in the vicinity of the gulf coast, much of the pine has been cut. From that region, however, a rather large amount of cordwood and charcoal are shipped to New Orleans.

cut. From that region, however, a rather large amount of cordwood and charcoal are shipped to New Orleans.

The dense stand of timber in the Delta region makes it an important source of supply, and it promises to long continue so. Though the land possesses great fertility, much of it is so wet, and such large tracts are covered with water, that farming will be a long time in taking possession. In 1880 it was estimated that only one-sixth of the Delta was under cultivation, the rest chiefly in timber.

In 1909 Mississippi stood third among the states in the production of lumber. Washington was first and Louislana second. Ten years earlier Mississippi was in the tenth rank, and during that interval (1899 to 1909) it increased its lumber output 113 per cent, or nearly a billion and a quarter feet, and took the rank held in 1899 by Michigan. Louisiana and Virginia are the only southern states which increased their per cent of lumber output more than Mississippi in the ten-year period between 1899 and 1909; and Lonisiana, only, increased more in actual amount. The growth of the lumber industry was exceedingly slow in Mississippi for a long period after the settlement of the state. The old-time planters devoted to growing cotton, thought little of forest resources, and what areas were cut over were cleared for plantation purposes, and the logs were destroyed, except a small percentage used for feucing and building material. The diary of a planter, written about 1840 and recently published by the Mississippi Historical Society, records in a monotonous series of entries extending over some years, the process of clearing land. Fire was always depended upon to do the chief work; while one or two slaves are often mentioned as spending the days in the clearings "mauling," and the women and children in "burning." These specific instances given by a single planter were doubtless typical of general conditions in the state at that time and during many preceding decades. The forests, which grew on the best land and were of the

stroyed the cane brakes that wild cane was becoming rare in Mississippi. If cane was being destroyed then, it is evident that much greater destruction was going on among the forests outside the deep wet swamps.

Up to the Civil War the mills were small and few. They devoted their rather feeble energies to sawing bullding and fence lumber for the planta tions. The lumber industry at that time was much more highly developed on the Atlantic coast, in Georgia and the Carolinas, though the excellent timber on the eastern coast was no better than that in Mississippi. Fine hewed timbers for shipment to the North and export to Europe were rafted down the Savannah, Atlamaha, and other eastern rivers, while Mississippi's splendid yellow pine was mentloned chiefly for "mauling" and "burning." In 1860, according to B. M. Hilgard's "The New South," published in 1887, there were 277 sawmills in Mississippi, and only one planing mill. Doubtless much

lumber used in bullding was planed by hand. Carpenters could dress two or three hundred feet a day; but the condition then prevailing shows an almost total absence of wood manufacturers as the term is now understood. Doors, sash, floorling, celling, sidling and vehicle making were pratically all hand work, and some of it was done by slave labor. The absence, in the first place, of good harbors, and in the next place, the want of large cities or towns as centers of surrounding populations, discouraged manufacture in that state before railroads had greatly modified industrial conditions. The want of mineral resources was also a serious drawback, and the state was, largely by force of circumstances, forced to become almost exclusively agricultural to the neglect of its phenomenal wealth of timber. There was not much improvement, as far as forest products were concerned, up to 1880, when there were 295 sawmills and six planing mills. In 1900 the sawmills had increased to 481, and the planing mills to twenty-eight. Modern manufacturing conditions began to take a firm hold about that fime. The United States census in 1909 gives the number of mills at 1,470 cutting yellow pine alone. Many of these were large, complete and up-to-date plants, and perhaps the largest of them turns out as much in one day as was cut daily by the entire 277 mills in the state in 1860. Instead of counting planing mills on the fingers of two hands, as could be done up to 1880, they now number hundreds, and probably a single one of the most complete now dresses as much lumber in one day as the single mill in the state turned out in the year 1860. The lesson to be learned from this development is that old things in manufacturing have passed away to make room for new.

In taking up this study of the wood-using Indus-In taking up this study of the wood-using Industries of Mississippi, the Forest Service purposed to supply Information not available in any public or private report. The Bureau of the Census co-operating with the Forest Service, collects and complles annually statistics showing what the country's total sawmill output is; what the output in each state is; what is the mill value for each kind of wood in the several states; what kinds of wood and how much of each one are manufactured into lumber in each state, and in all the states. But this stops short of state, and in all the states. But this stops short of giving all needed information on the subject. It does not go beyond the rough lumber, and presents no statistics to show what becomes of the lumber after the sawmills turn it out in the rough state. The present report takes up the subject where the census leaves off; that is, it considers rough lumber as raw material for further manufacture, and shows what hecomes of it, what it is used for, and what products are manufactured from it. For instance, products are manufactured from it. For instance, the census statistics give figures showing how much white oak the sawmills cut into rough lumber, but that is all. This report follows that lumber until it has been made into finished commodities, such as furni-ture, vehicles, finish for houses, ships and boats, musical instruments, and whatever it goes into. It is thus shown what becomes of the wood which sawmills convert into lumber and stack in their yards. This report, however, does not take up the wood which is not further manufactured after it leaves the sawmills. If oak or any other wood goes into rough construction, or railroad ties, or bridge timbers, or is taken for any other purpose which uses it in the rough, it is not considered as raw material for further manufacture. A state's sawmills may turn out a large quantity of a certain wood, and little of it may be further manufactured. In that case, if no explanation were offered, it might appear that the difference between what the mills cut and that the difference between what the mills cut and what the factories account for is unreasonable. To Illustrate. Mississippi's mills cut about 168,000,000 feet of oak yearly, yet the state industries further manufacture only about 13,000,000, which is less than eight per cent. This means that ninety-two per cent. of the oak is either used in the rough or is shipped out of the state to be further manufactured elsewhere. Bearing this explanation in mind, the tables of uses in this report, and the amounts of the several species demanded, will be easily understood and will furnish a basis for ready comparison between the rough lumber produced in the state and the amount further manufactured. There are, nevthe amount further manufactured. There are, nevertheless, modifying conditions which should be held ertheless, modifying conditions which should be held in view, particularly in a general study of wood-manufacturing in states. Manufacturers in some states import lumber from other regions and actually manufacture more than their own sawmills cut. Except in the case of foreign woods, the Southern states do not import much lumber, but some of the Central and Northern states do. Mississippi brings in almost no wood to supply her factories—less than one per cent.; but it ships to other states, chiefly to the Middle West, hundreds of millions of feet. It is, therefore, a state which pours its wealth of raw material into other regions to build up their industries, while its own are growing with comparative slowness. tive slowness.

To some extent, that condition is due to local circumstances. Nature was not quite as liberal with

Mississippi as with many other regions in supplying it with water power. The absence of rivers of large volume and steep gradients prevents the erection of vast water-power plants as in the Appalachian region. Coal is wanting in the state, though abundance is available within moderate distances of the state's borders. Thus, while it possesses resources of the highest value, it lacks others, from the manufacturing standpoint. If a balancing of accounts were made, however, it would show to Mississippi's credit wealth which places it among the most fortunate states of the whole country.

KINDS OF WOOD USED.

Eighty or ninety kinds of wood grow in the forests of Mississippi, not counting a number that are too small or too scarce to be of commercial value. About half of that number are now of sufficient importance to fird a place in the list of woods put to use in the state, and with closer utilization in the future a number of other woods will take their place among the region's resources. It is a rule which appears to hold nearly everywhere that while wood is abundant only that which is best and most convenient is put to use, but when the pressure of scarcity begins to be felt, neglected woods are pressed into service.

The timber which grows in Mississippi is of two classes or kinds—hardwood and softwood. In a general way these terms describe the characters of the woods, but not absolutely so; for some trees in the hardwood class have wood actually softer than some in the softwood class. For example, bass-wood, willow, and cottonwood are never considered anything but hardwoods, yet they are softer than long leaf pine, which is in the softwood class. The separation of all woods into the two classes is, for that reason, a somewhat artificial arrangement, and is accorded a somewhat artificial arrangement. is accepted only by mutual consent. There is an easily understood line separating the two classes of wood. Broad-leaf trees are usually classed with hardwoods. Among such are the oaks, hickorles, maples, gums, cottonwoods, and trees of that kind. The needle-leaf trees are softwoods. Such are the pines, spruces, hemlocks, cedars, and cypresses. In a general way, the evergreen trees are softwoods, the deciduous species hardwoods; but there are so many exceptions to this rule that confusion is liable to result. Cypress in the South and tamarack in the North are needle-leaf species which shed their leaves yearly; and live oaks, and some of the magnollas and hollies, are broad-leaved, yet they are magnollas and hollies, are broad-leaved, yet they are evergreen. It is thus apparent that the simple fact that a tree is or is not an evergreen is not sufficient reason for calling it a softwood or a hardwood. Some persons would call a cone-bearing tree a softwood, and all others hardwood. This distinction holds good in most cases. The United States, when it collects statistics of lumber cut, and the Forest Service in discussing the country's timbers in a practical way, recognize a clear division between hardwoods and softwoods, and base the distinction upon broad-leaf and needle-leaf trees. Confusion is apt to follow an attempt to call a tree a tinction upon broad-leaf and needle-leaf trees. Confusion is apt to follow an attempt to call a tree a softwood because it bears cones. Some trees bear what look like cones, but they are not. Among trees of that kind are some of the birches, hophorn-beam, cucumber, and yellow poplar. Neither is it safe to base a division into hard and soft woods upon the annual fall of leaf alone. As already said, there are several exceptions, but in addition to that there are several exceptions, but in addition to that, every living tree sheds its leaves sooner or later, although the evergreens do not cast them all down although the evergreens do not cast them all down at once, but grow a new crop before the old falls. Anyone walking through a pine, spruce, hemlock, cedar, or live oak forest, and noting that the ground is covered with dead leaves or needles, has undoubted evidence before him that even the leaves of vergreens fall in larger numbers. In Mississippi the long leaf pine's needles fall at the end of the second year; the loblolly pine's fall the third year; the shortleaf pine's at the end of the second and beginning of the third year, while the sand pine carries its needles to the third and fourth years. Some of the evergreen trees on the high Western mountains carry their needles much longer than the Southern pines retain theirs. The foxtail pine, growing at the perpetual snowline in the Sierra Nevada mountains, may cling to its needles as long as vada mountains, may cling to its needles as long as twelve years; for in its barren soil and bleak cli-mate that tree can grow new leaves only very slowly, and it keeps what it has as long as possible; but pines in the warm and friendly climate of the South find it no hardship to part with their needles every second or third year.

The Pines.

In quantity, the pines in Mississippi much exceed the hardwoods. Seven or eight kinds of pine are cut for lumber, but three or four are scarce, and even when they are distinguished from other pines with which they are associated, it is not customary for lumbermen to keep separate the lumber cut from each kind. The census reports from year to year call it all "yellow pine." It is evident to any one that it is not all the same kind of lumber when It comes out of the mill. Some of it has narrow rings of annual growth, some has wide rings; some of the lumber is comparatively free from sapwood, other is largely sap. The wide-ringed thick-sapped wood is usually classed a little softer than the wood of narrow rings and little sap, and not quite so strong. There are other differences well known even to those who are satisfied to call it all yellow pine. The same observation holds for the appearance of the standing trees as for lumber in logs. Some of them have long needles, others are short, and this difference serves to distinguish the trees nearly as far away as their appearance can be made out. There are four species of pine usually cut for lumber in Mississippl, and it is proper that a short account be given of each, together with references to the parts of the state where they are most abundant.

Longleaf Pine (Pinus palustris).

Much of the yellow pine lumber in Mississippi is cut from this tree, which is found in greatest abundance in the southern half of the state. It has longer needles than any other Southern pine, and they range from eight to eighteen inches in length, and are arranged three needles in a little bundle or sheath (white pines have five needles in a bundle). The longleaf pine has thinner sapwood than any other Southern pine. This sapwood generally forms a thin ring round the darker colored heartwood. The rings of annual growth are narrow, due to the tree's slow growth. Thus there are three visible features which usually serve to distinguish this tree from others in the woods, and the logs or lumber from other pine lumber in the lumber yard. The three points are: longer needles than other pines, thinner sapwood, and narrow annual rings. Being a tree of slow growth, a new stand does not qulckly come on to take the place of a forest cut down. A period of eighty to 150 years is necessary to grow a longleaf pine tree to merchantable size. The lumber of this species is often known as hard pine, and certain trees that are rich in resin are occasionally called "pitch pine." That name, however, is among the pines what the name "rock elm" is among elms in some regions; it is applied to any one of several species, and, except as far as local custom extends, it does not mean any species in particular.

Shortleaf Pine (Pinus echinata).

The shortness of this pine's needles gives name to it and serves to distinguish it at once from the longleaf pine. There is little likelihood that any one will mistake one for the other while the trees are standing, for the difference in the appearance of the needles attracts immediate attention; but when shortleaf pine trees are compared with two other pines growing in the same region—lobloily and Cuban—the differences in the appearance of the needles is not quite so apparent, though it is not usually difficult to separate the shortleaf species from the others. Shortleaf lumber has certain characteristics which differentiate it from longleaf. The sapwood is much thicker, and the annual rings near the heart of the tree are generally wider than those of longleaf; but the outer rings of both are much alike. Longleaf is heavier and stronger than shortleaf, and is generally preferred for structural timbers which are expected to carry heavy loads, but the softness and the attractive grain of shortleaf pine lead to its extensive use for doors and interior finish. The two pines are found growing near together in many parts of Mississippi, but generally the longleaf is in the southern half, and the shortleaf northward.

Lobloily Pine (Pinus taeda).

The needles of the loblolly pine are in length nearly double those of shortleaf, but much shorter than longleaf. The loblolly and the shortleaf pines are often cut and sent to market as one. There are differences in the wood of the two trees, but they might not be noticed by a casual observer. The shortleaf trunk grows rapidly during its first quarter or third of a century and more slowly later in life, and the record of the growth is shown by the annual rings; but the loblolly grows rapidly and at a fairly uniform rate its whole life, and the rings are wide from heart to bark. This generally serves to distinguish loblolly logs from shortleaf, but it is not an unerring guide, because accidents may befall trees and interfere with their growth. The loblolly pine is liable to be met with in all of the pine regions of Mississippi. It has not, nevertheless, developed in the Mississippi valley states as vigorously as in Virginia and North Carolina, where it has taken possession of large areas to the exclusion of almost all other pines. Its wood serves practically the same purposes as that of the shortleaf pine.

Cuban Pine (Pinus heterophyila).

The Cuban pine is occasionally confused with loblolly. There are a number of differences which may

be noted. The Cuban pine's needles are generally longer, the wood is heavier, stiffer, stronger, harder, longer, the wood is heavier, stiffer, stronger, harder, and is much more resinous. Turpentine operators orchard the Cuban and the longleaf plnes, but seldom the loblolly or the shortleaf. The Cuban grows rapidly and has wide rings and thick sap. Seedlings spread readily into areas left vacant by lumbering or by fire. In this habit it resembles loblolly. The Cuban pine has apparently worked its way northward through the Florida Peninsula, although there is no historical record that it has done so. It seems to have crossed from Cuba ages ago. It is now the only pine in South Florida. At about one-third of the distance up the Peninsula it meets longleaf pine, and the two mingle together. Loblolly is encountered at about the same time, but shortleaf leaf pine, and the two mingle together. Lobioliy is encountered at about the same time, but shortleaf is not met until the northern part of Florida is reached. There the four southern yellow pines, longleaf, shortleaf, lobioliy and Cuban, mingle, and all four grow in southern Mississippi. The Cuban pine has not yet advanced much further north or west than the southern part of that state, though it is probable that it will continue to advance and take nessession of land where longleaf once grew. take possession of land where longleaf once grew, provided the agricultural interests of the people permit it to do so. It holds out much promise to hecome one of the most profitable pines of the South. It is not known how far north this tree can endure the climate.

The four pines listed above constitute the group from which the southern yellow pine lumber is cut, but two or three other pines are occasionally lumbered in Mississippi, though the amounts are small. One of these is the spruce or cedar pine (pinus glabra). It has very short leaves and thin bark, and the wood is somewhat like the northern white plne, light, soft and easily worked. It is not abundant. The sand plne, occasionally called spruce pine (pinus clausa) is found in the state, but the tree is usually small.

Except pines, cypress is the most important softwood found in Misslssippl. Botanists recognize two species of this tree, Taxodium distichum and Taxodium imbricarium, but lumbermen do not distinguish them apart. The heaviest stands are in the Delta region, along the banks of the rivers, ponds, and lagoons, and on the flat lands subject to frequent overflow. The tree is able to maintain itself on ground which is under water much of the time. It has been generally observed by persons familiar with the region that young cypresses are not comling on in sufficient numbers to take the places of old, mature trees which are ready to fall by natural demature trees which are ready to fall by natural decay or before the lumberman's ax. It is pretty generally understood that when the present cypress forests have been cut, there will be little prospect of a future cutting. The sunlight let in by lumber operations seems to be fatal to small seedlings. In some localities and in restricted areas young cy-presses are getting started, but such is the exception rather than the rule.

There is a little red cedar (Juniperus virginiana) in MississIppi, but not enough to cut much figure In the state's timber resources. It is a tree of rather the state's timber resources. It is a tree of rather slow growth, and unless seedlings come in out-of-the-way places, they are not apt to be encouraged by farmers who may need the land.

The Oaks.

The Bureau of the Census in compiling yearly The Bureau of the Census in compiling yearly statistics of lumber cut does not distinguish between different species or kinds of oak. There are in the United States several dozen species of oak, not all in one region, but scattered from Canada to Mexico and from ocean to ocean. Almost every species is made like by the lumber to a larger or smaller excles is made into lumber to a larger or smaller excles is made Into lumber to a larger or smaller extent, yet statistics group all of them as if they were a single wood, like yellow poplar. Sawmill men in their own yards usually recognize at least two classes of oak lumber, white oak and red oak. There is a particular tree whose proper name is red oak (Quercus rubra), and another whose name is white oak (Quercus alba), but sawmill men usually group several similar oaks and call the lumber from one whole group white oak or a group of another kind whole group white oak, or a group of another kind is called red oak. Just what this "white oak" or "red oak" lumber is actually composed of depends upon the region where it is cut. If produced in New York, for example, it would contain species somewhat different than that cut in Mississippi, because the two regions do not produce executively. cause the two regions do not produce exactly identical species of oaks. It is not very difficult to determine what constitutes white oak or red oak lumber in a single state. There are seven white oaks in the forests of Mississippl, if the live oak is counted as a white oak, and there are nine red oaks, six-teen oaks in all, cut for lumber, though some of them In quite small quantities.

Certain characteristics help to distinguish white oaks from red oaks. The leaves of the former usually have rounded lobes, but those of red oaks are sharp pointed. These features do not hold in all cases. The live oak's leaves are unlobed in Missis-sippl, and the black jack (a red oak) does not have sharp-lobed leaves, and the willow oak's leaves have no lobes. The shape of the leaf, therefore, is a useful guide in determining whether an oak belongs to the white oak or the red oak group, but something more than that is necessary to make sure in most

The white oaks ripen their acorns in one season; the red oaks require two. That is a pretty safe test, but In practice it is sometimes difficult to apply. It but In practice it is sometimes difficult to apply. It is not always convenient to watch a tree two years to see when the acorns fall. By noting the leaves and the acorns, and likewise the general appearance of the trees, one can usually determine whether a tree belongs in the white oak or the red oak group. A third test is found in an examination of the wood ltself. The structure of the wood of no two species of oak is exactly the same. A study of these differences will make it possible for an observer to determine the exact species of oak to which a piece of wood belongs though the study is somewhat technical. wood belongs, though the study is somewhat technical, and care and experience are necessary to work out satisfactory results. The United States Forest Service has prepared a manual and a key to assist those who desire to identify oaks from an examina-tion of the wood. (Bulletin 102 U. S. Forest Ser-

White Oaks.

The common white oak (Quercus alba) is a valuable forest resource of Mississippi. This tree holds an important place in more than half of the states of the Union, and the lumber is shipped to every state. The standing tree is not apt to be mistaken for any other if it is closely observed; besides, in most localities, it is the commonest of the white

Post Oak (Quercus minor).

This tree receives its highest praise when it is declared to be as good as white oak. Many lumber-men cut it and suppose they are cutting common white oak, though they recognize a slight difference Many lumber-In the leaves and frequently in the shape of the tree. A few manufacturers who buy different species of white oak insist on post oak being kept separate from others. They consider it a little better than the others, or, at least, it meets their particular requirements a little better.

Cow Oak (Quercus michauxii).

The only reason offered for the name of this oak is that cattle eat the acorns. It is occasionally known as basket oak, because the wood separates readily into long, thin splints useful in making basekts.

Overcup Oak (Quercus lyrata).

In some parts of Mississippi this tree is called water white oak. The cup nearly encloses the acorn, and because of that, the tree is usually easy to iden-

Chinquapin Oak (Quercus acuminata)

This should not be confounded with the chinqua-pin, which is a little chestnut. The acorn of the chinquapin oak is sometimes eaten as a nut. The tree is smaller than most other white oaks, but is occasionally cut for lumber.

Durand Oak (Quercus breviloba).

This white oak is so scarce in Mississippi that it hardly deserves a place as a timber tree, though the wood is of excellent quality. It is found near Columbus and in Mhoon's Valley.

Live Oak (Quercus virginiana).

This is the common live oak tree of the Southern ates. It is scattered from the Atlantic to the states. It is scattered from the Atlantic to the Pacific. Its chief value once was for ship-building, when large vessels were of wood. Live oak knees were hewed from the junction of roots or large limbs with the trunk, but at the present time this extraordinarily strong, hard wood serves few purposes. The trunks are generally too short and misshapen for saw-logs. The fact that its acorns ripen in one season, as among the white oaks, is the principal reason for calling this tree a white oak. Otherwise, it bears greater resemblance to the red oaks.

Red Oaks.

Nine or more of Mississippl's oaks belong to the red oak group. Some of them are of much importance in the lumber supply, while others occupy minor places. At least five different species are called red oak at the sawmills before they are cut into lumber, and others are given that name in the lumber yard. There is rather more difference between the woods of the different species of red oak than

between the white oaks. Most of the latter show very good grain when quarter sawed; some of the red oaks show good grain, others do not.

Red Oak (Quercus rubra).

This tree is not plentiful in any part of Mississippl and is not believed to exits at all in the southern part. The extreme southern limit of the tree's range barely enters the state, while its best development is found in Kentucky, West Virginia and Pennsylvania. In most cases when a lumberman as far south as Mississippi speaks of red oak he has in mind one of the other oaks of the group, and not the Quercus rubra or the genuine red oak. He most likely means the yellow oak or the Texan oak, perhaps the water or the willow oak.

Texan Oak (Quercus texana).

This species is very common in Mississippl, and is occasionally called spotted or Spanish oak, though it is most commonly known simply as red oak. Probably no oak in Mississippi supplies more lumber than this, but it is Impossible to produce statistics to substantiate this statement, because of the custom of lumping together several oaks in the mill yards as one. Some of the best Texan oaks show grain and color which very nearly approach choice northern red oak.

Yellow Oak (Quercus velutina)

This is an easy specle to identify In the woods. The inner bark, a thin layer next the wood, is yellow, and it may be exposed to view with a stroke of an ax, or even by boring through with the point of an ax, or even by boring through with the point of a pocket knife. Old settlers used this substance in dying cloth. The yellow oak tree as it grows in the forest is an uncertain quality from the lumberman's standpoint. 'Very good stuff may be cut from it, or the output may be poor. Few kinds of trees are more dependent upon the soil in which they grow. Good ground grows good timber, poor soil, the reverse. It is true that most trees are influenced by the quality of the soil and by the climate. enced by the quality of the soil, and by the climate in which they grow, but yellow oak is more responsive than most others. Trees on rich, well-drained ground may produce wood fit for tight cooperage which is a very exacting use; while others in poor, dry situations are scarcely worth cutting, so wormeaten, wind-shaken and doty are they.

Turkey Oak (Quercus catesbaei).

Turkey oak has never been of much importance in Mississippi and is not likely to become so. Choice trees make good lumber, but are met with only occasionally. Some call it "forked-leaf oak," and the name is due to the leaf's somewhat fanciful resemblance to a turkey fork lance to a turkey foot.

Spanish Oak (Quercus digitata).

Attempts to Identify this oak by its leaves alone sometimes leads to confusion, for leaves differ greatly. Some have well-developed lobes, others have none. The same tree often produces leaves of very different forms. In this respect it is like sassafras. The bark and general appearance of this oak resemble the water and the willow oaks. The three, in fact, look so much alike that they seem to belong in a class by themselves.

Water Oak (Quercus nigra).

Water oak is not generally well liked by lumbermen. They compiain that the wood is difficult to season, and that it has no beauty of grain to commend it for high-grade furniture and finish. It seems to be slowly working its way into use, and it will ultimately win, for the wood, in spite of some drawhacks, has good qualities. One point in its favor is that it grows rapidly, and though it may not measure up to the cypress in good appearance of the lumber, the tree may be expected to increase in size nearly ten times as rapidly. When the leaves are young, in the early spring, they show a soft, delicate, velvety green unsurpassed in beauty by any other oak. It is well fitted for parks and street shade, and the people of Mississippi are showing their appreciation of it for those purposes.

Willow Oak (Quercus phellos).

This tree owes Its name to Its willow-like leaves. Its wood is probably never known in the lumber yard or factory as willow oak but always as red oak. The tree, while standing, bears so little resemblance to the true red oak that no one could possibly mistake one for the other; but when the lumber of the two has been seasoned and dressed and laid side by slde, it would often puzzle a good lumberman to tell which was which; but willow oak, if it is to be compared with red oak, should be well selected from choice trees, for the run of it is probably not quite equal in appearance to Northern red oak, being a little paier in color. The willow oak grows rapidly, and the wide annual rings show well in finished lum-This tree owes its name to its willow-like leaves.

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ber. There rings are occasionally three-fourths of an inch wide, though usually much narrower. So vigorously does the willow oak increase in size that a man might live to cut large saw-logs from trees he had planted in his youth.

Black Jack (Quercus marilandica) and Blue Jack (Quercus brevifolia).

(Quercus brevifolia).

These two species are well established among the Mississippi oaks, the latter in the southern part, and the former in all parts where the soil is suitable; but they are more frequently looked upon as weed trees than as resources with which to augment the state's wealth. They are seldom found large enough for saw-logs, and the grain of the wood is figureless and dull. In point of usefulness they are doubtless lowest in the scale of all the oaks of Mississippi, yet there are a few places which they fill very well. Though neither is large, the black jack is the larger and more abundant. Its exceedingly rough bark, and its broad, round-cornered fanshaped leaves, modeled somewhat after a pear, usually are sufficient to identify this tree wherever seen.

The Hickories.

The Hickories.

It is not unusual for persons to speak of hickory as though there were only one kind. Timbermen are aware of the fact that the trees are not all the same, and sometimes the differences are duly considered; but sawmills which cut hickory seldom list more than one kind of species. Yet there is more apparent difference between species of hickory than between some of the species of oak. Mississippi has seven kinds of hickory in its forests, if pecan is counted as one, and yet it has no forest of hickory, for it never produces pure forests, but the trees are scattered singly among other species, a few occasionally standing near together. Operators who make a business of logging hickory must pick out the trees where they are found here and there. In favorable regions the stand of hickory seldom averages more than 200 feet per acre. Following are the species of hickory native to Mississippi.

Pecan (Hicoria pecan).

Pecan is usually considered the least valuable of the hickories where strength, elasticity, and toughness are essential. It gives satisfactory service only where it is not required to sustain great loads or stand sudden twists and strains.

Bitternut Hickory (Hicoria minima) and Pignut (Hicoria glabra).

These two hickories are pretty generally recognized as distinct from the hickories whose nuts are edible. The wood is high class for handles and parts of small vehicles.

Nutmeg Hickory (Hicorla myristicaeformis).

Nutmeg hickory is rather scarce, and next to pecan is probably of less importance as a forest product in Mississippi than any other of the seven species.

Water Hickory (Hicoria aquatica).

Water hickory reaches its best development in western Mississippi and the neighboring regions of Louisiana and Arkansas. As its name indicates, it is a water tree and flourishes on ground subject to frequent overflow.

Mockernut Hickory (Hicoria alba).

The powerful and pleasant resinous odor of the leaves of this species assists in its identification. The tree is not usually large, but the wood is of excellent quality.

Shagbark Hickory (Hicoria ovata).

Probably most persons have this tree in mind when they speak of hickory, and its fruit is the common hickory nut of commerce. The wood is of the highest class.

The sapwood of hickory is usually considered superior to the heartwood. The sap is white, the heart red or dark. Tests have shown, however, that for certain purposes the red wood serves as well as the white.

The Gums.

Three gum trees in Mississippi contribute to the lumber supply, but one of them is of rather small importance. It is the black gum (Nyssa sylvatica), and should not be confused with tupelo which is sometimes also called black gum. The true black gum is quite a different tree and stands alone among American trees because of its remarkably interlocked fibers which render the wood almost unwedgeable, except when frozen, in which state the fibers break across and seem to split. The black gum is less a swamp tree than the tupelo; its fruit which is dark blue, is about half an inch long, while tupelo's is dark purple, and is at least twice as

large. When black gum lumber goes to market it probably never carries its true name with it; but tupelo keeps its name, except when it passes as bay or bay poplar. It grows like cypress on ground flooded much of the year.

Red Gum (Liquidambar styracifiua).

This species bears some general resemblance to the others, but it stands on its own merits, although it often loses its identity in factories and passes for Circassian walnut, cherry, birch, or oak. The claim was made nearly a century ago that the largest body of red gum timber in the world was in the Yazoo delta in Mississippi. At that time the timber was made way with in the usual manner—the ax and fire. The land was so valuable that the timber was considered an incumbrance. The long-staple cotton grown there attracted attention in most parts of the world where cotton was an article of trade, and every planter who could clear more of the extraordinary soil for cotton did so. Though much red gum was sacrificed, a large quantity was the extraordinary soll for cotton did so. Though much red gum was sacrificed, a large quantity was spared and has become an important source of wealth. Some iumbermen specify two kinds of red gum, the heart and the sap. It is all the same tree, but the wood appears different—some of it white, other red. The sapwood of a gum, as in trees of other kinds, gradually turns dark and changes to heart as the trunk grows older. Some red gums change from sap to heart much more rapidly than others; and sometimes a large trunk is nearly all others; and sometimes a large trunk is nearly all sap. The "sap" gum of commerce is cut from such trees. If the same tree is permitted to stand half a century longer it is not improbable that most of the sapwood will become heart.

Red gum is more used for veneer than any other American wood, and much of it is rotary cut from what is known as sap gum logs. If the material is selected for its figure, sap veneer closely resembles Circassian walnut, and some of it is made into fine furniture and interior finish, musical instruments, sewing-machine tables, and other articles where heauty of the wood is essential. The seasoning of red gum stood for a long time in its way, but better methods are now employed and early troubles are methods are now employed and early troubles are being forgotten.

The Elms.

Four elms constitute a group in Mississippi, and in the lumber business little effort is made to distinguish one species from another. They are known by various names, and not infrequently the same name does service in pointing out different species. The name "rock elm" is given in one locality to one species in another region it is emplied to rother. species, in another region it is applied to another. This is true in other states than Mississippi, where the term "rock elm" is applied without regard to any particular species.

The most important elm in Mississippi, and likewise the most important in nearly all parts of the United States where elm grows, is the common white elm (Ulmus americana). The tree assumes appearances somewhat different, depending upon the soil where it grows, but it is usually an easy matter to distinguish it from other trees of the same genus associated with lt.

Slippery Elm (Ulmus pubescens).

This tree is not often mistaken for any other, because the mucilaginous inner bark furnishes a ready means of identification. No other elm possesses this peculiar bark. Slippery elm is frequently called red elm, but the name is no guide to identification, because two other elms in Mississippi are often called by that name.

Cedar Elm (Uimus crassifolia).

This elm is not abundant, but is occasionally found in lumber yards. It grows on Sunflower river and at other points in the state. The small twigs may or may not be equipped with flat, corky brown wings, one on either side, and about a quarter of an inch wide.

Wing Elm (Ulmus alata).

That which occasionally occurs in the cedar elm, wings on the twigs, is a characteristic of this species, and the wings are much broader. It is usually not difficult to identify this elm by its winged twigs, though certain other characteristics should be taken into consideration. It thrives best on gravelly soil.

Other Woods.

It is not the purpose to give in this place a list of all the woods which may become of commercial importance in Mississippi. On preceding pages groups are presented of several species which are often spoken of as if they were a single one, or only two or three species. On page 75 of this report will be found a list of all woods reported in use by manufacturers in Mississippi. Doubtless many others are in use but were not reported in a way to bring them into this report. them into this report.

INDUSTRIES.

Manufacturers in Mississippi consume yearly about 618 million feet of wood, consisting of twenty-five species which are shown in Table I, following. It is worthy of remark that not one foot of foreign wood is reported used in Mississippi. The Forest Service has already carried out studies of wood uses in nearly half of the States, and in no other uses in nearly half of the States, and in no other than Mississippi are foreign woods absulutely lacking. Every other State thus far investigated uses mahogany at least, and some of them have lists of a dozen or more foreign woods employed in manufacturing. It is, therefore, remarkable that Mississippi, which demand more wood than is demanded by North Carolina, Maryland, Massachusetts, Oregon, Missouri, or Washington, should import no foreign wood. The State depends almost wholly upon its own forests to supply its manufacturers, for it draws very little from neighboring States, though regions abounding in forest whealth lie on every side. Of the twenty-five woods reported by the manufacturers, white pine is the only one which is not native to the State, and only ten thousand feet of that was brought in. Less than one per cent of all the wood came from the outside, while twelve species were entirely supplied from within, and only four from other States.

It is of interest to note what proportion of the

It is of interest to note what proportion of the wood further manufactured in Mississippi was pine. The five pines which supplied it made up eightynine per cent of the whole, and twenty other woods, nineteen of them being hardwoods, furnished eleven per cent. It is evident that Mississippi is yet a pine State, not only in the output of its sawmills but also in the demands of its manufacturers who use wood. Nine industries are recognized. Table I which follows is intended to show at a glance the woods demanded, the quantity of each, the average price of each, the proportion grown in the State, and that which came in from elesewhere. The other tables which follow show one industry each and give details necessary to proper understanding of the relative rank of the industries in the State. The average cost of the wood used, as shown in Table I, makes it apparent that cheap material lies at the hand of the manufacturer in the State. An average of only \$12.22 per thousand for all kinds of woods is shown. It is of interest to note what proportion of the of woods is shown.

THE USE OF WOOD IN MISSISSIPPI.

Table 1.

SUMMARY OF KINDS OF WOOD USED IN MISSISSIPPI.

Kinds	OF WOOD.						Grown
		Quantit	у	Average	Total cost	Grown	out of
Common Name	Botanical Name	Used Annu	ally	cost per	f. o. b.	in Miss.	Miss.
		feet B. M.	Per cent	1,000 ft.	factory.	Per ct.	Per et.
Longleaf plne	Pinus palustris:	411,423,066	66.54	\$11.66	\$4,798,836	99.95	.05
Shortleaf pine	Pinus echinata	117,728,397	19.04	11.66	1,372,921	99.92	.08
Loblolly pine	Pinus taeda	20,500,000	3.32	11.24	230,500	100.00	
Cottonwood	Populus deltoides	16,513,000	2.67	17.09	282,250	100.00	
Red gum	Liquidambar styraciflua	15,942,116	2.58	11.38	181,471	99.69	.31
Hickory	Hicoria	7,930,000	1.28 *	20.89	165,695	93.69	6.31
White oak	Quercus alba	7,534,000	1.22	21.96	165,467	98.87	1.13
Pond pine	Pinus serotina	6,751,371	1.09	12.97	87,587	100.00	
Yellow poplar	Liriodendron tulipifera.	4,796,080	.78	22.48	107,828	99.58	.42
Red oak	Quercus rubra	2,483,000	.40	16.73	61,842	98.39	1.61
White ash	Fraxinus americana	2,171,000	.35	20.93	45,445	50.48	49.52
Tupelo	Nyssa aquatica	1,800,000	.29	11.81	21,250	100.00	
Cypress	Taxodium distichum	1,342,000	.22	24.13	32,385	37.26	62.74
Black willow	Salix nigra	1,000,000	.16	14.00	14,000		100.00
Water oak	Quercus nigra	75,000	.01	10.00	750	100.00	
White elm	Ulmus americana	65,000	.01	13.49	877		100.00
Sweet birch	Betula lenta	62,000	.01	59.52	3,690		100.00
Evergreen magnolia	Magnolia foetida	54,000	.01	9.02	487	100.00	

Pin oakQuercus palustris	50,000	.01	15.00	750	100.00	
SycamorePlatinus occidentalis	20,000	*	35.00	700	100.00	
White pinePinus strobus	10,000	*	80.00	800		100.00
Black gumNyssa sylvatica	7,000	*	15.00	105	100.00	
Post oakQuercus minor	5,000	*	18.00	90	100.00	
Yellow oakQuercus velutina	5,000	*	18.00	90	100.00	
Biack walnutJugians nigra	3,000	*	38.33	115	100.00	• • • • • •
010	0.070.000	700.00	410.00	AE FE4 F01	00.05	0.5
Total618	8.270.030	100.00	\$12.22	\$7.554.531	99.35	.65

*Less than 1/100 of 1 per cent.

PLANING-MILL PRODUCTS.

The eleven woods which contribute the material shown in Table II aggregate more than half a billion feet, but nearly three-fourths of it is longleaf pine, and most of the other is shortleaf and loblolly. The hardwoods aggregate little more than a million feet, or about one-five hundredth part of the whole. The softwoods are so preponderant in this industry that the hardwoods are scarcely worth mentioning. The significance of the fact is apparent when it is borne in mind that this is the principal wood-using industry in Mississippi, from the veiwpoint of quandemanded. The principal items which make up this industry are flooring, ceiling, siding, and such finish as is turned out by planing mills which dress stock for the general trade. Such planers are usualby run in connection with sawmills, and they piane the lumber which the sawmills cut, both mills being generally under the sawmins cut, both mins being generally under the same management. This serves to distinguish these planing mills from a class which do general mill work and make other kinds of products, such as sash, frames, and doors. Manufacturers of that class are shown in Table VI.

Longleaf Pine.

The largest item among those constituting planing mill products is flooring, and longleaf pine is the chief contributor. The wood is admirably fitted for the manufacture of that commodity. It is hard, for the manufacture of that commodity. It is hard, insuring long wear; strong, which is a guarantee against failure through breakage; stiff, which enables it to hold its place under trying circumstances; it resists decay under conditions where many other woods speedily disintegrate; and it presents an attractive appearance because of its positive color and the clearly marked grain. Flooring of two patterns are turned out from the longleaf plne. The common kind is worked without a purpose of conforming to any particular run of the grain—some of it flat, some quarter-sawed, and some edge grain. There is a select kind, however, known as edge flooring. The sawing is done in a way to bring the edges of the grain upward for a wearing surface. Flooring of that kind is generally narrow and extra thick, sometimes two inches, and is more expensive, but it is that kind is generally narrow and extra thick, some-times two inches, and is more expensive, but it is better, stronger, wears longer, is less liable to splin-ter, and most persons consider it more attractive. It is often used to floor stores, halls, schools and ware-houses. No softwood is superior to longleaf plne for that kind of flooring. Ceiling and iding are made of longleaf pine to a large extent; but shortleaf and loblolly are preferred by some. These pines being of longlear pine to a large extent; but shortlear and loblolly are preferred by some. These pines being of more rapid growth than longleaf, the grain shows more variety in figure, and its general tone is a little lighter. The wood is softer than longleaf and lends itself a little more readily to the carpenter's took. tools

Six and three-quarter million feet of pond pine are listed in Table II. Manufacturers who reported this wood generally called it pitch pine, which appears to be the commonly accepted local name for it. The wood whose official name is recognized by the U. S. Forest Service as pitch pine is a different tree (*Pinus rigida*) and is not found in Mississippi, and it is not believed that any of it was reported during the progress of this investigation.

Cypress.

Cypress makes a rather poor showing in this industry. For some reason, the people of Mississippi do not seem to be making much flooring, ceiling and siding of this wood. It is good for flooring, though not as hard as longleaf pine; suitable for ceiling, though It lacks the distinct grain which loblolly and shortleaf pine exhibit; but for outside work, particularly continued to the continued snortlear pine exhibit; but for outside work, particularly as siding or weather boarding, it is doubtful if it has any superior among the woods of this country. Weli-selected cypress lasts so long when used in the form of weather boarding that enthusiasts have called it the "everlasting wood." It would perhaps be unwarranted to claim for it longer service in the control of the country was a significant than the control of the country was a significant than the control of the country was a significant than the country was a significant vice in exposed situations than may be had from Cal-ifornia redwood, western red cedar, southern red cedar, and eastern white cedar, but it is well up in the front rank of that remarkable list of woods. For that reason it is noteworthy that the people of Mississippi use so little of it, out of the abundance which their state affords. It has been said that a prophet is not without honor save in his own country. All the wood-using industries of MississIppi combined use less than a million and a half feet of cypress yearly. They use that much longleaf pine daily. White oak contributes four times as much as cypress to planing mill products, and about five times as much to the wood-using industries of the whole state.

Yeilow Popiar.

Yellow poplar supplied a small amount of lumber to the industry, and all of it was state grown. The yellow poplar here is near the southern limit of its range, the tree reaching its best development in Tennessee, Kentucky, North Carolina and West Virginia. There is reason to believe that this splendld wood was once more abundant in Mississippi than it now was once more abundant in Mississippi than it now is. Its large, shapely trunk was calculated to attract attention in the early periods of settlement, and it would be one of the first trees to fall to meet the settlers' demand for lumber. William Darby wrote that Baton Rouge was a rather important local market for yellow poplar a century ago; but that was before the days of railroads, and timber was not then taken far to market unless it could be floated. Lack of payingle streams then closed market. was not then taken far to market unless it could be floated. Lack of navigable streams then closed markets against a considerable part of the interior of Mississippi. Some white oak and a smaller amount of red oak was reported in this industry. It has been remarked that there exists considerable difference of opinion in Mississippi as to what red oak is. Some have always called the Texas oak red oak, while others give that name to the yellow oak when it grows on rich, well-drained soil where it develops a large trunk and choice wood.

All of the black walnut reported by manufacturers in the state is found in this industry, and the amount could all be procured from two or three medium-sized trees. Its cost per thousand feet is higher than that of any other wood in this industry.

PLANING MILL PRODUCTS. Table 2.

PLANING-MILL PRODUCTS.

	Quantii		Average	Total	Grown in	Grown out
77 31/		nualiy.	cost	cost	Misslssippi,	of Miss.,
KINDS OF WOOD	feet B. M.	Per cent.	per 1,000 ft.	f. o. b. factory.	feet B. M.	feet B. M.
Longieaf pine	.399,491,066	74.11	\$11.63	\$4,644,695	399,291,066	200,000
Shortleaf pine	.113,313,000	21.02	11.65	1,320,654	113,213,000	100,000
Loblolly pine	. 18,000,000	3.34	1142	205,500	18,000,000	
Pond pine	. 6,751,371	1.25	12.97	87,587	6,751,371	
White oak	. 860,000	.16	32.62	28,050	775,000	85,000
Cypress	. 212,000	.04	26.70	5,660	50,000	162,000
Yellow poplar	. 170,000	.03	24.91	4,235	170,000	
Red oak	. 110,000	.02	33.18	3,650	70,000	40,000
Red gum	100,000	.01	11,00	1,100	100,000	
White ash	6,000	*	35.00	210	6,000	
Black walnut	. 3,000	*	38,33	115	3,000	
Total	. 539,016,437	100.00	\$11.69	\$6,301,456	538,429,437	587,000

^{*}Less than 1/100 of 1 per cent.

BOXES AND CRATES.

The second largest industry in MIssissippi is boxmaking. It is not unusual for a state's largest or second largest wood-using Industry to be the manufacture of boxes and crates. Containers in which to ship commercial commodities constitute a heavy, but necessary tax upon the other industries of a region. Fortunately, the wood of which the containers are made is generally of cheap grades. Much that goes to the box factories could find no sale elsewhere, and if it were not serviceable there it would go into the waste heap. It happens, however, that the principal wood demanded by Mississippi box-makers is cottonwood, and not of cheap grade, as the average price (Table III) indicates. Boxes of very many kinds are produced, but when the makers pay an average price of \$17.32 per thousand for box material, it is evidence that boxes above the average are being turned out. Cottonwood is known as a clean wood. That is, it has no offensive odor, and imparts no stain to articles shipped in boxes made of it. That fits if tor provisions, particularly for meats, butter, lard, fruits and confectionery. So weil is cottonwood liked for boxes in which to ship cured meats, that willow is sometimes sold as cottonwood, thought it is not easy to deceive persons acquainted with both woods, for willow has not the clean color of cottonwood. Some manufacturers prefer boxes of cottonwood, though no provisions or other commodities that can be damaged by stain are to be shipped in them. The attractive appearance of a crate sometimes helps to sell the articles packed within. For instance, makers of screen doors, wash boards, and brooms, buy nice white lumber for crates which will show off their wares to good advantage while in transit or on exhibition. Soap-makers have been known to pay extra for white wood because the letters stenciled on the top or sides show to so much better advantage. The nearly sixteen million feet of cottonwood bought by Mississippi box-makers yearly doubtless receives innumerable stencilings or letterings with paint brushes before the boxes have run their courses and have gone to the final scrap pile of kindling wood.

Cottonwood is one of the native timbers of Mississippi which may be expected to hold its place when cypress, pine, tupelo and red gum have become scarce. Cottonwood will pay for planting, when the time for tree planting comes to Mississippi. It grows rapidly; large amounts will thrive on small tracts; it is satisfied with waste land, provided it is neither too wet nor too poor. It is one of the easlest trees to plant and make grow. It is not improbable that there is as much cottonwood In the state now as there ever was, though large trees may not be as abundant as formerly. Small ones are coming on everywhere. They are quick to seize on vacant places left when farm land is abandoned or when iumbermen cut the forests. A writer who traveled through Mississippi nearly a hundred years ago said there was little cottonwood in the state. He either did not see all there was, or much has since come

Next after cottonwood, red gum holds chief place mong box and crate makers in the state. Fruit, among box and crate makers in the state. Fruit, berry and vegetable crates demand large amounts of wood, frequently made into rotary-cut veneer. Early gardens and truck patches in the state contribute largely to northern markets, and some sort of woodlargely to northern markets, and some sort of wooden container is needed for practically everything of that kind that grows. Red gum and the pines are the largest contributors to the supply of truck-garden crates and berry baskets and cups. The box material furnished by longleaf, shortleaf and loblolly pine seems to be fairly well apportioned to the relative abundance of these species, since makers seldom express a preference, but take what is most convenient or chaptest. The average costs for the convenient or cheapest. The average costs for the three pines show only a difference of nine cents per

three pines show only a difference of nine cents per thousand feet, and for practical purposes they may be regarded as of equal cost.

One-fourth of all the yellow poplar reported in the state went into boxes and crates, and it was highest in price of the nine woods shown in Table III. It was used for the best grades of boxes, on which stenciling, painting and printing were to be done. Magnolia was the cheapest wood in the industry.

BOXES AND CRATES.

Table 3.

BOXES AND CRATES, PACKING.

KINDS OF WOOD	Quantit ann feet B. M.	y used ualiy. Per cent.	Average cost per 1,000 ft.	Total cost f. o. b. factory.	Grown in Mississippi, feet B. M.	Grown out of Miss., feet B. M.
Cottonwood		40.56	\$17.32	\$276,030	15,940,000	reet B, M.
Red gum		26.26	9.88	101,987	10,270,616	50,000
Longieaf pine	5,425,000	13.81	9.96	54,025	5,425,000	
Shortleaf pine	2,737,397	6.97	10.05	27,523	2,737,397	
Loblolly	2,500,000	6.36	10.00	25,000	2,500,000	
Yeliow poplar	1,257,080	3.20	22.88	28,765	1,257,080	
Black willow	1,000,000	2.54	14.00	14,000		1,000,000
White elm	65,000	.17	13.49	877		65,000
Evergreen magnolia	50,000	.13	8.00	400	50,000	
Total	39,295,093	100.00	\$13.45	\$528,607	38,180,093	1,115,000

FURNITURE.

Red gum leads the list of furniture woods in Mississippi, and supplies nearly twice as much as any other, but it is third from the bottom in average price. A man does not need a long memory to carry him beyond the time when red gum was not considered suitable material for furniture, or for much of anything else. If thrown upon a lumber pile in the mill yard, as was the custom once, and left to season in sun, wind, and rain, red gum boards warped so persistently that they became a discouraging proposition. Artificial heat in an old-style kiln was not much hetter; but mill men knew that red gum had the stuff in it that makes good lumber, and they began experimenting with it, and gradually the secrets of seasoning it were found out, although experienced lumbermen say there is something to the found out yet. When seasoning is done according to the latest approved methods, it sometimes falls a little short of expectations. The test frequently comes in working veneer glued upon a backing of some other wood. It appears that three things must work together to make success sure: the red gum must be in proper condition, the wood upon which it is to be glued must be just right, and the glue must lack nothing. If one of these factors is wanting, the job may fall short of success. That is true, of course, for all woods to some extent, but since it occurs a little oftener when the veneer is red gum than when it is mahogany, oak, or walnut, the conclusion has been reached that red gum has some peculiarities which must be carefully studied if success is to he attained in high-grade work. On a former page of this report something was said of the manner of making red gum veneer and of the characteristic figure of the wood. Furniture makers study these matters carefully. They not only use the gum under its own name, but they finish it in imitation of several other woods, among those most frequently imitated heing Circassian walnut, mahogany, cherry, birch, maple and oak. Some of these limitations are produced almost wholly by the

It should not be supposed that all red gum in the furniture business is choice figured veneer for outside use. Much common lumber and cheap veneer are employed for inside. It goes into frames, slides, drawer bottoms and backs, shelves, partitions, pigeonholes and boxes. Some cheap furniture for kitchen or pantry use is solid red gum, though many other cheap woods are as good or even better for that purpose. In England they make furniture of red gum and call it "satin walnut." That is only a trade name, as there is no such wood as "satin wainut." It has been said—though specific instances have not been cited—that red gum from the southern states is exported to Italy and France, is there made into furniture of artistic patterns, is reshipped to this country and sold under the name of French and Italian walnut. At any rate, there is a good market in Italy and France for red gum, and its identity seems to be lost when it reaches these countries, and at least some of it must be manufactured under the name of some other wood. Exporters of the wood say that foreign countries have been very successful in handling this wood and it is popular there. The field for the development of the red gum industry in this country, the making of high-grade commodities, appears to be only opening. The prediction has been made that the wood in a few years will self for as much as good white oak.

The second wood on the furniture list, shown in Table 4, is red oak. That is the name under which

The second wood on the furniture list, shown in Table 4, is red oak. That is the name under which it was reported, but the low average cost casts doubt on the wood's identity. It was probably Texan oak, yellow oak and others, with some genuine red oak;

for the latter cannot be bought in Mississippi in grades suitable for furniture, for \$15.23 per thousand feet. The low cost of yellow poplar was due to the

low grades used which went into drawer bottoms, sides and other unexposed parts. The average low cost of all the furniture woods in the table is surprising, except for cypress, white ash and longleaf pine. The table shows that the average cost of the 10,278,000 feet of material was only \$13.44. That indicates a remarkable opportunity for building up a furniture manufacturing business in Mississippi Cheap material ought to more than offset high freight rates in carrying the finished products to market. If northern manufacturiers can buy lumber in Mississippi, freight it north, make furniture of it, ship the furniture back and sell it in the region where the timber grew, there ought to be husiness for somebody in making and selling the finished article near the source of the raw material. The amount of furniture now made in Mississippi is a fair beginning only. There are possibilities of enormous expansion. Every foot of the wood used in the furniture factories of the state grew in Mississippi. It is doubtful if another state in the Union can make that showing.

FURNITURE. Table 4. FURNITURE.

	Quantity used annually.		Average	Total	Grown in	Grown out
KINDS OF WOOD			cost	cost	Mississippi,	of Miss.,
	feet B. M.	Per cent.	per 1,000 ft.	f. o. h. factory.	feet B. M.	feet B. M.
Red gum		41.45	\$12.80	\$54,525	4,260,000	
Red oak		22.43	15,23	35,100	2,305,000	
Yellow poplar		18.03	9.11	16,875	1,853,000	
White oak	ite oak 1,655,000 16.1		17.40	28,800	1,655,000	
Tupelo	100,000	.97	7.00	700	100,000	
Cottouwood	60,000	.58	15.00	900	60,000	
White ash	25,000	.24	20.40	510	25,000	
Cypress		.10	40.00	400	10,000	
Longleaf		.10	30.00	300	10,000	
Total	10,278,000	100.00	\$13.44	\$138,110	10,278,000	

VEHICLE AND VEHICLE PARTS.

Statistics of the vehicle industry are given in Table 5. The investigation is two-fold, in a measure; that is, the making of finished vehicles constitutes only part of it, while the manufacture of parts of vehicles ranks almost as a separate industry. Conditions are peculiar. Some shops take raw material and turn out the finished wagon or buggy ready for hitching the horses, but that is not the customary way of doing it. A portion of the work is done in one shop, and another shop finished it. Perhaps one factory makes wheels only, ready for the irons and the paint; it may be that hubs are the sole product of another. Some rough-turn spokes; some make poles and shafts; others assemble the parts, put the irons on and apply the paint. Occasionally a shop confines its operations to producing carriage hodles. Thus a number of factories may have a hand in the production of a single vehicle, and the report of no operator will give complete statistics. The finished product of one factory may become the raw material of another. The job must be followed through all the operations to get the first and last of it. Vehicle making is one of the most difficult of all the wood-using industries for the statistician to handle. There is constant danger of counting the same material twice, as it passes from factory to factory, or of missing it altogether. The difficulty is often much increased by the fact that parts of the work may be done in different states. The assembler of a carriage may buy the unpainted wheels in Arkansas, the pole or shafts in Kentucky, the body in Tennessee, and put on the irons and the paint in Mississippi. How can each of the states, in a case like that, receive its proper credit for the part it

makes of the carriage? The only practicable course for the statistician in a case of that kind is to check and recheck as carefully as possible, and offer the result as the best approximation obtainable under the circumstances.

White oak, hickory and yellow poplar are the three chief vehicle woods in Misslssippl, and constitute more than ninety-seven per cent of all. The hickory and the oak are made into wheels and other running gear, while the poplar is converted into bodies. Beds for farm wagons take some of the best. Poplar has always been a favorite material for wagon beds in this country, but the advance in its cost within the past twenty or thirty years has opened the way for substitutes, and cottonwood, willow, and some of the plnes have taken much of the wagon-bed trade. Yellow poplar, however, is still large in spite of high price. The same wood has long filled a place of equal importance in the manufacture of fine carriage bodies, particularly broad-panels and curved parts. Yellow poplar finishes with a fine, smooth surface, and it receives and displays paint better than any other wood. It is much used for the tops of light business wagons, for butchers, bakers, grocers, milkmen and others.

The only water oak and pin oak listed in the state are found in this industry, and they are the cheapest in Table 5. Most of the longical pine was made into wagon bottoms, and the small amount of cottonwood listed was converted into farm-wagon beds. In addition to wagons, this industry includes carts, trucks, sleds, wheelbarrows and push carts. A good many band trucks are used at where and load

In addition to wagons, this industry includes carts, trucks, sleds, wheelbarrows and push carts. A good many hand trucks are used at wharfs and landings on the banks of navigable rivers where buiky commodities are loaded on hoats or unloaded.

VEHICLE AND VEHICLE PARTS. Table 5. VEHICLE AND VEHICLE PARTS.

Quantity used feet B. M. Page 4 620 Average Total Grown in Grown out. cost per 1,000 ft. KINDS OF WOOD Mississippi, cost feet B. M. Per cent. f. o. b. factory. feet B. M. 4,636,000 4,326,000 45.11 42.09 \$21.89 28.10 \$101,490 121,555 4,636,000 3,826,000 White oak..... Hickory
Yellow poplar
White ash
Water oak 500,000 1,042,000 1 042 000 10.14 44.27 46 130 4,325 750 750 115,000 37.61 75,000 1.12 .73 .49 .29 75.00010.00 75,000 15.00 50,000 30,000 28.00 30,000 840 .03 120 3,000 40.00 Total..... 10,277,000 100.00 \$26.85 \$275,960 9,702,000 575,000

SASH, DOORS, BLINDS AND GENERAL MILL-WORK.

Ten woods contribute to this industry, but four of them aggregate ninety-eight per cent of all, and three-fourths are longleaf and shortleaf pine. Window and door frames are important commodities be-

longing here, as are stair work, railing, balustrades and posts. Among the woods listed, sweet birch is highest in price, and of course comes wholly from without the state, as it does not grow in commercial quantities in Mississippi. Most of the 40,000 feet was made into doors. In only one other industry,

fixtures, was this wood used in the state. The quan-

fixtures, was this wood used in the state. The quantity of cypress scarcely comes up to expectation.

Tupelo is second in the table, with a million and a quarter feet. This wood was late in receiving recognition, and lumbermen once were in the habit of passing it by. It was subject to seasoning troubles the same as red gum, or perhaps the troubles were worse. Partial seasoning is sometimes effected by girdling the standing trees six months or a year before they are felled. That step is generally taken to facilitate the handling of the logs. Tupelo is a deep swamp tree, and frequently stands in water from one to ten feet deep. In that case it is difficult to transport the logs to the mill unless they can be floated. Green logs are too heavy to float easily, but six months after deadening they have dried sufficiently to keep on the surface.

The wood of tupelo more nearly resembles yellow

The wood of tupelo more nearly resembles yellow poplar in appearance than any other wood with which it is apt to be compared. It is often called bay poplar, and sometimes the name is shortened to bay. The name is said to have been applied originally to this timber cut on the lower Chesapeake Bay, the intention being to pass it as yellow poplar growing near the bay. Though the standing trunk bears some resemblance to yellow poplar, and the wood also suggests poplar, the latter wood possesses several properties which tupelo does not. In the present industry, Table 6, the yellow poplar cost about \$42 per thousand, and the tupelo cost \$11. That is sufficient to show that manufacturers who use both

woods recognize considerable difference between them. Nearly three-fourths of all the tupelo reported by the wood-using industries in the state was made into sash, doors, blinds and general miliwork. It is sometimes called cotton gum.

SASH, DOORS, BLINDS AND GENERAL MILLWORK.

SASH, DOORS, BLINDS AND GENERAL MILLWORK.

	Quantity used		Average	Total	Grown In	Grown out
KINDS OF WOOD	annualiy.		cost	cost	Mississippi,	of Miss.,
	feet B. M.	Per cent.	per 1,000 ft.	f. o. b. factory.	feet B. M.	feet B. M.
Longleaf pine	5,157,000	63.81	\$15.36	\$79,231	5,157,000	
Tupeio		15.47	11.00	13,750	1,250,000	
Shortleaf pine		13.46	18.45	20,069	1,088,000	
Cypress		6.06	36.28	17,775	140,000	350,000
Yellow poplar		.52	41.98	1,763	22,000	20,000
Sweet blrch	40,000	.50	60.00	2,400		40,000
Red oak		.10	36.50	292	8,000	
White oak		.05	33.00	132	4,000	
Red gum		.02	11.50	23	2,000	
Evergreen magnolia	1,000	.01	12.00	12	1,000	
Total	8,082,000	100.00	\$16.76	\$135,447	7,672,000	410,000

HANDLES.

Hickory is the chief handle wood in Mississippi, and as Table 7 shows, supplies more than eighty-nine per cent of the material. For certain kinds of handles it has no superior among the world's known woods. Its best qualities are seen in slender han-dles where strength, toughness and resiliency are required. The ax handle and the long hammer handle are typical. Though hickory may be greatly bent and deflected, it will spring back and regain its original position, and continue to do this for a long period, and times almost innumerable. Other woods may do it for a short time, but they are apt to lose their resiliency, and set permanently out of shape. All hickories do not give similar results when made into handles. Different parts of the same tree show different results, and the qualities of the wood change with age. The butt of a young tree is tougher than the game wood when the truth is all the same tree is tougher than the game wood when the truth is all the same trees the same tree is tougher the same trees the same tree same trees the er than the same wood when the trunk is old; and the part of the trunk near the ground is better than that toward the top. Handles test the quality of hick-ory more thoroughly than any other commodity, not even excepting buggy spokes.

It is well known that hickory wood is of two colors, white and red. The white is the sapwood, the red is the heart. The proportion between the heartwood and the sapwood varies greatly in different trees, in different ages of the same tree, and between different species. Sometimes young trees growing in the open are nearly all white wood; some large trunks have comparatively thin shells of sapwood.

Prejudice has long existed against the use of the red heartwood for handles. Better acquaintance with the properties of the red wood of hickory has somewhat lessened the prejudice against it, at least for some kinds of handles. If resiliency is not insisted upon, as when a thick pick handle is wanted, the red hickory answers very well. There is a general tendency to work into use more and more of the heartwood. Scarcity and the desire to utilize more closely are powerful influences operating to give the heartwood a place. Prejudice has long existed against the use of the red

Much of the hickory-handle wood never passes through an ordinary sawmili. The bolts are cut in the woods, and are often split into blielts and in that form go to the handle factories. Many sizes are made, the largest being the cant-hook handles, and

from that the sizes range down to chisel and gimlet handles. A fourth of a million feet of white oak is employed in this industry and a rather large quantity of red gum also. The ash on the list is used for hoe, rake and pitch-fork handles. Most of the poplar and gum was made into small handles, such as are employed for hand grlps on wire bails and on bundle carriers. Some of them are used for flatiron handles, and as the wooden part of pan and cooking pot handles. Neither a tough nor a hard wood is required for this service. Some handles of this kind are painted black, intended for cheap imitations of ebony. Handle woods average low in cost in Mississippl, about \$12 a thousand feet. That is because a large part of the material reaches the factory before much labor has been expended on it.

HANDLES.

Table 7.

HANDLES.

	Quantit	y used	Average	Total	Grown in	Grown out
KINDS OF WOOD	annuaiiy.		cost	cost	Mississippi,	of Miss.,
	feet B. M.	Per cent.	per 1,000 ft.	f. o. b. factory.	feet B. M.	feet B. M.
Hickory	3,604,000	89.30	\$12.25	\$44,140	3,604,000	
White oak	250,000	6.19	10.00	2,500	250,000	
Red gum	107,000	2.65	8.00	856	107,000	
Yellow poplar	50,000	1.24	10.00	500	50,000	
White ash	25,000	.62	16.00	400	25,000	
· Total	4,036,000	100.00	\$11.99	\$48,396	4,036,000	

AGRICULTURAL IMPLEMENTS.

The most important commodities of this industry are machine and appliances for growing, ginning and haudling the cotton crop. The state supplies ail the woods demanded by the manufacturers, and nearly three-fourths of all is longleaf pine. It possesses the requisite hardness and strength for cotton presses and gins. The figures shown in Table 8 do not indicate that general plantation machinery is extensively manufactured in the state.

AGRICULTURAL IMPLEMENTS.

Table 8.

AGRICULTURAL IMPLEMENTS

	Quantit	y used	Average	Totai	Grown in	Grown out	
KINDS OF WOOD	ann	annually.		cost	Mississippi,	of Miss.,	
	feet B. M.	Per cent.	per 1,000 ft.	f. o. b. factory.	feet B. M.	feet B. M.	
Longleaf pine	575,000	71.88	\$17.39	\$10,000	575,000		
Shortleaf pine	65,000	8.13	15.00	975	65,000		
White oak	65,000	8.12	27.38	1,780	65,000		
Red oak	55,000	6.87	24.36	1,340	55,000		
Red gum		3.75	12.00	360	30,000		
Yellow oak	5,000	.63	18.00	90	5,000		
Post oak	5,000	.62	18.00	90	5,000		
Total	800,000	100.00	\$18.29	\$14,635	800,000		

FIXTURES.

Fixtures are akin on the one hand to furniture and on the other to interior finish. They are not as movable as furniture or as fixed as finish. They are made for banks, stores, offices, saloons and halls, and consist of showcases, cabinets, shelving, specially-made desks and tables, partitions, counters, bars, railings and many other appliance of like kind. The wood used was of higher average cost than for any other industry in Mississippi. That was not so much on account of the demand for rare or costly kinds as to the fact that high grades and large pieces were demanded. Extra wide boards are demanded for counter tops and broad panels in partitions, tables, desks and cabinets. These panels are usually built

up of veneers laid upon cores or backing of other woods to lessen the Ilability to warp, check and split. More than half was longleaf pine, but it went largely into frames and concealed parts while the surface material was some wood more expensive, and was in most cases applied in the form of veneer. The prices paid for the white oak, yellow poplar, cypress, sweet birch, sycamore, red gum and magnolia listed in Table 9 indicates that good grades were used. Longieaf and shortleaf pine are the cheapest woods in the table. Some of the red gum was finished in imitation of other woods. Part of the sycamore was made into shelving and interior parts of cabinets and counters; but part was of high grade and was selected for the exposed surfaces. This wood may be sawed in a way to show attractive grain. It lends up of veneers laid upon cores or backing of other

Itself readily to quarter sawing, and has a characteristic appearance. When most woods, as white oak, are quarter sawed, the medullary, or silver-like rays of wood, are cut obliquely across, exposing bright patches, streaks and flecks. The meduliary rays of sycamore are cut across in the same way when that wood is quarter sawed, but the rays, instead of heing the brightest parts of the wood, are the darkest, and the result is that quarter sawed sycamore is darker than plain sawed. Its peculiar appearance is much admired.

The high price of evergreen magnolia in this in-

The high price of evergreen magnolia in this industry is notable, for it is usually quite cheap. It is one of the southern woods which is coming into favor. It was formerly left standing in the swamps when the other woods were cut out, and the heavy, intensely-green, laurel-like foliage attracted the attention of travelers who were often led to ask why such fine-appearing timber was left when other was taken. The reply was almost invariably that it was such line-appearing timber was left when other was taken. The reply was almost invariably that it was not worth marketling. That answer was of long-standing in Mississippi. Nearly a century ago William Darby, who has been several times quoted in this report, dismissed magnolla in his forest survey of the state, with the short and decisive remark: "Magnolia abounds, but is too useless to deserve mention"

mention."

It is better thought of now, but it is a variable wood. Some is of high grade, other is poor; one piece may be nearly as white as holly, another black enough to compare with ebony. The wood may be interspersed with very hard streaks which make it a difficult material to pass through wood-working machines. The colors are not permanent, the light grow darker, the dark lighter. In spite of these disadvantages, magnoila is liked for many purposes. It is substituted for holly in brush backs, for yellow poplar for panels, for various woods in boxes, for cottonwod and basswood in some kinds of woodenware, and it has a place of its own as general lumber. There are two species in use, the evergreen which is largest, and the sweet which is scarce and not so frequently used.

FIXTURES.

Table 9.

FIXTURES.

Kinds of Wood	Quantit	y used ually.	Average	Total cost	Grown in Misslsslppl.	Grown out of Mlss.,
	feet B. M.	Per cent.	per 1,000 ft.	f. o. b. factory.	feet B. M.	feet B. M.
Longleaf pine	225,000	51.31	\$18.00	\$4,050	225,000	
White oak	64,000	14.60	42.42	2,715	64,000	
Yellow poplar	32,000	7.30	30.00	960	32,000	
Cypress	30,000	6.84	45.00	1,350		30,000
Shortleaf plne	25,000	5.70	18.00	450	25,000	
Sweet birch	22,000	5.02	58.64	1,290		22,000
Sycamore	20,000	4.56	35.00	700	20,000	
Red gum	17,500	3.99	37.71	660	17,500	
Evergreen magnolla	3,000	.68	25.00	75	3,000	
Total	438,500	100.00	\$27.94	\$12,250	386,500	52,000

MISCELLANEOUS.

Table 10 presents statistics of manufactures which are not of sufficient importance in Mississippi to be classed as separate industries. The chief lines covered by statistics in this table are pumps, patterns,

saddles, harness, laundry appllances, paving blocks, mill machinery woodenware, noveltles, boats and ships, coffins, caskets and excelsior. The cheapest wood reported in the state is in this table, shortleaf plne for excelsior and the most expensive is white plne bought by pattern makers.

MISCELLANEOUS.

Table 10.

MISCELLANEOUS.

KINDS OF WOOD	Quantit	y used ually.	Average	Total cost	Grown ln Misslssippi,	Grown out of Miss
	feet B. M.	Per cent.	per 1,000 ft.	f. o. b. factory.	feet B. M.	feet B. M.
White ash	2,000,000	33.08	\$20.00	\$40,000	1,000,000	1,000,000
Red gum	1,105,000	18.27	19.87	21,960	1,105,000	
Cypress	600,000	9.92	12.00	7,200	300,000	300,000
Longleaf plne	510,000	10,000 8.43		5,695	510,000	
Cottonwood	510,000	8.43	10.20	5,200	510,000	
Shortleaf pine	500,000	8.27	6.50	3,250	500,000	
Tupelo	450,000	7.44	15.11	6,800	450,000	
Yellow poplar	350,000	5.79	24.57	8,600	350,000	
White pine	10,000	.17	80.00	800		10,000
Black gum	7,000	.12	15.00	105	7,000	
Red oak	5,000	.08	12.00	60	5,000	
Total	6,047,000	100.00	\$16.48	\$99,670	4,737,000	1,310,000

SUMMARY BY INDUSTRIES.

Wood-using industries in Mississippi, as presented in this report, are arranged in eight tables, with a miscellaneous group shown in a separate table.

Table 11, which follows, shows these industries, the total quantity of wood demanded by each, the average cost per thousand feet, and the total cost. The per cent of the wood grown in and out of the state is shown also.

SUMMARY OF WOODS USED BY INDUSTRIES IN MISSISSIPPI.

Table 11.

SUMMARY OF WOODS USED BY INDUSTRIES IN MISSISSIPPI.

ALL CALLS OF THE REAL PROPERTY.	Quantit;	y used	Average	Total	Grown in	Grown out
INDUSTRY.	ann	annually.		cost	Misslssippi,	of Miss.,
	feet B. M.	Per cent.	per 1,000 ft.	f. o. b. factory.	feet B. M.	feet B. M.
Planing-mill products	539,016,437	87.18	\$11.69	\$6,301,456	99.89	.11
Boxes and crates	39,295,093	6.36	13.45	528,607	. 97.16	2.84
Furniture	10,278,000	1.66	13.44	138,110	100.00	
Venicle & vehicle parts.	10,277,000	1.66	26.85	275,960	94,40	5.60
Sash, doors, blinds and general millwork		1.31	16.76	135,447	94.93	5.07
Miscellaneous	6,047,000	.98	16.48	99,670	78.34	21.66
Handles	4,036,000	.65	11.99	48,396	100.00	
Agricultural implements	800,000	.13	18.29	14,635	100.00	
Fixtures	438,500	.07 ·	27.94	12,250	88.14	11.86
Total	618,270,030	100.00	\$12.22	\$7,554,531	99.35	.65

FUTURE SUPPLY OF TIMBER.

It was formerly not customary in this country for people to trouble themselves to look ahead to see where the future supply of timber was to come from. The evidence of this is seen in the fact that large regions which were once heavily timbered now have little. The tree cutter and tree planter were strangers to each other. A slight tendency toward a change in policy is noticeable in many parts of the United States. It has been learned that it not only is possible to grow timber for commercial purposes, but if done with judgment and patience, it may be carried out with profit.

The people of Mississippi are now passing over a road on their industrial journey which some other states traveled some years ago. They are harvesting the crop of trees which nature planted and brought to maturity unalded by man. Nature will not do it again, for conditions bave changed. Growers of farm crops will not give up their rich land and walt two hundred years for nature to bring on another cutting of trees, but another way to procure needed timber must be found, and it is now time to begin seriously to think it over. Thinking alone will not suffice, but experiments and experience must be made use of.

Mississippl's future woods must grow on land which can be spared from agriculture; that is, on

thin, rugged, and wet land. When the present forests are cut off, which will be accomplished in the not distant future, the second and succeeding timber harvests will come from wood-lots which will belong with the farms and plantations; from thin lands where annual crops will not pay; from wet and partly submerged ground where trees will flourish, but corn. cane, rice and cotton will not. Drainage will doubtless reclaim large areas of swamp in Mississippi, but much will never be drained for many years, and that land's proper function will be to grow trees. Some of the soll of the uplands, owing to its great depth and its friable nature, gullies badly. Protecting cover and belts of trees will be planted to check erosion, and the timber so planted will serve the double purpose of protecting the ground and producing posts, fuel, and saw timber.

Timber planters will select species which will suit

Timber planters will select species which will suit place and purpose best. Plne will not be relegated in swamps nor willow to uplands. Slow-growing species will not be favored in situations where trees of quick growth will flourish, for time is an important factor in forestry. Seven or eight pines are native in Mississippl, but if a man means to plant he will select the one or two which will grow fastest. The slow growth of longleaf pine would seem to he a pretty effective bar against much of a future for it; and shortleaf has only a little more hope. Loblolly and Cuban, neither of which occupies first place

In the state now as a source of supply, promise to strike up to the front, because a tree of either of these species can produce a saw-log while longleaf is growing a cross-tie. The spruce pine which is seldom mentioned now because it is scarce and its range is local, may have a surprise in store when tree planting comes into practice. The excellent quality of its soft, white wood, and its rapid growth, hold great promise for this tree. It has never been able to get much foothold under natural conditions. Neither did catalpa and osage orange which by man's help have now spread over a considerable part of the United States.

Nature was profuse in planting species of oak in Mississippi, but when men shall begin to do the planting it may be depended upon that some of the small, slowly-growing kinds will be relegated to the ravines and sterile ridges where natural methods will hold longest. The tendency in forestry is to reduce rather than increase the number of woods found under natural conditions. There are nearly five hundred tree species in the United States. If timber were grown from plantings and coppice (sprouts) in this country as in some European countries, probably not more than one species in ten would survive. The oaks in Mississippi may be expected to follow that rule, when the time of tree culture arrives. The best and most rapid growers will be chosen, the others will be rejected. It does not, however, necessarily follow that the trees which grow most rapidly will be the most profitable, for the fast grower may have wood of poor qualities, and In that case It will pay to wait longer for a better tree. White oak, post oak, Texan oak and willow oak will be strong candidates for favor. The first two, though not very rapid growers, have wood of sterling qualities, and with good grain and figure; and the planter can afford to walt a good while for them to reach marketable size, for the price will be high. The Texan oak accommodates itself to most solls, as It is one of the most vigorous trees of Misslssippi. The willow oak may be a little off if beauty of grain is considered, but it lays on wood at such a rate that it has all the other oaks of the region beaten, except the water oak which appears to do about as well.

There are many kinds of trees which grow rapidly in wet ground, such as cottonwood, Carolina poplar and black willow; and others grow more slowly, like red gum, tupelo and cypress. So much swamp land is found in Mississippl that tree culture on such land may be expected to assume large proportions in future years. Enormous cuttings of cottonwood and willow may be made at intervals of thirty to fifty years, while cypress, tupelo and red gum will take longer to reach desirable size; but many tracts will doubtless be kept growing such species long after forests planted and cared for in nature's way cease to be looked upon as a profitable resource in that region.

Tree planters will always find profit in such species as yellow poplar and black walnut, hickory and persimmon, which possess qualities fitting them for special uses. The growing of fence posts, cross-ties, and telephone poles will be one of the first practical purposes to which forestry will be devoted in the region. The demand is ever present, the trees soon grow to proper size. Locust, catalpa, red cedar and osage orange will answer for posts and poles, and are long-lasting woods, but they are rather small for the material, unless permitted to stand a long time; and some more suitable species may be expected to meet the demand for ties.

ADDITIONAL STATISTICS.

Many sawmills in Mlssissippi plane timber primarily to reduce freight. Sometimes heavy timbers are so dressed. The weight removed in the process of planing may amount to 500 or more pounds per 1,000 feet, and the item is worth saving. The lumber or the timbers so dressed go into the general market, and much of it becomes the raw material for further manufacturers. Other is used in rough construction. This study did not regard lumber dressed in that way as a manufactured product entitled to a place in this report; but figures showing the annual quantity of such material turned out in Mississippi are presented as a matter of information. Table 15 which follows shows the kinds of wood planed and the quantity of each, with the total cost and the part grown in and out of the state. It is, of course, understood that it is in addition to the totals given in preceding tables.

DRESSED STOCK. Table 15. DRESSED STOCK.

	Quantit	y used	Average	Total	Grown in	Grown out
KINDS OF WOOD	ann	ually.	cost	cost	Mississippi,	of Miss.,
U U	feet B. M.	Per cent.	per 1,000 ft.	f. o. b. factory.	feet B. M.	feet B. M.
Longleaf pine	312,260,000	63.10	\$11.35	\$3,544,815	292,230,000	20,030,000
Shortleaf plne	.147,750,000	29.86	11.81	1,745,150	138,750,000	9,000,000
Loblolly pine	. 23,475,000	4.75	11.96	280,725	23,475,000	
Red gum	. 9,000,000	1.82	7.00	63,000	9,000,000	
Pond plne	1,000,000	.20	13.00	13,000	1,000,000	
White oak	. 500,000	.10	7.00	3,500	500,000	
Sugar maple	. 500,000	.10	7.00	3,500	500,000	
Red oak	. 100,000	.02	7.00	700	100,000	
Water white elm	. 100,000	.02	7.00	700	100,000	
Pumpkln ash	100,000	.02	7.00	700	100,000	
Cypress	60,000	.01	16.00	960	30,000	30,000
Total	494 845 000	100.00	\$11.43	\$5.653.950	465 785 000	20 060 000

WOODS APPORTIONED AMONG INDUSTRIES.

Some woods are wholly used in a single industry, others are divided between two or among several.

Table 12, which follows, shows this in convenient form. Yellow poplar, red gum, and longleaf plue

are each found in eight of the nine industries, while black gum, black walnut, black willow, pin oak, pond plne, post oak, sycamore, water oak, white elm and yellow oak are each entirely used in but one industry.

PERCENTAGE OF THE DIFFERENT KINDS OF WOOD USED IN EACH INDUSTRY.

PERCENTAGE OF THE DIFFERENT KINDS OF WOOD USED IN EACH INDUSTRY. Cook doors Wahiala

							Sas	sh, doors,	Vehicle	
	Agricul-	Boxes &					Planing-	blinds,	and	
	tural lm-	crates,	Fix-	Furni-	Han-	Miscel-	mill	& gen'l	vehicle	
Kinds of wood-	plements.	packing.	tures	ture.	dles.	laneous.	products.	millwork	. parts.	
Black gum						100.00				
Black walnut							100.00			
Black willow		100.00								
Cottonwood		96.53		.36		3.09			.02	
Cypress			2.23	.75		44.71	15.80	36.51		
Evergreen magnolia		92.59	5.56					1.85		
Hlekory					45.45				54.55	
Loblolly pine		12.20					87.50			
Langlant place	.14	1.32	.05			.12	97.10		0.1	
Longleaf plne	r1.							1.25	.01	
Pln oak									100.00	
Pond pine							100.00			
Post oak										
Red gum	.19	64.74	.11	26.72	.67	6.93	.63	.01		
Red oak	2.22			92.83		.20	4.43	.32		
Shortleaf plne	.06	2.33	.02			.42	96.25	.92		
Sweet birch			35.48					64.52		
Sycamore			100.00							
Tupelo				5.56		25.00		69.44		
Water cale	• • • •						• • • • •		100.00	
Water oak				4 15	4.15	00.10	• • • •		100.00	
White ash		400.00		1.15	1.15	92.12	.28		5.30	
White elm	****	100.00								
White oak	.86		.85	21.97	3.32		11.42	.05	61.53	
White pine						100.00				
· Yellow oak	100.00									
Yellow poplar		26.21	.67	38.64	1.04	7.30	3.54	.87	21.73	
							3.02			

*Less than 1/100 of 1 per cent.

AVERAGE COST OF WOODS IN THE INDUS-TRIES.

Much difference in price is paid by different indus-tries for wood of the same species. White oak ranges lows, presents these figures.

from \$10 to \$42.42; yellow poplar from \$9.11 to \$44.27; longleaf pine from \$9.96 to \$30, and so on down the whole list of woods. Table 13, which fol-

Sash doors Vehicle

COST OF DIFFERENT KINDS OF WOOD USED BY EACH INDUSTRY. Table 13.

COST OF DIFFERENT KINDS OF WOOD USED BY EACH INDUSTRY.

		-						ii, doors,		
	Agricul-	Boxes &					Planing-	blinds,	and	
	tural lm-	crates,	Fix-	Furni-	Han-	Miscel-	mill	& gen'l	vebicle	
Kinds of wood-	plements.	packing.	tures	ture.	dles.	laneous.	products.	millwork	. parts.	
Black gum	\$	\$	\$	\$	\$	\$15.00	\$	\$	\$	
Black walnut							38.33			
Black willow		14.00								
Cottonwood		17.32		15.00		10.20			40.00	
Cypress			45.00	40.00		12.00	26.70	36.28		
Evergreen magnolla		8.00	25.00							
Hickory	• • • •				10.0"		• • • •	12.00	0010	
Hickory		10.00	• • • •		12.25	• • • • •			28.10	
Loblolly plne		10.00					11.42			
Longleaf pine	17.39	9.96	18.00	30.00		11.17	11.63	15.36	28.00	
Pin oak									15.00	
Pond pine							12.97			
Post oak	18.00									
Red gum	12.00	9.88	37.71	12.80	8.00	19.87	11.00	11.50		
Red oak	24.36			15.23		12.00	33.18	36.50		
Shortleaf pine	15.00	10.05	18.00			6.50	11.65	18.45		
Sweet birch			58.64					60.00		
Sycamore			35.00							
Tupelo				7.00		15.11		11.00		
Water oak									10.00	
White ash				20.40	16.00	20.00	25.00			
White elm	• • • • •	12.40				20.00	35.00		37.61	
White cal-	07.00	13.49	10.10	15.40	40.00					
White oak	27.38		42.42	17.40	10.00		32.62	33.00	21.89	
White pine						80.00				
Yellow oak	. 18.00									
Yellow poplar		22.88	30.00	9.11	10.00	24.57	24.91	41.98	44.27	

MISSISSIPPI'S LUMBER CUT.

The Bureau of the Census, co-operating with the

	1 0000
Yellow plne	.2.114.706.000
Oak	. 168.508.000
Red gum	120,733,000
Cottonwood	46,222,000
Cypress	41,666,000
Yellow poplar	. 25,833,000
Hickory	. 21.967.000
Ash	. 15.017.000
Tupelo	6.146.000
Elm	. 6,090,000

COOPERAGE. Total

Tupelo10,	000,000
Red gum 7,	940,000
Oak	480 000
Cottonwood	000,000
Plne	777.000
Elm	777,000
Doodh	
Beech	230,000
Ash	50,000

Total......22,002,000 VENEER.

VENEER.

The Census makes a report on the manufacture of veneer cut in the state. This product is of three kinds, classified with regard to the process of manufacture: rotary cut, sawed and sliced. It is customary to measure rotary cut and sliced by log scale; that is the logs are measured before beling cut litto veneer. Generally the expensive woods are sawed or sliced, while cheaper ones are rotary cut. It is not improbable that a portion of the material listed in the table of box and crate statistics, Table 3, is duplicated in the table giving the cut of veneer which follows, for in some instances the box maker's raw material is veneer, bought from veneer mills. Following is the production for 1909, practically all of which is rotary cut:

	Feet
	Log scale.
Red gum	3,052,000
Cotton	2.249.000
Yellow pine	1,155,000
Yellow poplar	910,000
Black willow	60,000
Tupelo	50,000
Beech	50,000
Red oak	
Birch	10,000
Total	7.563.000
	,

TURPENTINE.

The gathering of turpentine from pine trees has declined in recent years in Mississippi, as the following census data indicates:

	Spirits of turpentlne	Rosin
Year	gallons	Bbls. (280 lbs.)
1904	3,160,000	363,000
1907	2,233,000	255.000
1908	2,278,000	278,000
	1,589,000	193,000

The falling off in the output in recent years is at-The falling off in the output in recent years is attributed to the depletion of the plnes which produce the turpentine, chiefly longleaf. Old turpentine regions become exhausted, and the operators move on to new areas. Georgia was once a much larger producer than it now is, while Louisiana and Texas furnished little. The center of supply has moved west, and old districts have declined more and more.

USES OF WOODS.

The following list shows the uses of each of the woods in Mississippi, so far as reported by the manufacturers; but it would be misleading to conclude that these are all the uses of the woods, or even all the uses to which they are put in the state. Manufacturers generally regard only the most important uses; the places where it has served them best, and this fact should be kept in mind when considering

facturers generally regard only the most important uses; the places where it has served them best, and this fact should be kept in mind when considering the uses given.

BLACK GUM—Bowls, boxes, broom handles, crates, egg cases, hopper boxes, kitchen utensils, ox yokes, woodenware.

BLACK WALNUT—Balusters, baseboards, casing, interior finish, mantels, moldings, panels, partition, newel posts, railings, starwork.

BLACK WILLOW—Baskets, boxes, crates, egg-cases, fruit dryers, trays.

COTTONWOOD—Boxes, crates, cupboards, egg cases, excelsior, furniture, Ironing boards, kitchen cabinets, kitchen safes, stands, tables, wagon boxes.

CYPRESS—Balusters, blinds, boxes (packing), brackets, caskets, ceiling, coffins, closets, columns, doors, finish (Interior), flooring, frames, kitchen cabinets, kitchen safes, kitchen tables, mantels, moldings, panels, pedestals, refrigerators, sash, shutters, sideboards, window frames.

EVERGREEN MAGNOLIA—Baskets, boats, boxes, counters, crates, excelsior, mantels, office fixtures, ox-yokes, shelving, showcases.

HICKORY—Axles, bent shafts, doubletrees, eveners, handles (ax, peavy, pick, tool), poles, reaches, rims, singletrees, spokes, spring bars.

LOBLOLLY PINE—Boxes, casing, ceiling, columns, crates, doors, flooring, Interior finish, molding, partition, railing, sash, siding, window frames.

LONGLEAF PINE — Agricultural implements, blinds, boxes, brackets, cabinets, cars, celling, china closets, columns, crates, decking, door frames, drop siding, flooring, furniture, grain doors, interior finish, molding, partition, paving blocks, pine oils; pyroligneous acid, railing, sash, sammill machinery, screen doors, siding, spindles, stepping, stair work, stove fixtures, tar, tar oil, turpentine, wagon tongues.

POND PINE—Baseboards, casing, ceiling, flooring, window frames, woodenware.

PIN OAK—Bolsters, hounds, log trucks, spokes, wagon tongues.

POND PINE—Baseboards, casing, ceiling, flooring, interior trim, mantels, molding, pails, picture frames, porch columns, pump heads, stair work, ta

RED OAK-Agricultural implements, case goods, casing, doors, dressers, flooring, furniture, handles, harrows, interior finish, molding, plow beams, sash, stair work, tables.

narrows, interior finish, molding, plow beams, sash, stair work, tables.

SHORTLEAF PINE—Balusters, blinds, boats, bridges, boxes, cabinets, car siding, ceiling, cotton presses, 'doors, excelsior, flooring, frames, grain doors, interior finish, lath, molding, partition, sash, siding, school desks, store fixtures, wagon boxes, window casing.

SWEET BIRCH, Parkets and

window casing.

SWEET BIRCH—Baskets, crates, fixtures, furniture, Interior trim, show cases.

SYCAMORE—Baskets, boxes, core work, crates, egg cases, fixtures, pails, show cases, tubs.

TUPELO—Boxes, bowls, broom handles, drawer bottoms, flooring, hopper boxes, Interior work, porch columns, pump heads, pump tubing.

WATER OAK—Axles, bolsters, double trees, hounds, poles, wagon beds.

WHITE ASH—Bent bows, boat oars, buggy bodies, felloes, fork handles, hoe handles, wagon bodies, wagon tongues, wheels.

ies, felloes, fork handles, hoe handles, wagon bodies, wagon tongues, wheels.

WHITE ELM—Baskets, boxes, crates, egg cases, hoops, trunk slats.

WHITE PINE—Casket cases, clasks, general millwork, models, machine snop patterns, turned stock, woodenware, novelties.

WHITE OAK—Agricultural implements, casing, ceiling, chairs, church pews, dressers, fixtures, flooring, furniture, gear work, handles, harrows, lounges, mantels, molding, picture frames, plow beams, sawmill machinery, show cases, spokes, tables, ten pins, wardrobes.

wardrobes.
YELLOW OAK—Cotton gins, cultivators, harrows, hay rakes, mowers, planetrs, plows, seeders.
YELLOW POPLAR—Auto bodies, bevel siding, boxes, broom handles, caskets, drawer bottoms, excelsior, fixtures, furniture, interior work, porch col-

umns, pump heads, shelving, show cases, wagon-box

The following woods were found in use in the state but were not separately reported by the manu-

facturers:

BASSWOOD—Boxes, excelsior, fixtures, molding.

BEECH—Boxes, flooring, furniture, wagon bol-

BEECH—Boxes, flooring, furniture, wagon bolsters.

BUTTERNUT—Finish, fixtures, pews.

CUBAN PINE—Boxes, car siding, ceiling, crates, flooring, siding.

CHINQUAPIN OAK—Fixtures, handles, vehicles.

COW OAK—Furniture parts, handles, hubs, reaches, spokes, wagon bottoms.

LIVE OAK—Handles, wagon stocks.

RED CEDAR—Chests.

SHITTIMWOOD—Boxes, crates, fixtures, furni-

SHITTIMWOOD-Boxes, crates, fixtures, furni-

ture.

SILVER MAPLE—Boxes, finish, flooring. SPRUCE PINE—Doors, sash, screens, shop work.

DIRECTORY.

Below is a list of Mississippl wood-using manufacturers who supplied the data contained in this report. Those manufacturing several products classified under different industries will appear in the list, with their addresses, under more than one industries. dustry.

Agricultural Implements.

Southern Manufacturing Company, Columbus. W. T. Adams Machine Company, Corinth. Harrison-Cochran Lumber Company, Hattiesburg. J. W. Hlett, Iuka.

Boxes and Crates, Packing.

W. A. Price, Carpenter.
A. H. Slegrist, Corlntb.
Alford & Miller, Gallman.
Georgetown Manufacturing Company, Georgetown. Paepcke-Leicht Lumber Company, Greenville. J. J. Newman Lumber Company, Hattiesburg. J. J. Newman Lumber Company, Hattlesburg.
Hazlehurst Box Factory, Hazlehurst.
Little Creek Veneer Company, McLain.
Carrier Lumber & Manufacturing Company, Sardls.
Terry Manufacturing Company, Terry.
Toledo Carriage Woodwork Company, Toledo, O.
Anderson-Tully Company, Vicksburg.
W. F. Foxworth, W. Columbia.

Car Construction.

Harrlson-Cochran Lumber Company, Hattiesburg. Tartt Lumber Company, Lauderdale.
Batson-McGehee Company, Millard.
C. E. Mayerhoff, Pachuta.
Carrier Lumber & Manufacturing Company, Sardls.

Dressed Stock.

A. Brannin, Aberdeen.
Green County Lumber Company, Bexley.
Elder & Bradford, Biloxi.
W. Fountain & Co., Biloxi. W. Fountain & Co., Biloxi.
Cochran & Harrington, Bodga.
Adams Bros. Lumber Company, Brandon.
The Pine Belt Lumber Company, Braxton.
The Robinson Land & Lumber Company, Chicora.
Alexander Lumber Company, Clarksdale.
The Lamar Lumber Company, Clyde.
Falk & Stolzer, Columbus.
Hampton Lumber Company, Columbus.
Interstate Lumber Company, Columbus.
Deemer Manufacturing Company, Deemer.
Anchor Saw Mill Company, Ellisville.
Scogin Bros., Forest.
City Lumber Company, Gulfport.
Farnsworth Lumber Company, Gulfport. City Lumber Company, Gulfport.
Farnsworth Lumber Company, Gulfport.
Home Lumber Company, Gulfport.
Handsboro Lumber Company, Handsboro.
W. B. Birdyes, Harrisville.
Grantham Bros., Hopewell.
Native Lumber Company, Howison.
W. H. Wesley, Inda.
Southern Lumber & Manufacturing Company, Jackson. son. Kola Lumber Company, Kola.
Gilchrist-Fordney Company, Laurel.
Ingram-Day Lumber Company, Lyman.
J. J. White Lumber Company, McComb. Cotton States Lumber Company, Magnolia.
Cotton States Lumber Company, Mechan Junction.
Carter Lumber Company, Meridian.
Eureka Planing Mills, Meridian. Eureka Planing Mills, Merldian.
Meridian Planing Company, Merldian.
Cooley Bros., Mize.
Keystone Lumber & Brick Company, Monroe.
J. T. Kinney, Monticello.
P. M. Ikeler, Moselle.
L. N. Dantzler Lumber Company, Moss Point.
O'Leary Mill Company, Moss Point.
Robinson Land & Lumber Company, Moss Point.
Newton Lumber Company, Newton.
Butterfield Lumber Company, Norfield,
Oakvale Lumber Company, Oakvale.

F. C. Ott, Osyka. Lockwood Lumber Company, Pelahatchie. J. F. Wilder Lumber Company, Perkinston. McInnes Lumber Company, Petal. Tallabatchie Lumber Company, Phlllip. Louisell Lumber Company, Plcayune. James Hand & Bro., Purvis.

James Hand & Bro., Purvis.

Richton Lumber Company, Richton.

Ship Island Lumber Company, Sanford.

Chas. Beagley, Scoba.

Brownlee Lumber Company, Shubuta.

Ten Mile Lumber Company, Ten Mile.

Finkton Lumber Company, Wiggins.

Fixtures.

Hattlesburg Cabinet Works, Hattlesburg. Houston Lumber Company, Houston. Cambre Bros., Jackson. Westbrook Manufacturing Company, Jackson.

Furniture.

W. Q. McKenzle, Columbia. W. A. Stewart, Corinth. W. A. Stewart, Corinta.
Georgetown Manufacturing Company, Georgetown.
Tallahatchie Furniture Manufacturing Company,
Greenwood.
O. C. Bacon, Marks. Meridlan Furniture Factory, Meridian.
Mississippl Lumber Company, Quitman.
Mississippl Furniture Company, Vicksburg.
Delta Table & Chair Company, Yazoo City.

Handles.

S. A. Goodwin, Blue Mountain. Mathlston Handle Company, Mathlston. Hartzell Handle Company, New Albany. Arthur Delaplerre, Pyland.

Emmons & Bullard, Basic.

Miscellaneous.

W. T. Adams Machine Company, Corlnth. W. A. Stewart, Corinth. Clarksdale Manufacturing Company, Clarksdale. W. Q. McKenzie, Columbla.
Sneed & Jamison, Greenwood.
Gulfport Creosote Company, Gulfport.
Fetterman Bowl & Column Manufacturing Company, Ittabena.

Jackson Casket & Manufacturing Company, Jackson. Cliff Williams Machine Company, Meridian.
Batson-McGebee Company, Millard.
Wilsey & Shaffer Manufacturing Company, Vicksburg.
Wetherbee Huggins Company, Waynesboro.

Planing Mill Products.

L. J. Alford Lumber Company, Ackerman. Lumber-Mineral Company, Arbo.

Mrs. K. Edwards & Sons, Bay St. Louis.

C. C. Gray, Bay St. Louis.

R. J. Williams Lumber Company, Bay St. Louis. Bay Springs Lumber Company, Bay Springs. Green County Lumber Company, Bexley. Green County Lumber Company, Bexiey.
S. A. Goodwin, Blue Mountain.
Hodges Bros., Booneville.
Smith & Payne Lumber Company, Braxton.
Central Lumber Company, Brookhaven.
J. E. Clement, Burnsville.
Lacey Lumber Company, Carrlere.
Tallahatta Lumber Company, Chunky Lacey Lumber Company, Carrlere.
Tallahatta Lumber Company, Chunky.
Clarksdale Manufacturing Company, Clarksdale
The Lamar Lumber Company, Clyde.
W. C. Wood Lumber Company, Collins.
Whitfield Planing Mill Company, Columbia.
Bell Lumber & Manufacturing Company, Columbus.
Cheatham & Son, Columbus.
Hampton Lumber Company, Columbus.
J. R. Webster Lumber Company, Corlinth.
Brookpark Lumber Company, Enterprise.
J. H. Johnson, Enterprise. J. H. Johnson, Enterprise. Eureka Lumber Company, Estabutchle. J. H. Johnson, Enterprise.
Eureka Lumber Company, Estabutchle.
W. B. Lundy Lumber Company, Fenton.
J. W. Parsons, Gallman.
Robinson Lumber Company, Gloster.
W. B. Birdyes, Harrisville.
Firm Lumber Company, Hattiesburg.
Harrison-Cochran Lumber Company, Hattiesburg.
McInnis Lumber Company, Hattiesburg.
J. J. Newman Lumber Company, Hazelhurst.
J. M. Hemphill Lumber Company, Hemphill.
Wickware Lumber Company, Hickory.
J. L. Crawford, Hickory Flat.
Houston Planing Mill Company, Houston.
Native Lumber Company, Howison.
W. H. Wesley, Inda.
Iuka Lumber Company, Iuka.
Cambre Bros., Jackson.
Enochs Lumber & Manufacturing Company, Jackson
Austin Lumber Company, Jamestown.
G. B. Merrill & Bro., Lake.
Tartt Lumber Company, Lauderdale. Eastman, Gardiner & Co., Laurel.
Gilchrist-Fordney Company, Laurel.
The H. Weston Lumber Company, Logtown.
Longview Lumber & Timber Company, Longview.
The K C Lumber Company, Lucedale.
Hinton & Wells, Lumberton.
Cotton State Lumber Company, Meehan Junction.
Bostick Lumber Company, Meridian.
Carter Lumber Company, Meridian.
Eureka Planing Mills, Meridian.
Meridian Furniture Factory, Meridian.
Batson-McGehee Company, Millard.
P. M. Ikeler, Moselle.
L. N. Dantzler, Moss Point.
E. A. Enochs, Natchez.
R. F. Learned & Son, Natchez.
C. E. Mayerhoff, Pachuta.
Adams Bros. Lumber Company, Pelahatchie.
Car Dal Lumber Company, Pinebur.
Poplarville Saw Mill Company, Poplarville.
Trexler Lumber Company, Prentiss.
Mississippi Lumber Company, Quitman.
Bentley & Emery, Richton.
Ripley Lumber & Manufacturing Company, Ripley.
Robinson Bros. Lumber Company, Robinwood.
Harmon Lumber Company, Scooba.

Conner Lumber Company, Seminary.
H. G. Doxsey & Co., Starkville.
New Island Lumber Company, Union.
Curphey & Mundy, Vicksburg.
West Point Manufacturing Company, West Point.
Lyndon Lumber Company, Wingate.

Sash, Doors, Blinds, and General Millwork.

C. C. Gray, Bay St. Louis.
Bay Springs Lumber Company, Bay Springs,
T. J. Rosell Manufacturing Company, Biloxi.
W. Q. McKenzie, Columbia.
W. A. Stewart, Corlnth.
Alexander Lumber Company, Greenville.
Tallahatchie Furniture Manufacturing Company,
Greenwood.
Nevers Sash & Door Factory, Gulfport.
Craft Cabinet Works, Hattiesburg.
Harrison-Cochran Lumber Company, Hattiesburg.
Hattiesburg Cabinet Works, Hattiesburg.
Houston Lumber Company, Houston.
Fetterman Bowl & Column Manufacturing Company,
Ittabena.
Cambre Bros., Jackson.

Enochs Lumber & Manufacturing Company, Jackson

O. C. Bacon, Marks.
Acme Supply Company, Meridian.
Caldwell Manufacturing Company, Meridian.
Curphey & Mundy, Vicksburg.
Mississippi Furniture Company, Vicksburg.

Vehicles and Vehicle Parts.

L. J. Alford Lumber Company, Ackerman.
W. Q. McKenzie, Columbia.
W. E. Small Spoke Manufacturing Company, Corinth Love Wagon Company, Durant.
Georgetown Manufacturing Company, Georgetown.
W. S. Higginbothan, Houston.
McGuire Bro. & Small, Houston.
Falk & Kenney, Jackson.
Hoopes Bros. & Darlington, Jackson.
Lindsay Wagon Company, Laurel.
Louisville Spoke Company, Louisville.
Whitaker Bros., Meridian.
Cliff Williams Machine Company, Meridian.
The Weis & Lesh Manufacturing Company, New Albany.
Toledo Carriage Woodwork Company, Toledo, O.
D. S. Blggs, Winborn.



Walter Mulford

The Wood-Using Industries of Louisiana

By HU MAXWELL, Expert United States Forest Service.

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The Wood-Using Industries of Louisiana

BY HU MAXWELL, EXPERT UNITED STATES FOREST SERVICE.

The following report was prepared by Hu Maxwell, expert, under the direction of H. S. Sackett, chief, Office of Wood Utilization, United States Forest Service. It is published and thus made available to the public through the courtesy of the Lumber Trade Journal, New Orleans, La.

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PREFACE.

Louisiana has 18,000,000 acres of forest land, the hardwoods being principally in the northern half, the softwoods in all parts. More than 100 kinds of trees make up the forest, about one-half of the specles possessing commercial value, the others being too small or too scarce to count for much. Six or seven softwoods—the pines and cypresses—supply fourteen-fifteenths of the annual lumber output of the state. At this time the softwood forests are given much more attention than those of hardwoods; but it may be expected that a change will come in time, diversified manufacturing will increase, and the large sawmills will lessen in number as the primeval stands of pine and cypress are cut out. Plants which manufacture lumber into other commodities will take the place of mills which now sell their output in the rough, or sell it planed or surfaced. Diversified manufacturing of wood products has not progressed nearly as far in Louisiana as in the northern and eastern states. Many southern industries of that kind are still in their infancy, and there is room for many others which have not yet had a heginning. Development will come in and there is room for many others which have not yet had a beginning. Development will come in yet had a beginning. Development will come in time, for the raw material is abundant. The least encouraging phase in the outlook for Louisiana is found in the fact that it is selling immense quantities of its logs and lumber in the rough, to feed factories in other regions, and when the development of home wood-working industries shall be undertaken in the future, it may be found that the forests will be much depleted. It may thus happen that its forest resources will never reach their best development

development.
Uses are being found for every wood that grows large enough and symmetrical enough for economical working. Search for new woods is stimulated by the Increasing scarcity of some of the well-known species. The Forest Service of the Department of species. The Forest Service of the Department of Agriculture has been pushing this search for some years. It has studied many woods to find out what they are best fitted for, and has investigated the forests and factories of various states and regions to ascertain in what amounts the commercial species exist, and what use is being made of them. Coustant attention is given to the discovery of new uses for well-known woods, and to bringing little-known woods—so-called "minor species"—to the attention of users. Many trees which were once looked upon as mere forest weeds, are now taking their place as valuable members of the American looked upon as mere forest weeds, are now taking their place as valuable members of the American forest family. Red gum, hemlock, and tupelo, are examples. In the spring of 1911 the Forest Service undertook an investigation of Louisiana's woodmanufacturing industries, and this report embodies the result. Statistics collected by the Bureau of the Census show that, with the single exception of Washingtou, Louisiana produces more lumber than any other state. Interest would naturally attach to a study undertaken to ascertain how much and what kind of further manufacture is given this lumber in the region that produces it—whether it is sold in the rough and shipped to other regions, or whether furniture, machinery, boats, finish, vehicles, and other commodities are made of it at home. Similar studies had already been

made In seven states-Hillnois, Kentucky, Maryland, made in seven states—illinois, Kentucky, Maryland, Massachusetts, North Carollna, Oregon, and Wisconsin. These represent the eastern, central, northern and western parts of the United States, and Louisiana was chosen as a representative of the hardwood and softwood forests of the South. As a lumber region it is new in comparison with some others, and that fact was expected to add to the value of the investigation. Some of the states practically exhausted their primeval forests long ago and now depend on young growth; but not so with Louisiana. The cutting of its original forests is now in full swing, and new growth, either present or prospective, is given little attention by the people of the state. The same human characteristic—or human frailty—which showed so conspicuously while the Pennsylvania, Michigan, and New England forests were being cut, appears again in Louisiana where they are harvesting the present crop with no thought for the future. It was believed, therefore, by the Forest Service that a study of manufacturing conditions in Louisiana would result in good by calling attention of thoughtful husiness men of the state to the subject. If the people are not manufacturing as much of their rough lumber into finished products as they might, means may be found for improving the situation, and developing home industries while wood is yet plentiful. It was not a part of the pian of this investigation to make a silvical study of the state, to look into the condition of the forests, note the stand of timber, rate of depletion, quantity and character of reproduction, and the like; but, incidentally, some attention has heen given to this phase of the question and the concluding paragraphs of this report present a few important facts which must be apparent to any one who travels through the various regions of Louisiana.

The investigation was conducted upon lines similar to those followed in other states where work at Massachusetts, North Carolina, Oregon, and Wisconsin. These represent the eastern, central, northern

facts which must be apparent to any one who travels through the various regions of Louisiana.

The investigation was conducted upon lines similar to those followed in other states where work of like kind has been done. Lists were obtained of manufacturers who were reported to be engaged in the conversion of rough lumber or wood into finished products. Blank forms for reperts were sent them by mail with requests that the reports be filled out and returned. A second request was sent to such as failed to respond to the first. The sallent points of the inquiry were: The kinds of wood used, the amounts required annually, the cost of each at the factory, the products manufactured, sizes and grades of lumber used, where it comes from, and the market for the products. After sufficient time had been given for all to reply who meant to do so, the field work began. This consisted in visiting those who had not replied and also many who had but whose replies were not quite satisfactory.

One of the constant purposes of the field work began.

One of the constant purposes of the field work was to note any new or little-used woods which were beginning to make their appearance in the mills and shops, and to observe any properties in them which seemed to commend them for wider use. One of the earliest discoverles made was that them which seemed to commend them for wider use. One of the earliest discoverles made was that a number of woods were going into the sawmills as one species and coming out as another. This was not due to any purpose to palm off an inferior wood for a better, but was owing to the fact that Louislana has more than a hundred species of forest trees, while the lumber yards recognize scarcely a score of species as lumber. For instance, three maples are cut as saw logs, but all appear in the lumber yard as "soft maple." Two species of ash are cut in the woods, and sugarberry and hackberry are loaded on the log truck with them; but in the lumber yard the whole four are often simply "ash." Turkey oak, post oak, overcup oak, cow oak, and white oak all come from the mill as "white oak." Texan oak, yellow oak, willow oak, and water oak blend in the yard as "red oak," and not one of them is the true red oak (Quercus rubra) which is a more northern tree. Three elms go to the saw mill; one comes out. The same method holds to some extent in the softwoods. The two cypresses are never distinguished apart, and in many lumber yards where three or four pines are stacked side by side, one or two may be recognized. Black gum and tupelo are never mistaken for each other in the woods; but black gum almost invariably becomes tupelo if sawed into lumber.

This method is not pointed out for criticism, nor

This method is not pointed out for criticism, nor is it peculiar to Louislana. It exists as a matter of convenience, and because no one objects. The time is near at hand, however, when there will be less grouping and mixing of species in the lumber yards and shops. Each will go by its true name. Farmers once had simply "cattle;" but specializa-

tion has gone on until now there are many breeds which buyer and seller clearly distinguish. Species of wood are capable of being separated and distinguished equally as well, and it will be done when wood-using shall become as highly specialized as stock raising. During the progress of the field work of this investigation, 24 woods were found in use, though not one of them was listed by any manufacturer under its proper name. Some went under other names, others were unknown, and still others were used in amounts so small as to be thought not worth mentioning. In some instances, manufacturers were inclined to apologize for using a certain wood, not because it was not good, but because it was new and it was feared the public might not take kindly to innovations.

The use of some of the minor species which are just coming in, would not have been discovered had the reports of manufacturers alone been depended upon, for in many cases they do not know all the woods coming to their factories. Valuable information along that line was obtained from saw-mill men, lumbermen, and woodsmen. They know the trees, and can often tell what industry buys the lumber. In this way, by carefully following lumber it may be traced to the shop or factory that uses it. In many instances, too, local uses of wood may be learned from people not in the lumber business at all. ber business at all.

It may be instructive to compare the number of wood-using industries in Louisiana with those in other states where similar studies have been made. An "industry," it should be explained, is not a definite term, and does not mean exactly the same everywhere. The comparison should, therefore, apply in a general way only. Following are the numbers of industries:

Illinois 51, Wisconsin 22, North Carolina 21, Massachusetts 20, Oregon 20, Kentucky 19, Maryland 13, Louisiana 9. This low place is held by Louisiana because its forests products, that is, its logs and lumber, are sold in the rough. Other states take these rough products and further manufacture, them. It is the further manufacture, not the rough lumber, which is considered in this report. Take from Louisiana's total the one item, "planing mill products," and not much remains. Its total would be lower than that of any other state named above, not only in the number of industries but in the amount of wood used, and this in face of the fact that it is next to the highest state in lumber cut, and perhaps exceeds every state in the total output of forest products. (See Table 29 and accompanying footnote.) Much of the "planing mill products," Table 2. is really raw material for northern factories which buy it in Louisiana because they can procure it more cheaply there than elsewhere. In addition to more than a billion feet of planing mill products, much of which goes out of the state to be further worked up, Louisiana sends out perhaps half of its total mill output as rough lumber—not even planed at home.

In reaching some of the best markets in the Illinois 51, Wisconsin 22, North Carolina 21, Mass-

perhaps half of its total mill output as rough lumber—not even planed at home.

In reaching some of the best markets in the United States—those from New York to the Rocky Mountains, and north of the Ohio River—the Louisiana manufacturers of wood commodities are at some disadvantage compared with makers of like articles more centrally located as regards those markets. Long hauls by rail make freight rates high. Compensating circumstances are found in the fact that Louisiana's only market does not lie at the terminus of long overland hauls. Take New Orleans as a point in the end of an elipse and complete the figure by extending its enclosing line along the eastern coast of Mexico and Central America, the northern coast of South America to the mouth of the Orinoco River, thence northward through the West Indies back to New Orleans. That touches some of the foreign markets in which the forest products of Louisiana may be laid down so cheaply, because of low rates of water carriage, that competition with the great wood-manufacturing industries of central and northern states need not be feared. There is, however, a still wider foreign market open to Louisiana manufacturers—Europe, South Africa, and the eastern countries of South America. This market is not merely theoretical, or a future possibility, but is now being developed. An examination, Industry by Industry, of the reports of Louisiana manufacturers shows that commodities are now regularly sold in all those countries, and manufacturers are already planuing for an enlargement of trade when the completion of the Panama Canal makes new ports accessible.

THE USE OF WOOD IN LOUISIANA.

Table 1.

SUMMARY OF KINDS OF WOOD USED IN LOUISIANA.

KINDS OF WOOD.						Grown
Common Name Detailed Name	Quantit	y .	Average	Total cost	Grown	out
Common Name— Botanical Name—	Used Ann	uaily.	cost per	f. o. b.	in La.	of La
	Feet B. M.	Per cent	. 1000 ft.	factory.	Per ct.	Per ct
Longieaf pinePinus paiustris	672,446,374	49.63		\$7,129,779	99.45	0.53
Shortleaf piue	389,504,118	28.75		4,113,041	99.85	0.15
Cypress	216,933,500	16.01			99.93	0.07
ked gumLiquidambar styracınua		-		3,568,147		
	15,193,000	1.12		162,982	81.90	18.10
CottonwoodPopulus deitoides	13,281,000	0.98		144,225	79.74	20.26
TupeloNyssa aquatica	11,666,000	0.86		106,940	100.00	
Lobiolly pine rinus tæda	8,610,000	0.64		112,495	100.00	4.00
Black willowSalix nigra	8,547,500	0.63		61,100	95.32	4.68
White oakQuercus alba	8,161,800	0.60		124,921	97.88	2.12
Hickory micorla ovata	2,986,800	0.22		79,453	99.99	0.01
Texan (spotted) onn Quercus texana	1,777,250	0.13		33,198	99.43	0.57
White ash	1,731,450	0.13	21.28	36,845	97.10	2.90
Evergreeu magnoliamagnolia lætida	1,627,500	0.12	12.66	20,607	84.70	15.30
Yeilow poplarLiriodendron tulipifera.	1,268,933	0.09	29.55	37,499		100.00
Spruce pine	200,000	0.01	20.00	4,000	100.00	
BasswoodTilia americana	160,000	0.01	20.38	3,260		100.00
Engelmann spruce ricea engelmanni	100,000	0.01	54.00	5,400		100.00
Black gumNyssa sylvatica	120,000	0.01	7.92	950	100.00	
Cow oakQuercus michauxii	90,000	0.01	13.89	1,250	100.00	
Overcup oak	90,000	0.01	13.33	1,200	100.00	
White elmUlmus americana	60,000	*	12.00	720		100.00
Mahogany (Mex.) Swietenia mahogani.	ASSESSMENT OF THE PARTY OF THE				7 11 1	
Mahogany (Africa) Khaya senegalensis	55,523	*	116.78	6,484		100.00
Cuban pinePinus cubensis	50,000	*	7.00	350	100.00	
Sweet magnoliaMagnolia giauca	45,000	sk:	8.11	365	100.00	
Chestnut	41,000	*	35.12	1,440		100.00
BeechFagus atropunicea	40,500	*	19.14	775	98.77	1.23
Red CedarJuniperus virginiana	37,000	alt .	44.05	1,630	30.11	100.00
Sugar mapleAcer saccharum	33,000	*	38.48			100.00
White pinePinus strobus	30,500	*	80.10	1,270		100.00
Red oakQuercus rubra		*	48.71	2,443 967		100.00
Sweet birchBetula lenta	19,853 16,500	*				100.00
		*	53.45	882	100.00	,
River birch Betula nigra	10,000	*	12.00	120	100.00	
Silver mapleAcer saccharinum	4,000	Lak	12.00	48	100.00	100.00
Locust	2,200	*	61.36	135		100.00
Persimmon Diospyrus virginiana	2,000	*	10.00	20		100.00
Dogwood	2,000	*	12.50	25		100.00
Usage orange Toxylon pomiferum	2,000	*	12.50	25	100.00	100.00
Cherry Prunus serotina	2,000	*	65.00	130	100.00	100.00
Circassian walnutPterocarya caucasica	1,000	*	140.00	140	100.00	100.00
Catalpa Catalpa catalpa	1,000		25.00	25	100.00	
Umbrella treeMelia azedarach umbra-		*	95.00	95	00,000	
Black walnutJugians nigra	1,000	*	25.00	25	100.00	100.00
Black sprucePicea mariana	500	*	100.00	50		100.00
	500	3k	74.00	37	100.00	100.00
Red muiberryMorus rubra	500	**	20.00	10	100.00	
Water oakQuercus nigra	500		20.00	10	100.00	
Willow oakQuercus phellos	500	*	20.00	10	100.00	****
Lignum vitæGualacum officinale	300	*	100.00	30		100.00
American holly‡Ilex opaca‡						
Black jackQuercus marilandica						
Green ashFraxinus lanceolata						
Buckthorn bumeliaBumelia lycioides						
ChittimwoodBumelia lanuginosa						
Cedar elmUlmus crassifolia						• • • •
Drummond mapleAcer rubrum drummon-						
dil						
Florida mapleAcer saccharum florida-						
num				* * * * * * * *		
HackberryCeltis occidentalis						
SugarberryCeltis mississippiensis.						
Honey locustGleditsia tricanthos						
Water locustGleditsia aquatica		• • • •				
Live oakQuercus virginiana						
Post oakQuereus minor						
PecanHicoria pecan						
Spanish oakQuercus digitata						
Sassafras Sassafras Sassafras						
Turkey oakQuercus cates baei						
Wing elm						
Yeilow oakQuercus veiutina						
Bitternut hickoryHicoria minima						
Water hickoryHicoria aquatica						
Mockernut hickoryHicoria alba						
Pignut hickoryHicoria glabra						
Totals1,	354,954,101	100.00	\$11.64	\$15,765,458	98.27	1.73

^{*}Less than 1/100 of 1 per cent.

The cut of lumber in Louisiana in 1909 was 3,551,918,000 feet board measure. About 2,196,000,000 feet was disposed of in the rough, and the rest was further manufactured. The extent of further was further manufactured. The extent of further manufacture was not the same in all cases. Some of the lumber was simply planed or surfaced, and in that form was sent to market; other was made into boxes, furniture, finish, vehicles, boats, and other commodities, and thus went, ready for use, to the consumer of those commodities. The total quantity thus manufactured was 1,354,954,101 feet, according to the statistics collected during this investigation, costing when it reached the factories

\$15,765,458, or \$11.64 per thousand feet.

The total is made up of a large number of species, 72 appearing in the list shown in Table 1; but most of these supplied amounts so small that but most of these supplied amounts so small that they could be neglected without materially affecting the total. Louisiana's forests grow more than 100 species of trees large enough to be of some commercial use, and more than fifty of them appear in the table, yet of the total quantity of wood manufactured, three species contributed 94 per cent, and 69 species only 6 per cent. It thus appears that, judged by quantity, the manufacturers of wood commodities in Louisiana depend on three woods. Longleaf pine supplies 50 per cent of it, shortleaf 28 per cent, and cypress 16 per cent. This is not the rough lumber, but such as is further manufactured. However, a ratio almost exactly the same holds for the whole lumber cut in the state. Yellow pine (chiefly longleaf and shortleaf) and cypress make up 94 per cent of it.

press make up 94 per cent of it.

The manufacturers of Louisiana brought in very little wood from other states and countries, only 15,014,102 feet, or a little over one per cent, and it cost \$270,304, or less than two per cent of the total cost. Foot for foot, that brought from without cost more than the home grown, the price of the imported lumber being \$18, and the home grown \$11.56. Although hard pine and cypress so greatly exceed all other woods in amount and value, it by no means follows that these are the only important timbers in the state. The forests are rich in kinds, and many of the species are valuable at present and are destined to increase in value when manufacturing shall become more diversible at present and are destined to increase in value when manufacturing shall become more diversified than it now is in Louisiana. The softwoods are rapidly going to market, but the hardwoods, which are found in all parts of the state, particularly in the northern portions, are waiting for further development before their full value is appreciated. At this place it seems proper to append a list of woods now used in considerable amounts, or coming into use, and to refer briefly to the merits and characteristics of some of them, purely from and characteristics of some of them, purely from the standpoint of usefulness.

SOUTHERN PINES.

Sawmili men of Louisiana, and of the South generally, do not distinguish between the different comerally, do not distinguish between the different commercial pines of the region as carefully as botanists do. Lumbermen frequently recognize two kinds of pines, the one with much heartwood and thin sapwood, which is called "hard pine," "yellow pine," "heart pine," or some other of many names. The other kind has thick sap-wood, small heartwood, and is called "sap pine," or "short-leaf," or "loblolly." Division into two general classes of lumher based on the thickness or thinness of the sapwood, is practical, and satisfactorily answers general purposes. But there are other differences in appearance which are recognized. The needles of some of the southern pines are long—from eight inches poses. But there are other differences in appearance which are recognized. The needles of some of the southern pines are long—from eight inches to a foot—others are short. Length of leaf is often made a basis for separation, particularly before the trees are cut down. When logs are piled on skidways, exposing their ends to view, it may frequently be noticed that the annual rings of the wood are broad and easily distinguished in some, but narrow, and, for that reason, somewhat obscure in others. At the same time it may be observed that generally, but not always, the logs with thick sapwood have broad rings, while the narrow-ringed logs have thin sapwood and much heartwood. The same characteristics may be noted in sawed timbers of large dimensions. If the trees are observed in the woods, and the logs afterwards examined, it will be found, as a rule, that the pine with long needles produces the log with thin sapwood and narrow annual rings; and, conversely, the logs with broad rings and thick sapwood were cut from trees with short needles. If the logs are followed through the sawmill to the lumber yard, it will usually be found that what is then called "hard pine," "yellow pine," "heart pine," etc., was cut from the long-needled tree; and the "sap pine," "loblolly," and "shortleaf" lumber will come from the tree with short needles.

Among Louisiana mill men, any other names for standing pines than "long leaf" and "short leaf"

with short needles.

Among Louisiana mili men, any other names for standing pines than "long leaf" and "short leaf" are rather unusual. These terms fitly describe the trees as they stand, but botanists go farther than that, and lumbermen will also when the pines become scarcer and the uses for which each one is best fitted are more carefully considered. Instead of two pines, "longleaf" and "short leaf," there are four, and counting two scarce ones, there are six in Louisiana. The four which are pretty abundant are longleaf (that is its true name), Cuban, lobiolly, and shortleaf (that is also its true name). The last three named have short needles, and they are often considered by lumbermen as a single species which is given the common name short leaf. These four trees are common in Louisiana. If all four are considered, they are probably more generally distributed there than in any other state. In North Carolina and Virginia the loblolly prevails; in Florida the Cuban pine is common; in Southwestern Arkansas and Northeastern Texas, shortleaf prevails; but they have all made Louisiana a common home—not necessarily mingled together, but growing somewhere in the state.

Longleaf Pine.

The needles are longer than those of any other southern pine; the wood is heavier than any other, except Cuban pine, and is surpassed in stiffness only by Cuban pine. The sapwood is thin, the annual

[‡]This and the woods which follow were not separately reported but were found in use.

rings narrow. It is the most abundant and the most widely used wood in Louisiana.

Shortleaf Pine.

This wood was reported second only to longleaf pine in amount used, and it goes for similar purposes. It is of more rapid growth than longleaf, consequently the annual rings are usually broader. As the tree approaches maturity the rate of growth is apt to lessen, thus producing rings narrower next the outside of the tree than near the center. The narrow outer rings may resemble those of longleaf pine, but the proportionally larger amount of sapwood is nearly always sufficient to distinguish it from longleaf. It has not the weight, strength, or stiffness of longleaf pine.

Lobiolly Pine.

This tree has broad rings and usually little heartwood, and for that reason would seldom be mistaken for longleaf pine, though it might be for shortleaf or Cuban. It is stronger and stiffer than shortleaf, but is considerably lighter, and a cubic foot of it, well dried, is ten pounds lighter than a cubic foot of longleaf pine. It grows rapidly, and persistently pushes into abandoned fields or other vacant ground. In this respect it is much more vigorous than either longleaf or shortleaf. The two latter show a disposition to contract the areas which they once held, while lobiolly is constantly extending its range. It will probably, therefore, become more important in Louisiana than it now is, and it will be well to reckon with it in figuring on a future wood supply for the state's industries.

Cuban Pine.

This is the heaviest and stiffest of southern pines, but in strength it is a little under longleaf. Its rings are wide and its sap thick. In this respect as well as in other respects, it so much resembles iobiolly that it is frequently mistaken for it. It contains more resin than lobioliy or shortleaf, and compares favorahly with longleaf. It resembles lobiolly in the vigor with which it fights for possession of vacant land. In some regions it is spreading over areas once occupied by longleaf pine. It has been suggested that the Cuban pine entered the United States by way of the Fiorida peninsula and has spread northward and westward. Its range is constantly extending. It is an excellent timber tree, and promises much for the future.

Spruce Pine.

This is one of the minor and little known species of Louisiana, but is a fine wood for doors and interior finish. Only 200,000 feet were reported in the state, and one factory had the whole amount, having procured it in the region of Pearl River in the southeastern part of the state. Its identity was unknown by the factory which was working it, and it was reported as "a cross between shortleaf and cypress." In softness and color it approaches nearer to white pine than any other southern wood. It is of interest to note that this is the only instance where this pine has been reported for manufacturing purposes. Some years ago a little of it was used as masts for small boats on the Florida coast.

Cypress.

This wood stands third in quantity manufactured in Louisiana, amounting to 16 per cent of all used by wood-working factories. There are few trees in the United tSates that will compare with cypress in extent and diversity of use. Nearly two-thirds of the cypress cut in Louisiana's sawmills is sent outside the state in the rough, and it goes into practically every market in this country, and into many elsewhere. It is one of the timbers destined to disappear, for when the swamps where it is now cut have been cleared, there will be no new growth. There is geologic evidence that it has occupied the swamps during an immense length of time, for logs have been dug from deep excavations, the strata of sediment upon them indicating a period of perhaps 30,000 years since they grew. It is remarkable that some of those logs were "pecky," the same as much of present-day cypress is. This disease is caused by a species of fungus (Daedalia vorax), which holiows out little pits in the wood. The cypress is the largest tree of Louisiana. For many years there was exhibited in South Peter street a cypress plank 71 feet long, 42 inches wide and 5 inches thick, with scarcely a blemish or defect visible. It was burned in 1890. An important use for cypress in early times was for dugouts, a kind of canoe hewed from a single log. In late years hoats have taken their place, but some old ones are still to be seen. One made in 1871 was still in service in 1911 on a northern Louisiana river.

Red Gum.

Nearly one-half of the red gum cut in Louisiana is further manufactured after it leaves the sawmill. Five states—Arkansas, Mississippi, Missouri, Tennessee, and Kentucky—cut more of this wood than Louisiana, which produces only five per cent of the total output. This tree is occasionally called "star-leaved gum," "sweet gum," and "sap gum." The last name applies to certain grades of the lumber rather than to the tree itself. The proportion of heartwood and sapwood varies greatly in different trees. Sometimes a large log is nearly all white sapwood; others are largely red or brown heartwood. Two quite distinct classes of lumber are produced, and each has its particular uses. This wood passes under several names. Furniture makers in England often call it "satin walnut," while makers of furniture and interior finish in this country frequently sell it as "Circassian Walnut." If grain and figure are carefully selected, the finished product so closely resembles Circassian Walnut." If grain and figure are carefully selected, the finished product so closely resembles Circassian Walnut. That it is difficult to distinguish one from the other. Much of the "Circassian Walnut" furniture seen in show windows is red gum. Little staining or "doctoring" of the figures is necessary. Red gum may be stained, however, to imitate other woods, particularly white oak, cherry, and mahogany. It may be said with much truth of some furniture factories—not necessarily in Louisiana—that "red gum lumber goes in and white oak furniture comes out." It is one of the finest woods in this country. It is more highly appreciated in Europe than at home, for it is more skillfully handled there than here. Some dealers whose opinions are worthy of consideration believe that before many years red gum will equal or excel white oak in price.

Cottonwood.

This wood grows rapidly, and it has long been a staple article in Louisiana's lumber trade. Complaint is heard that the best grades are becoming scarce. One-fifth of the demand in the state is met by shipments from without. The scarcity of good grades is attributed by some to the large export to Germany and elsewhere of those grades some years ago. This trade is now much smaller. Another drain upon high grade cottonwood has been due to its demand by wagon factories. When yellow poplar a few years ago rose in price so high that its use for wagon beds diminished, cottonwood was found to be one of the best substitutes. The tree grows rapidly, and the soil and climate of Louisiana are suited to its best development, and it may be counted upon to fill an important place in the state's future forest policy.

Tupelo.

There does not seem to be any generally recognized name for the wood in Louisiana. Some call it "bay poplar," others "black gum," or simply "gum," "cotton gum," "tupelo," or some other name. It is a swamp tree, and is usually cut with cypress. The appearance of the tree, if judged by its bark, is like ash; if its leaves are considered, it looks like the true black gum; while in form, but in no other respect, it resembles cypress, as the bases of the trees are frequently much enlarged—a characteristic of swamp-grown trees. The logs have thick sapwood. Formerly much complaint was heard that the lumber was difficult to season; but improved methods have lessened the difficulty.

Black Willow.

There are many species of willow in this country, but practically all the lumber is cut from black willow, which is the common kind seen nearly every where. It is remarkable that the people of Louisiana manufacture into boxes and furniture seven times as much willow as the reported total cut of this wood for the whole United States, as given in the Census of Forest Products in 1909. The discrepancy is in part explained by the custom prevailing in Louisiana of marketing willow lumber and products as cottonwood. It is frequently listed as "brown cottonwood," and in the Census returns, much willow was doubtiess listed as cottonwood. It is strong, tough, cheap and serviceable. The worst thing against it is its color, which is generally quite dark. It is one of the timber trees which will be heard of in the future, for its possibilities are great. It grows rapidly, and such is its tolerance of shade that trunks grow crowded together in such close stand that the like is seldom seen with any other timber. An instance is cited, and is apparently well authenticated, of a tract near the Mississippi River in Louisiana, which was growing cane during the Civil War, but was abandoned because of the frequency of overflow; and since that time more than 100,000 feet of willow per acre has been cut from it. The size of willow logs is often surprising. In the early spring, rafts of this wood may be seen tied up along the Mississippi, above Baton Rouge, the logs of which are two, three, and many four feet in diameter.

Small black willow osiers, one and two years old, are supplied to basket makers in New Orleans. Most of them are cut along the edges of streams and swamps in St. Bernard Parish, east of the Mississippi River. The industry is carried on after the most primitive fashion. The basket makers import cultivated rods from Europe for the visible parts of their wares, hut use wild willows for ribs, stays, hoops, and bands. The cutters go by ones and twos into the swamps, their only tool a pocket knife, and cut osiers where they can find them, seldom asking leave and seldom encountering interference from owners. Long rods are used for bands and hoops; short, stout ones (usually the butts cut from long ones are pressed into service as ribs and stays for lids, sides, and bottoms. The freshly cut rods are usually carried to some log that rises a few inches out of the swamp water, and the operator sits in the shade and peels them, then lays them in the sun to dry. Sunshine whitens the rods, but a shower of rain, or even a cloudy day, will darken them and lessen their value. The cutters have no way of bleaching them white again. The cutting and peeling of 500 to 700 osiers is a day's work, and they sell for 25 to 75 cents a hundred, delivered at the basket factory. The usual size sells for 25 cents. The butts for stays bring 10 to 25 cents a hundred. The rods must be cut "in season" or they are brittle. There are two seasons, one from February to April before the new wood has begun to form under the bark, the other from August to November after the new wood has hardened and grown tough. It was not found practicable to procure statistics of the annual cutting of the wild willow osiers, as the cutters make no reports, and guard their trade secrets with jealous care. The total quantity cut, however, cannot be very large. Some kinds of rough, heavy baskets, for barn, factory, and plantation use, are made wholly of wild osiers.

White Oak.

A number of oaks in Louisiana pass as white oak at the sawmili; and, after they leave the saw mill for further manufacture, it is generally impossible to separate the true white oak lumber from other which passes for it. The difference in the appearance of the woods of several of these oaks is slight, and for all practical purposes it is not necessary to distinguish between any of them.

Hickory.

Five or six hickories in Louisiana pass as one in the factory. Between some of them considerable difference exists in the appearance of the growing tree and of the manufactured wood, but most manufacturers in reporting the use of hickory did not say whether it was shag, hitternut, water hickory, pignut, or mockernut. All of these are used, but the amount of each could not be ascertained. The state has only fairly commenced to draw upon its own hickory resources, and much goes to northern cities for final manufacture.

Texan Oak.

This wood is sometimes called "spotted oak" in Louisiana, but it nearly always is listed as red oak. The true red oak (Quercus rubra) is a more northern wood hut there are a number of excellent timber trees belonging to the red oak group, and Louisiana is well supplied with them. They are broadly distinguishable from the white oak group on account of their sharp-pointed leaf lohes, while those of the white oaks are rounded. However, some oaks in Louisiana that have unlobed leaves are commonly spoken of as red oak—the willow oak for example; and, in practice, it is generally the appearance of the wood and not the shape of the leaves that determines the classification of oak lumber in the mill yard. If the wood looks white, or hears considerable resemblance to genuine white oak (Quercus alha) it is called white oak; otherwise, it is considered to be red oak. Though the manufacturers in the state used a million and three quarters feet of Texan oak, they reported less than twenty thousand feet that could be identified as northern red oak. The locality whence it comes, and the price, assist in its identification.

White Ash.

The word ash in Louisiana means several things; hut white ash is most common and it greatly exceeds in quantity used all other woods that pass through the factories under its name. Among the other woods in the list with this one are green ash, hackberry, and sugarberry. The two last named do not belong in the ash family, but their wood looks somewhat like ash and goes along with it. Both are cut and sold in considerable amounts in the state, and go to the shops and factories, yet not one manufacturer in Louisiana reported their use. In nearly all cases it was

doubtless a matter of mistaken identity—the sugar-berry and hackberry when they reached the facto-ries were supposed to be ash.

Magnolia.

Two magnolias are used by the manufacturers of Louisiana, the evergreen and the sweet. The former is the larger and more valuable tree, and more than one and a half million feet were reported, while the use of sweet magnolia was only 45,000 feet. The evergreen magnolia is praised by some users and condemned by others. Some claim that it is a satisfactory substitute for yellow poplar in many places, while others find fault with hard black flinty streets which the wood some poplar in many places, while others find fault with hard, black, flinty streaks which the wood sometimes contains. The streaks dull tools quickly, and are blemishes on the surface of dressed wood. If the lumber is carefully selected, some high grade stuff can be picked out. Few woods show less uniformity in quality. The white wood in a magnolia tree compares not unfavorably with holly, but is not quite as white. Next to the white portion lia tree compares not unfavorably with holly, but is not quite as white. Next to the white portion may lie wood almost as black as ebony, and there are all shades and colors. A distinct pink sometimes shows when large logs are freshly sawed. It is said that none of the colors are permanent, but the lights grow darker, and the darks lighter with exposure to weather. In rural communities dugouts are made of this wood for navigating rivers and estuaries, and give satisfactory service.

Yellow Poplar.

Louisiana lies on the southern outskirts of the yellow poplar's range, but the supply reported by manufacturers comes wholly from without the state. The saw mills in the state cut a little, but at least part of the small amount comes down the rivers from the north.

Basswood.

The whole reported supply of basswood came from without, though, as with yellow poplar, a little grows in the state. A very small but unique use is made of this tree in the northern parishes. The inner bark, which is tough, soft, and pliable, is braided into mule collars by negroes for use in the small fields and truck patches. Such collars are similar in mechanism to those made of corn husks in pioneer days in the Ohio valley. The braids of bark are sewed together with small splits of cow oak or some other tough wood.

Engelmann Spruce.

This wood does not grow in the south, and it is a matter of surprise that 100,000 feet of it was used by the manufacturers in Louisiana. It comes from the northern Rocky Mountain region.

Black Gum.

When a Louisiana sawmill man speaks of black gum he frequently means tupelo. Black gum is good for a few purposes, and unfit for others. It is unwedgeable, and this property sometimes gives it a value. It makes good rollers, such as are used at the wharfs and landings where boards and planks are unloaded from barges. The lumber is shoved along the rollers from the boat to the land. In Rapides Parish a little black gum lumber is mixed with tupelo and sold as such, and the practice probably obtains elsewhere.

Cow Oak.

This tree belongs to the white oak group, and its lumber is generally marketed as white oak, but a little is sold under its own name. Overcup oak stands in a similar position. Both of these are plentiful in some parts of the state and in some parts baskets are made of cow oak splints—long, narrow ribbons of wood split or drawn from billets. narrow ribbons of wood split or drawn from billets. Such baskets were in general use before the Civil War on plantations, and some are still made and in use there. They are now more frequently seen in laundries and markets where a rough, strong basket is demanded. They are home made, and many of the makers are old people who learned the trade many years ago and now follow it for a livelihood. Chair seats and backs are braided of the same material. Lumbermen in northern Louisians occasionally split capthook handles of the wood. ana occasionally split canthook handles of the wood, and use them in preference to any other native species.

Elm.

Three species of elm go into manufactures in Louisiana, white elm, wing elm, and cedar elm. The first is the common elm, and it was the only one listed in the returns, but the two others are in pretty general use. The woods are similar, and no great difference in leaves or form of trees are noticeable, and furniture and vehicle manufacturers who are the principal users consider the three elms who are the principal users consider the three elms

Mahogany.

Strictly speaking, there is only one mahogany, but several woods are bought and sold as such, and by common consent pass in the markets as maand by common consent pass in the markets as inahogany. Two such woods are reported by the Louisiana manufacturers, one from Mexico (Swietenia mahogoni) the true mahogany, the other from Africa (Khaya senegalensis), which is a very fine wood and is used the world over.

Chestnut.

Practically the entire demand for chestnut in Louisiana comes from the makers of coffins and caskets. The wood does not grow in commercial quantity in the state.

Beech.

Beech in Louisiana usually goes begging. The Census of 1909 reported only seven mills cutting it in the state, and only two manufacturers mentioned it in their reports. However, there is plenty of it growing in the forests of the northern regions, but generally the quality is not good. The trees but generally the quality is not good. The trees lack the smooth, clear boles common in the beech of the northern states. A little flooring is sawed from this wood in the region between Monroe and Shreveport, but elsewhere the lumberman of Louisi-Shreveport, but elsewhere the lumberman of Louisiana passes the beech by, and manufacturers of furniture do not demand it. There is only one species of beech in the United States—the same in Pennsylvania and in Louisiana. The blue beech (Carpinus caroliniana), though bearing some resemblance both in appearance and name, belongs to a different family.

Red Cedar.

This species is scattered over a good deal of Louisiana, but very little goes to saw mills, and Tennessee supplied nearly all that is used.

Maple.

As with oak and elm, several species of maple are classed as one wood. Sugar maple is usually listed separately because it does not grow in Louisiana. Three native maples figure in the supply drawn upon by manufacturers in the state, though the total amount is small. They are silver maple, Drummond maple, and Florida maple. When these are used, they are listed as "soft maple," without further distinction. Makers of violins and gnn stocks have found the Drummond maple in Union Parish of fine quality, with curled grain and bird's eye effect. Makers of bentwood rustic furniture occasionally obtain supplies of Florida maple in the northern part of the state, particularly in Ouachita Parish. Mills in the region where these species grow, saw them and send them to market simply as maple.

White Pine.

For more than a century white pine has been in the Louisiana markets. It does not grow in that state. Within two years after the purchase of Louisiana by the United States, rafts of white pine cut in western New York and northeastern Pennsylvania had floated down the Allegheny, Ohlo, and Mississippi Rivers, 2,000 miles, by the windings of the streams, and were sold at New Orleans for \$40 per thousand. The raftsmen who made these increases were accustomed to return to Pittsburg journeys were accustomed to return to Pittsburg on foot. White pine still goes regularly to Louisiana, but the amount is small and most of it is made into patterns.

Birch.

Two species of birch are listed for use in Louisiana, the sweet birch of the north, and the native birch, or river birch, which is fairly abundant in many parts of the state. The native species lacks figure and grain to make it valuable as furniture wood, but it has many good qualities which will doubtless win for it a place at no distant day in the esteem of Louisiana manufacturers. It will make good frames or cores, upon which to lay veneers of more attractive woods. At present, the whole cut is converted into ox yokes.

Persimmon.

This belongs with minor species as far as manufacturing in Louisiana is concerned. It is a shuttle wood, but shuttles are not made in the state.

Dogwood.

This wood is in the same class with persimmon to use. What is cut goes to northern or foreign shuttle makers.

Osage Orange.

A few planted trees of this species are occasionally cut in the northern part of the state, and are

sent to wagon makers. A little wood is used, as inlay for furniture, tool handles, and novelties. There is no reason to suppose that its importance as a commercial wood will increase in the state. No supply of it is coming on for future use. What little is now out comes from remnants of old bedges little is now cut comes from remnants of old hedges.

Locust.

rather large number of buggy hubs are sold yearly in Louisiana, but few are made there. This is about the only demand for locust. It is not cut in the state, but comes from Kentucky and North Carolina.

Circassian Walnut.

Red gum has made great inroads upon the use of Circassian walnut for furniture and finish, though small amounts of this scarce and expensive wood find their way to this country from regions south of the Caspian Sea. The price of the 1,000 feet reported in Louisiana was \$140, which is very low for this wood. It is procured with diffi-culty in the remote valleys of Asiatic Turkey and Russia, and smaller and smaller amounts reach the market year by year.

Cherry.

This wood is scarce and little thought of in Louislana, and the small quantity cut in the state was reported at ten dollars a thousand feet. It was bought in the log, and the cost of sawing was added to the price.

Catalpa.

This wood will probably never be much used for manufacturing purposes, being more valuable for fence posts. The small amount reported in Louisiana was used for tables, newel posts, and boat knees. Natural crooks were utilized for the knees. It is claimed that artificial crooks may be grown by beging the years tree and compelling it grown by bending the young tree and compelling it to grow in that form. If so, it may attain to some impor-tance in the manufacturing of small boats. Efforts have been made to stain the wood to resemble ma-hogany. It is not difficult to imitate the color, have been made to stain the model hogany. It is not difficult to imitate the color, but the rings of porous springwood are so marked, and are so different from mahogany, that successful imitation is difficult. Neither would it be profitable to substitute catalpa, for the counterfeit would cost more than the genuine article. Catalpa bears the Indian name given it by the Cherokees who once occupied the region northeast of Louisiana. That was the original home of the common catalpa.

Umbrella Tree.

There is little reason to suppose that this tree, whose chief value is in its shade, and in its symmetrical crown, will ever become important as a producer of lumber. However, it posseses some properties which make it interesting. It is a native of India, but flourishes so well in Louisiana that it has escaped from cultivation and is running wild. It is of very rapid growth. Boards clear of knots and sapwood have been sawed in Tangipahoa Parish eight feet long and 15 inches wide from a tree 18 years old. When the tree grows in the open and is cared for, its crown takes the form of an umbrel la, whence the name; but the forest-grown treploses its symmetrical form. Some growing on the borders of swamps in St. Bernard Parish might pass in shape and general appearance for butternut trees There is little reason to suppose that this tree, in shape and general appearance for butternut trees growing in the forests of Pennsylvania. The same growing in the forests of Pennsylvania. The same characteristic may be observed where the trees have escaped from cultivation in the parishes of Lafourche, Terre Bonne, St. Mary, Iberia, and elsewhere in southern Louisiana. The tree's very rapid growth, fine color, and the marked rings of its wood, may lead to its use where novelty of effect is desired. A little furniture and finish are now made of it. The wood does not finish smoothly in an ordinary planer, but sandpapering improves it. The grain is coarse that is, the spring wood is The grain is coarse, that is, the spring wood is very open and porous, while the broader bands of summer wood are dense. The natural color of the wood is reddish brown, the sapwood yellow.

Red Mulberry.

The mention of red mulberry, though the quanty is very small, shows the use of an unusual wood in furniture making.

Willow Oak.

In Louisiana the willow oak is called red oak. Its leaves are willow-shaped and distinguish the tree from any other with which it is likely to be associated. In only one instance is this wood mentioned under its true name in the reports of Louisiana manufactures, yet it is cut by millions of feet in the state. In some localities it is the prevailing species, more of it being found than of any other one species. This is true in the flood plains of many of the streams in Chatahoula, Caldwell, and

Ouachita Parishes, and also in many other parts of the state. Perhaps no other hardwood in Louisiana promises as much for the future as willow oak. It grows rapldly, assumes good shape of trunk in forest situations, and has many good qualities. The court house square at Monroe, La., contains a number of planted trees of this species. Two were sawed down in the spring of 1911. Annual rings showed them to be 55 years old, sound, and free from shake. At 3 1-2 feet from the ground one was 42 inches in dlameter, the other 49 inches. During the first thirty-five years these trees grew from two-thirds of an inch to one and three-fourths of an inch in diameter per year. The sapwood of each was about three inches thick. The general appearance of the heartwood resembled that of northern red oak. The logs cut from the trees scaled 1300 feet, board measure, for the smaller, and 1700 for the larger, representing a growth of lumber of about 28 and 31 feet per year respectively. It is evident that a woodlot of such trees, planted and cared for under forestry methods, would produce lumber in large amounts. When the time comes for the people of Louisiana to plant forests, the willow oak will doubtless merit a prominent place in wood supply. The stumps, and part of the trunks, of two other willow oaks in a vacant square in Monroe were still larger. One was 60 and the other 61 inches in diameter, breast high, the age of one having been 69 and the other 70 years, as shown by the rings. Calculations based on the stumps and the portions of the trunks remaining on the ground indicated that one tree contained 3450 and the other 3555 feet of lumber. During their growing periods one laid on approximately 49 and the other 51 feet, board measure, of wood a year.

It is remarkable how different are the opinions

expressed of the value of willow oak for manufacturing purposes. It is praised and condemned. Those loudest in its condemnation base their objection upon the difficulties encountered in seasoning the wood. Others complain of no such difficulty. In some instances men disparage willow oak when they have in mind water oak (Quercus nigra), a tree baring some resemblance, but of a different species. Even water oak, upon better acquaintance, will probably be found much better than its present reputation. Tupelo was once considered a nuisance, but it is now valuable. One by one the rejected woods are coming into favor, as men learn how to handle them, and find out what they are good for. Willow oak is coming into its own in Louisiana now, and water oak will follow at no distant day, for the small matter of seasoning a wood cannot long keep it out of use. Since these two oaks seem to promise much in the future, particular care was had to inquire into their uses in different localities, while prosecuting the field work connected with this investigation. An examination of the list of uses for various woods, beginning on page 30 of this report, will show that Willow oak and water oak compare favorably with most other species.

UNREPORTED WOODS.

An inspection of Table 1 will show that several of the woods listed are accompanied by no figures giving the feet used annually. That is because no manufacturer listed those woods. As far as reports sent in by the makers of furniture, finish, boats, vehicles, and other commodities are concerned, the list of woods in the table might have ended with lignum-vitae. That wood in the table, however, is followed by twenty-four others. Some of these have been mentioned in the foregoing discussion, where they were included under the names of others, as the elms, hickories, and maples, and the reason for including others, though not mentioned by any manufacturer, will now be given.

During the progress of the field work in Louisiana, many parts of the state were visited, and it was discovered that several woods were being cut in the forests, sent to saw mills, cut into lumber, and at that stage they disappeared from view. If this lumber were used in the rough—as In construction of buildings, fences, and the like, and was not further manufactured—this investigation was done with it; for it took into account such lumber only as passed through further stages of manufacture. Careful inquiry developed the fact that much of the lumber which, under its own name, had dropped out of sight after it left the saws, was being shipped to factories under other names, or by no names at all. In addition to this, a few woods were used in a small way locally, perhaps not passing through a manufacturing plant.

American Holly.

A small holly tree is occasionally cut in Louisiana, and goes to the brush makers, or is converted into small articles, such as surveying instruments, or small boxes for handkerchiefs and collars.

Black Jack.

This oak is always rather small and generally of poor quality. It is abundant in Louisiana, and the wood serves as repair material for heavy wagons, and sometimes goes into new vehicles. Chair makers buy it, and a little is made into other furniture. It seems to be more in favor in Grand and Rapides Parishes than elsewhere in the state, and it is not unusual to see black jack logs on skidways, trucks, and at mills in that region. Logs above eighteen inches in diameter are uncommon.

Chittimwood,

and its near relative, Buckthorn Bumelia or Southern buckthorn, are used for crosscut saw bandles, small cabinet work, sometimes for box lumber, and fence posts. Only occasionally are these woods large enough for saw timber.

Honey Locust and Water Locust.

These two thorny trees, the latter generally smaller than the first, are nearly always considered to be one and the same in Louisiana, where their common name is "thorntree." In the Red River Valley, sawlogs two feet in diameter are sometimes seen, but that size is unusual. The lumber is rough, coarse, and is little thought of. Some of it goes to furniture factories, but may be employed as crating material only. Carpenters lay it for subfloors—the rough floor which is to be covered with some better wood. The trees are so little valued that unless quite convenient, they may be passed by in logging operations.

Live Oak

This tree is abundant in the flat, coast regions of Louisiana, and is found in all parts of the state.

It was once valuable as ship timber, but it is now one of the most neglected woods in this country. The unshapely trees are unsultable for saw logs. A little of it goes to vehicle factories, but no other use, except fuel, could be found for it in Louisiana.

Pecan.

This tree is "pecan" where it grows for ornament and bears nuts, but when it is cut and goes to the vehicle factory it becomes "hickory." It is not regarded as the equal of the other hickories to which it is related, and that is perhaps the reason why those who use it do not list it by its true name.

Spanish Oak, Turkey Oak and Yellow Oak

are regularly cut by the hardwood mills in the northern parts of Louisiana, and the operators occasionally recognize them; but when the lumber goes to the furniture factory and vehicle shop it is called either red oak or white oak.

Sassafras

Though sassafras is seldom mistaken for any other wood, it was not reported by any manufacturer in the state. Some of it is cut, however, in the northern parishes, and one of its uses is for flooring. Cabinet makers buy it and make wardrobes and clothes chests of it. It is highly esteemed along the rivers of northern Louisiana for dugout canoes, being light, long-lasting, and not liable to split or check by action of the weather. The sassafras trees of Louisiana are generally too small for canoes, for the species there approaches the southern limit of its range. Rivermen in need of dugouts watch the streams that flow from Arkansas, and gaff choice sassafras logs as they float down on floods, and these supply their wants.

PLANING MILL PRODUCTS. Table 2. PLANING MILL PRODUCTS.

			Grown	in Louisiana.	-Grown Ou	tside La.
	Av.	cost		Av. cos	t	Av. cost
	uantity per			per 1,00	0	per 1,000
used	annually fee			ntlty feet at	Quantity	feet at
Species— (F	t. B.M.) fact	ory. Total	cost. (Ft. 1	B.M.) factor	y. (Ft. B.M.)	factory.
Longleaf pine 64	4,321,266 \$1	0.50 \$ 6,76	4,976 641,5	21,266 \$10.4	9 2,800,000	\$12.86
Shortleaf pine 37'	7,476,618 1	0.50 3,96	4,941 374,4	76,618 10.5	2 3,000,000	9.00
Cypress 18	4,210,000 1	6.21 2,98	5,611 184,2	10,000 16.2	1	
Lobiolly pine	7,500,000 1	2.00	0,000 7,5	00,000 12.0	0	
Tupelo	5,000,000	8.50	2,500 5,0	00,000 8.5	0	
	3,635,000 1	5.95	7,995 3,6	35,000 15.9	5	
Texan oak	1,063,000 2	4.99 2	6,563 1,0	63,000 24.9	9	
Totals	3,205,884 \$1	1.39 \$13,93	2,586 1,217,4	05,884 \$11.4	0 5,800,000	\$10.86

Nearly all manufacturers of wood products use machines of some sort to dress lumber and to that extent most of the output of such factories might be classed as the product of planing mills. The accompanying table (No. 2), however, does not include so much. What appears in this table does not appear in other tables of this report, except that there may be slight and unavoidable duplication in a few particulars, for it is impossible to trace all lumber from the sawmill to the last manufacturer who handles it before it becomes a finished product. The manner in which the statistics for this report were collected and compiled made it possible to so check and cross-check the items that few, if any, of them appear in more than one table, and there is, therefore, practically no duplication.

A considerable part of Table 2 consists of floorlng, siding, car roofing and siding, fencing, and heavy timbers, but it was not found practicable to separate these items into classes, to make a table (or industry) of each class. Many of the large mills in Louislana plane boards, planks, and dimension stocks simply to lessen the weight and reduce freight charges on long hauls. Items of this kind figure prominently in the table. Timbers of large size, for bridges, trestles, and large buildlngs, are occasionally surfaced by the mill that saws them. This item appears also in the table.

saws them. This item appears also in the table.

Louisiana supplies practically all of the wood listed in table 2. A little longleaf pine came from Mississippi and some short leaf pine from Texas, and none from elsewhere. A large part of the material reaches the mill as logs. The bulk of the output is from large mills which do their own logging. The low average price of the lumber is due to that fact, and the price is made up,chiefly, of stumpage, cost of logging, the cost of sawing, and the handling at the mill up to the time it reaches the planer. Some of the mills in giving the cost of the rough lumber when it reaches the planer omit the item of "depreciation of plant." That is as much a charge against the lumber as any other

Item is, for a plant, costing perhaps one hundred thousand dollars, will wear out, and if the work is to continue the plant must be replaced, and at any event, the cost of the plant constitutes part of the cost of the lumber sawed. With this explanation, it will be apparent that the average costs in the table are a little too low, though the difference is very small in most cases.

table are a little too low, though the difference is very small in most cases.

The market for the planing mill products of Louisiana is both domestic and foreign. Shipments go regularly to all parts of the United States. The foreign demand is large and in many countries. Canada and Mexico are important buyers, and nearly every seaport and many interior cities of the West Indies, Central America, and South America draw supplies of this material through New Orleans, and other ports on or near the Gulf of Mexico. Large quantitles go to England and Scotland, to Germany, France, Belgium, Italy, and Spain. In northern and western Europe the hard pine of Louisiana competes with the pine from the Baltic Provinces which once nearly monopolized the European markets. The southern pines have been able to gain and hold a considerable part of that market. South Africa is a large buyer of pine from the Gulf region.

Table 3 compares the planing mill output of Loulsiana with certain other states. In order to make the basis for comparison the same for the several states, tables 2 and 6 for Louisiana are combined, because the figures for the other states represent a combination of similar products.

Table 3.

Planing Mill Products of Louisiana Compared with Certain Other States.

	Quantity used	Average cost	No. of
States.	annually	per 1000 feet	woods
	Feet B. M.	at factory.	used.
Louislana	. 1,259,775,551	\$11.52	15
North Carolina.	. 368,016,000	12.59	14
Wisconsin	174,185,000	30.19	25
Maryland	81,356,000	27.46	23

65,825,000 20 Oregon Kentucky 41.259,000 24.27 22 34.15 28 Massachusetts ... 21,795,357

Louisiana's output is nearly twice the combined output of North Carolina, Wisconsin, Maryland, Oregon, Kentncky and Massachusetts. Its raw material is much the cheapest, the nearest above it being North Carolina's. Large as is the planing mill output in Louisana, as shown in the table, the figures there given are known to be too small. In making their reports, upon which these figures are based, some of the mill operators in Louisiana did not understand that the output of planing mills was desired, and the item was omitted. The error due to that misunderstanding was corrected, as far as it was practicable to do so, but a complete revision of the reports was not practicable. Therefore, Louisiana's enormous total planing mill output, exceeding one and a quarter billion feet as shown—table 2—is slightly under the true amount. It equals nearly three per cent of the entire lumber cut of the United States in 1909, and 35 per cent of the cut in Louisiana for that year. There are thirty-one states, each of which has a total lumber cut smaller than the planing mill output of Louisiana, and some of these states are important producers of lumber. Among them are Tennessee ducers of lumber. Among them are Tennessee, Florida, California, Maine, Missouri, and Kentucky.

Considering the large output of the planing mills, few efforts at utilizing waste are reported. The shavings are usually burned as fuel under the boilers, and in some instances are sold for bedding for horses. Pine scraps in some cases are disposed of to distillation plants, and are converted into tar, charcoal, and other commodities. The pine shavings alone—exclusive of dust from the saws—is an enormous item in Louisiana. If each thousand feet of lumber going through the planer loses 500 pounds as shavings, the total in the state is 250,000,000

BOXES AND CRATES.

Table 4.

BOXES AND CRATES.

				Grown in Lou	ilsiana	Grown Out	side La.
		Av. cost			Av. cost		Av. cost
	Quantity	per 1000			per 1,000	p	er 1,000
The state of the s	ised annuall;	y feet at		Quantity	feet at	Quantity	feet at
Species—	(Ft. B.M.)	factory.	Total cost.	(Ft. B.M.)	factory.	(Ft. B.M.)	factory.
Cottonwood	12,710,000	\$10.84	\$137,730	10,210,000	\$10.70	2,500,000	\$11.40
Red gum	10,622,000		110,575	7,972,000	10.23	2,650,000	10.94
Black willow	8,507,500		60,500	4,507,500	7.21	4,000,000	7.00
Shortleaf pine	8,369,000	9.97	83,430	5,939,000	9.77	2,430,000	10.45
Tupelo	6,145,000	9.30	57,175	3,895,000	9.61	2,250,000	8.77
Cypress	4,230,000	9.92	41,960	4,080,000	9.88	150,000	11.00
Longleaf pine	2,975,000	9.63	28,650	2,195,000	9.50	780,000	10.00
Exergreen magnolia	1,516,000	12.30	18,644	1,266,000		250,000	15.00
Texan oak	200,000	5.00	1,000	200,000	5.00		
White oak	200,000	5.00	1,000	200,000	5.00		
Basswood	160,000	20.38	3,260			160,000	20.38
Black gum	120,000	7.91	950	120,000			
Loblolly pine	100,000	7.50	750	100,000			
Cuban pine	50,000		350	50,000	7.00		
Yellow poplar	50,000		1,000			50,000	20.00
Sweet magnolia	45,000		365	45,000			
Beech	5,000	9.00	45	5,000	9.00		
Totals	56.004.500	\$9.77	\$547.384	40.784.500	\$9.79	15,220,000	\$9.73

Louisiana box makers sell their wares in many northern and western states, and also in Mexico, Central America, the West Indies, and in Europe. Orange and lemon boxes constitute an important part of the shipments to the republics south, and much of the wood is tupelo. It is a favorite material for macaroni boxes for domestic trade, and yellow poplar and basswood are put to some use for the same purpose. The white color of cottonwood, which makes it suitable for stenciling, causes its employment for cracker boxes, not only in this country, but in Germany and England. Boxes shipped to foreign countries, as well as those to neighboring states, go in the knocked down form, as shooks, and are nailed in final form when they reach their destination. The West Indies countries which buy boxes in Louisiana are Cuba, Porto Rico, and Jamaica; and on the mainland are Mexico, Honduras, and Panama. The available statistics do not show the quantity or value of boxes sold to the export trade. Boxes for both domestic and foreign markets are of white woods if it is desirable to Louisiana box makers sell their wares in many export trade. Boxes for both domestic and foreign markets are of white woods, if it is desirable to print or stencil upon them; and when this is not necessary, darker woods will answer. Cottonwood, yellow poplar, basswood, tupelo, the sap of red gum, and the pines, are generally of sufficient whiteness to be unobjectionable from the stenciler's view point. Evergreen magnolia, which is rapidly taking its place as a boxwood, is uneven in color. Some of it is nearly as white as basswood, but much is very dark, almost as black as persimmon, and of course is unsuited to stenciling or printing. Occasionally black streaks disfigure boards otherwise white enough. Much magnolia is made into small white enough. Much magnolia is made into small berry crates, or crates for vegetables, and goes to market plain. Some serves as sides of crates, and boxes, while cottonwood, or some other white wood, is employed as ends, and takes the stenciling. Magnolia is tough and strong, and compares favorably with the best box lumber in these particulars. The high price paid for it is evidence of its value. A large part is converted into veneer by the rotary

Willow, if judged by quantity, is the most important of the dark woods employed in the state as box material. It is tough, light, strong, and cheap. The hlack willow (the common willow in most parts of the United States) is the only one cut for lumber in Louisiana. About half of the supply is home grown and the representations of the supply is home grown. and the remainder comes from Mississippi and Ar-kansas, being floated down the Mississippi River in rafts. Logs three feet in diameter are frequent, and a few exceed four feet. Much of the willow lumber

is marketed as "brown cottonwood." Like magnois marketed as "brown cottonwood." Like magno-lia, the wood of different trees shows many colors and shades. Some is nearly white when freshly sawed, and changes to a darker shade as it seasons; other is brown, or deep purple, or nearly black when first cut into lumber, but fades while drying. Thus, what was light at first becomes darker, and that which was dark when newly cut, changes to a lighter shade in seasoning, and when finally sea-soned, all presents nearly the same appearance.

The largest users of willow boxes are meat packers in Kansas City, Omaha, St. Louis, and Chicago.
The black gum reported was cut into rotary

veneers and was made into berry crates and vegeta-ble containers. In some parts of Louisiana tupelo is called black gum, and it is not improbable that some of the 120,000 feet reported in table 4 as black gum was tupelo. The two trees bear little resem-blance, except that their leaves are somewhat similar in shape. The wood of black gum is tough, with scarcely any figure in the grain, and the fibers are so interlocked that splitting is next to impos-

The basswood was all reported cut outside the state, but the low price suggests that some of it may have come from the forests of northern Louislana. It is not an abundant wood in the state, however. The most of that reported was used as crating for shipments of doors and sash. Jobbers insist that these must be put up in attractive crates in order to sell to advantage.

Wirebound boxes for roasted coffee constitute part of the box exports to Europe, and red gum is preferred for that purpose. The domestic purchasers of coffee boxes likewise prefer red gum.

The 5000 feet of beech was manufactured into lids for vegetable and berry crates.

lids for vegetable and berry crates.

The well-managed box factory has little ultimate waste. The veneer machines accumulate cores—the hearts of logs left after the rotary veneer is cut off—and these would constitute a heavy waste were they not worked into other commodities. Some factories saw them into cleats for crates, lids for small containers, and narrow box lumber; while others install machines to cut the cores into excelsior. In the larger towns it is generally profitable to sell sawdust to stables for horse bedding. This is a common mode of disposing of sawdust in New Orleans, where the damp floors of many of the stables require frequent renewals of the bedding.

Six states contribute to Louisiana's box lumber

Six states contribute to Louisiana's box lumber supply. Nearly all of the outside material comes from the neighboring regions of Mississippi and Arkansas. The yellow poplar and basswood are credited to Wisconsin, Kentucky, and Tennessee.

Table 5.

The Box and Crate Industry in Louisiana Compared with Certain Other States.

	Quantity used	Average cost	No. of
States.	annually	per 1000 feet	woods
	Feet B. M.	at factory.	used.
Illinois	372,025,000	\$15.31	30
Massachusetts	351,941,350	16.02	23
Maryland	136,273,000	13.31	17
Wisconsin	119,267,000	13.09	18
Kentucky	109,567,000	15.36	16
Oregon	77,946,500	11.92	8
North Carolina .	68,064,000	9.56	7
Louisiana	56,004,500	9.77	17

SASH, DOORS, BLINDS AND GENERAL MILL WORK.

Table 6.

SASH, DOORS, BLINDS AND GENERAL MILLWORK.

				Grown in Lou	lsiana.	Grown Out	side La.
		Av. cost			Av. cost		Av. cost
	Quantity			I	per 1,000	1	per 1,000
	used annually		100000	Quantity	feet at	Quantity	feet at
Species-	(Ft. B.M.)	factory.	Total cost.	(Ft. B.M.)	factory.	(Ft. B.M.)	factory.
Cypress	16,071,000	\$20.97	\$337,025	16,071,000	\$20.97		
Longleaf pine	15,691,608	14.39	225,748	15,691,608	14.39		
Shortleaf pine	3,045,000	19.24	58,595	3,045,000	19.24		
Red gum		12.00	6,600	550,000	12.00		
Loblolly plne		19.95	10,075	505,000	19.95		
Texan oak		12.00	3,790	315,750	12.00		
Spruce plne	200,000	20.00	4,000	200,000	20.00		
Engelman spruce	100,000	54.00	5,400		*	100,000	\$54.00
White oak	61,000	60.30	3,678	61,000	60.30		
Yellow poplar	11,933	40.98	489			11,933	40.98
Red oak		43.94	389			8,853	43.94
Sweet birch		53.78	242			4,500	53.78
Mahogany		103.32	364			3,523	103.32
Cherry		120.00	120	*****		1,000	120.00
Black walnut	500	100.00	50			500	100.00
Totals	36,569,667	\$17.95	\$656,565	36,439,358	\$17.82	130.309	\$54.13

The line separating the material grouped in Table 4 from that included in Table 6 is, in many instances, difficult to draw. The manufacturers who report one or both of the classes do not always distinguish one from the other. "Planing Mill Produccts," as the term is used in Table 4, is very general in its application, and, as it is explained in the discussion following that table, might including anything which passes through a planing mill. "Interior Finish," and included with it sash, doors, blinds, frames, stair material, etc., is more restricted in meaning, and it is practicable to separate it from meaning, and it is practicable to separate it from planing mill products in general.

Louisiana is a large producer of doors, sash, and kindred products. The hulk of this output is made up of four woods, cypress, longleaf pine, shortleaf pine, and red gum, the relative quantity of each following the order in which they are here named Lobiolity pine is only a little below red gum, and spruce plne appears in no other industry of this report. This wood should not be confounded with spruce cut in the northern part of the United States. It is a product of southeastern Louisiana, is very soft, of attractive grain, and otherwise more nearly resembles white pine than any other wood of the Gulf region.

Engelmann spruce, a wood of the northwestern part of the United States, appears nowhere else in this report, and no satisfactory reason has been given for the use of this wood among and in competition with the chardent and cheen and tition with the abundant and cheap soft woods of the South. It is good material, and is widely used for doors, sash, and frames, but its appearance in rather large quantity in Louisiana was scarcely to be expected.

The difference in price between Texan oak and the northern red oak, where both are employed in the same classes of work, is well shown in this in-dustry. The red oak costs three and a half times as much as the Texan or spotted oak

The yellow poplar demanded by this industry was cut in Kentucky, sweet birch in Wisconsin, cherry in Pennsylvania, black walnut in Arkansas, red oak in Kentucky, Engelmann spruce in Washington, and the mahogany—of which two kinds were used—was brought from Central America and Africa.

Louisiana sells its interior finish, doors, sash, etc., in nearly all states in the union. The product competes in the North and Northeast with spruce, oak, basswood, yellow poplar, and white pine; in the

far West it competes, but to a less extent, with red-wood, western red cedar, Douglas fir, and the white and yellow pines of the Pacific coast and the Rocky and yellow pines of the Pacific coast and the Rocky Mountains; and in the middle region, from Mexico to Canada, it shares the trade with the similar products of both East and West. A wide foreign market is supplied also. It has not been the purpose of this investigation to trace the shipments to their ultimate destinations, but it may be stated that they go to practically every civilized country in the world, but chiefly to the West Indies, and the eastern countries of Central and South America, including Mexico.

A small quantity of the lumber shown in the fore-

A small quantity of the lumber shown in the fore-A small quantity of the lumber shown in the foregoing table was made into grain doors which were sold to rallroads. Similarity of name is the sole reason why this commodity was included in the table. The doors are not for houses or offices, nor does the "grain" refer in any way to painting, finish, or texture or figure of the wood. The doors are of cheap lumber, roughly nailed together, and are used as inside doors of cars in which grain is shipped. Their purpose is to prevent the contents of the car from wasting when the outside doors are opened. opened.

The commodities included in Table 6 are gener-

ally made of the best or second best grades of lumally made of the best or second best grades of lumber, though in some instances lower grades were reported. The sizes and forms in which this lumber reaches the factories are many; but perhaps three-fourths of it is one-inch stock, and the remainder ranges in thickness up to three inches, or more in some kinds of stair work, posts, and columns. Nearly all reaches the factory as rough, unplaned lumber, and in a few instances it comes as logs and is converted into lumber on the premises.

ber, and in a few instances it comes as logs and is converted into lumber on the premises.

It was found generally in Louisiana that mannfacturers of interior finish and related products work their waste into other commodities and sell them wherever a convenient market can be found; but the lack of diversified industries, as such exist in some of the northern states, renders it impracticable in many instances to utilize odds, ends, and left-overs. In such cases a good deal of wood goes to the furnace in the mill yard, or feeds the fire under the boilers. Sometimes edgings are made into molding, lath, or spindles; short boards are converted into boxes, wedges, mutts, etc., short squares into table legs, balusters, or chair stock; while cypress pieces are frequently sent to factories which make washing machines, tubs, buckets, and which make washing machines, tubs, buckets, and

FURNITURE. Table 7. FURNITURE.

				Grown In Louisiana.—Grown Outside La.			
		Av. cost			Av. cost		Av. cost
	Quantity	per 1000		1	per 1,000	1	per 1,000
	used annuall;	y feet at		Quantity	feet at	Quantity	feet at
Species—	(Ft. B.M.)	factory.	Total cost.	(Ft. B.M.)	factory.	(Ft. B.M.)	factory.
Red gum	3,415,000	\$11.03	\$37,672	3,315,000	\$10.91	100,000	\$15.00
Cypress		10.68	25,155	2,355,500	10.68		
White oak		15.64	13,505	860,000	15.43	3,300	71.21
White ash		19.39	12,505	595,000	19.76	50,000	15.00
Yellow poplar		15.76	5,390			342,000	15.76
Cottonwood		18.75	3,750	200,000	18.75		
Texan oak	175,000	6.29	1,100	175,000	6.29		
Loblolly pine	. 100,000	12.00	1,200	100,000	12.00		
Evergreen magnolla	. 85,000	16.65	1,415	85,000	16.65		
Longleaf pine	60,000	18.00	1,080	60,000	18.00		
Shortleaf pine		12.00	600	50,000	12.00		
Black willow		15.00	600	40,000	15.00	.,	
Sugar maple		36.00	1,080			30,000	36.00
Red cedar		38.00	760			20,000	38.00
Red oak	. 2,000	60.00	120			2,000	60.00
White pine	. 1,000	48.00	48			1,000	48.00
Mahogany		140.00	140			1,000	140.00
Totals	. 8,384,800	\$12.66	\$106,120	7,835,500	\$12.27	549,300	\$18.25

Except cypress, practically all the furniture made in Louisiana is of hardwood. Cypress is one of the few soft woods which is well suited to both outside few soft woods which is well suited to both outside and interior furniture construction, and that fact accounts for its large use as furniture material. The cut of this wood in the state exceeds nearly threefold the combined cut of all the hardwoods, but nearly two and a half times as much hardwood as cypress is demanded by the manufacturers of furniture. Seventeen woods are used, but six of them come wholly from outside the state. Many grow in commercial quantities in the state but are not listed in the statistics of lumber bought for furniture. Three oaks are reported, but there are sevniture. Three oaks are reported, but there are several others, while hickory and tupelo, both abundant, are not reported by any manufacturer of furniture. Three maples grow in the state, yet none of the wood reaches the furniture makers. The small ture. Three maples grow in the state, yet none of the wood reaches the furniture makers. The small quanlitity of sugar maple reported was grown in Wisconsin. Beech is abundant in many of the forests of northern Louisiana, and is good material for certain parts of furniture, yet none is used. Two species of elm are found, both excellent chair material and suitable for the interior of most kinds of furniture, yet elm is not found in the furniture statistics of the state. More than a dozen other good furniture woods grow in the state, but apparently are not used.

The red gum reported came from Louisiana and Mississippi; yellow poplar from Tennessee and Mississippi; red cedar from Tennessee; white oak from Louisiana, Oklahoma, and Tennessee, and the mahogany from Cuba.

Red gum enters into all parts of furniture, both exterior and interior. Yellow poplar serves chiefly for shelves, table tops, and wardrobes. Magnolia is substituted for yellow poplar with general satisfaction, and is specially commended for furniture doors. It keeps its shape well during weather changes. The discolored heartwood of some of the logs is sawed into crating lumber for use in furniture factories. Red cedar is occasionally demanded

changes. The discolored heartwood of some of the logs is sawed into crating lumber for use in furniture factories. Red cedar is occasionally demanded for drawer bottoms when furniture is made to order. Its odor is reputed to drive moths away, and though it is an expensive wood, the demand for it continues from generation to generation. It has been used during three hundred years in this country to keep injurious insects away from clothing and furs.

Although the furniture factories of Louisiana fail

much short of supplying the home demand, they export to Central and South America, the West Indies, and a little to Europe. The low cost of raw material, the low freight rates by water, and the high prices received in foreign countries, make the export of furniture profitable in Louislana. At the

same time, the indications are that some of the good home markets are neglected. It is said that red gum furniture, made in northern cities, is sold in considerable quantity in New Orleans and other towns of the state. Not infrequently it passes for Circassian walnut, and so closely resembles it that the difference is hard to detect—in fact, it is claimed that the chief difference is that the red gum is handsomer.

The furniture factories of the state do not report much saving of waste through the making of by-products. Some of the short pieces of oak are sold for heading material in cooper shops; red gum short lengths are made into boxes; and cypress odds and ends are converted into tubs, fence lath and tomato sticks

A comparison of Louisiana with certain other states in the manufacture of furniture will show how small a beginning it has made in this industry. The difference brought out by the comparison is emphasized if the forest resources of Louisiana are compared with those of some of the states which are far ahead of it in furniture manufacture. It is not possible to say exactly what the timber resources of the different states amount to in feet or dollars, but it is known that Louisiana has enor mous supplies of both hard and soft woods. Acre or dollars, but it is known that Louisiana has enor mous supplies of both hard and soft woods. Acre for acre of forest area, Louisiana will compare favorably with any other state, both in quantity and quality of timber. The table which follows compares the furniture industry in Louisiana with certain other states, also the timbered areas, and shows how much furniture wood each of the states uses yearly per 100 acres of forest land.

Table 8.

The Furniture Industry in Louisiana Compared with Certain Other States.

States.	Quantity used annually. Feet B. M.	Average cost per 1000 ft. at factory.	Number of woods used.	Area in forest acres.	Amount used for furniture per 100 acres of forest feet B. M.
North Carolina	182,861,250	\$18.00	18	22,592,000	809
Illinois	123,643,930	37.89	41	6,518,000	1897
Wisconsin	48,376,000	25.22	15	20,320,000	238
Massachusetts	48,143,300	28.36	23	2,688,000	1791
Kentucky	26,577,100	26.63	26	14,218,000	187
Maryland	17,774,675	29.32	24	2,816,000	631
Oregon	8,853,250	22.48	23	34,752,000	26
Louisiana	. 8,384,800	12.66	17	18,208,000	46

The foregoing table would be misleading if interpreted to mean that each of the states draws furniture material from its own forests only. No state in this country does that. There is a constant exchange of lumber between different regions, and often these regions are far apart. The Pacific Coast draws supplies from the East, and the East draws from the Pacific Coast; Wisconsin manufacturers send to Louisiana for cypress, Maryland buys cottonwood, white oak, and cypress there, and Louisiana in turn purchases white oak in Tennessee, cottonwood in Mississippi, and cypress in Arkansas. Statistics show that Louisiana actually uses a less amount of its homegrown lumber in its own furniture factories than it ships to the furniture factories The foregoing table would be misleading if interture factories than it ships to the furniture factories

The table is instructive because it shows how great may be a region's forest resources, and how moderate the use made of them at home, as in Louisiana's furniture industry; while, conversely some regions with comparatively small resources of the hind demanded, have developed extensive industries by drawing supplies from distant localities, as in the cases of Massachusetts, Maryland, and Illinois. A very high development of home resources is seen

in North Carolina's furniture industry which draws 94 per cent of its wood from the state's forests; and with a wooded area but little larger than Louisi with a wooded area but little larger than Louisiana's, it turns into furniture more than twenty times as much lumber, and pays nearly one and a half times as much for it, per thousand feet. Illinois furniture makers pay three times as much per thou sand feet for their lumber as the manufacturers in Louisiana pay, and Massachusetts, Kentucky Wisconsin, and Maryland pay more than twice as much. The markets in which the finished products are sold are not equally accessible to all these states, for Louisiana, by reason of higher freigh rates, is at a disadvantage in competing for some of the northern markets. There are, however many markets where the Louisiana product competes with little or no disadvantage on account of higher little or no disadvantage on account of higher freight. Water carriage is cheap, and the ports of freight. Water carriage is cheap, and the ports of Louisiana are within reach of the whole Atlantic Coast from Maine to Florida, as well as the Wes Indies, and most of the Spanish-American and European countries. The possibilities of developing a trade in furniture manufactured from the excellent and very cheap woods of Louisiana, will doubtless attract much attention in the near future

VEHICLES AND VEHICLE PARTS:

Table 9.

VEHICLES AND VEHICLE PARTS.

			Grown In Louisiana.—Grown Outside La.						
		Av. cost Av. cost							
	Quantity	per 1000		1	per 1,000	I	per 1,000		
	used annually	y feet at		Quantity	feet at	Quantity	feet at		
Species—	(Ft. B.M.)	factory.	Total cost.	(Ft. B.M.)	factory.	(Ft. B.M.)	factory.		
White oak	3,189,300	\$12.61	\$40,203	3,189,300	\$12.61				
Hickory	2,963,800	26.54	78,663	2,963,800	26.54				
Cow oak	90,000	13.89	1,250	90,000	13.89				
Overcup oak	90,000	13.33	1,200	90,000	13.33				
Beech	35,000	20.00	700	35,000	20.00				
Yellow poplar	30,000	50.00	1,500	22,000	40.91	8,000	\$75.00		
Red gum	30,000	20.83	625	30,000	20.83				
White ash	26,250	39.24	1,030	26,250	39.24				
Longleaf pine	16,000	26.56	425	16,000	26.56				
Texan oak	10,500	25.71	270	10,500	25.71				
Shortleaf plne	2,500	26.00	65	2,500	26.00				
Locust	2,200	61.36	135			2,200	61.36		
Red oak	2,000	60.00	120			2,000	60.00		
Cypress	2,000	• 45.00	90	2,000	45.00				
Evergreen magnolia	500	22.00	11	500	22.00				
Totals	6,490,050	\$19.46	\$126,287	6,477,850	\$19.36	12,200	\$70.08		

Except a little yellow poplar, locust, and red oak, Louisiana depends entirely upon its own forests for vehicle wood. The poplar is made into panels for carriages, the locust into hubs, but the use to which the 2,000 feet of imported red oak is put is not stated. Oak and hickory are the most important woods in this industry. Four oaks are included, namely, the common white oak, the cow oak, the overcup oak, and the Texan oak, which is commonly called red oak, or spotted oak. Louisiana is a large user of hickory, and it nearly all goes into vehicles. Most of the hickory cut in the state is shipped to the other states rough or only partly manufactured, there to be finished and made ready for use. The cut of hickory lumber in the state is nearly eight million feet, besides much not listed as lumber which goes out as logs, bolts, or billets. The manufacturers in the state use less than three The manufacturers in the state use less than three million feet of this fine vehicle wood. A consideraable part of that appearing in the accompanying table as manufactured product, is not in the form of table as manufactured product, is not in the form of vehicles ready for use, but as completed parts, such as spokes, hubs, shafts, poles, and gears. These are shipped to northern factories where they are assembled, ironed, painted, and sent out as finished vehicles. It is not possible to state how much of Louisiana's six and a half million feet of vehicle wood shown in the table is actually finished in the state and made ready for the consumer. Vehicle making in many regions is somewhat different from most other kinds of manufacturing because it is most other kinds of manufacturing, because it is rather unusual for one factory to begin with the rough wood and turn out the completed vehicle; but the finished product of one concern becomes the raw material for another, thus passing by successive stages, and through successive mills and factories,

stages, and through successive mills and factories, from the rough material to the completed product. There are, however, a number of shops and factories in Louisiana which make vehicles ready for use. These vehicles are of many kinds, from the heaviest wagon, to the lightest buggy. First consideration is given to supplying local demand, and after that, buyers in neighboring states are supplied. Louisiana farm wagons are sold in Central Texas and Eastern Missouri. In the latter instance, the cheap freight by river assists the manufacturer in selling his wagons. The complaint is common, however, that freight rates to many parts of Texas render it difficult to sell Louisiana-made wagons there in competition with large wagon manufacturers of Indiana, Illinois, Kentucky, Missouri, and Arkansas.

Arkansas.

Water rates are low from Louisiana ports southward, and vehicles are shipped to Mexico, Central America, and Panama. The latter country buys heavy wagons made in New Orleans, and also light vehicles, such as are demanded by butchers, bakers, and peddlers. The beech reported by this industry is made into felloes for heavy wagons; the locust for small business vehicle hubs. It is claimed for beech that it seasons more quickly than oak, and that it stands well the strain to which it is subjected in heavy trucks. Wagon bottoms are made of longleaf pine and Texan oak; and cypress bends well and is used for bows for tops of light wagons. Strong, thick panels for coal wagon bodies are made of ash, which is less liable than oak to split and pull apart by shrinking and swelling. The small quantity of magnolia reported was substituted for yellow poplar in light panels. Kentucky supplied the red oak and the locust, and Tennessee the yellow poplar bought by the vehicle makers.

It does not appear that vehicle makers are working much waste into by-products. One factory uses small pieces to make wheelbarrows. Much of the white oak and hickory goes to the factory as logs; Water rates are low from Louisiana ports south

but many billets, and much sawed lumber and dlmension stock are demanded. The sawed stuff is one lnch thick and upwards. The pine is bought one inch thick and upwards. The pine is bought after surfacing. Buggy makers report the use of considerable red hickory, that is, the common hickory's red heartwood, which was formerly considered unsuited for use. Tests have shown, however, that for many purposes it is entirely satisfactory.

Table 10.

The Vehicle Industry in Louisiana Compared with Certain Other States.

Q	uantity used	Average cost	No. of
States.	annually	per 1000 feet	woods
	Feet B. M.	at factory.	used.
Kentucky	59,445,500	\$30.00	14
Illlnois	57,930,000	41.49	25
Wlsconsin	41,664,000	41.02	16
North Carolina	15,636,000	26.30	8
Louislana		19.46	15
Marylaand	1,956,300	36.89	15
Oregon	198,200	104.71	11
- penning			1000

TANKS.

at one time contained 90,000 cisterns. The estiat one time contained 90,000 clsterns. The estimate would seem high were it not for the fact that many houses had two or more cisterns, some outside and some indoors. In nearly all cases, the cisterns were above ground—unlike those in many dry regions which are built of masonry and cement below the surface. The soft and saturated soil underlying New Orleans was not sulted to the construction of subterranean cisterns of masonry.

At the present time in New Orleans many cisterns are being torn down, and after rejecting such pleces as are too much decayed for further use, rebuilt clsterns are constructed of the old serviceable lumfind sale for windmill tanks, or some other use. Some of the shops which formerly manufactured cisterns for city use, now confine their activities chiefly to rebuilding old ones which they ship away to sell, often outside the state.

All cisterns in Louisiana are not for rainwater, though most of them are. Brewerles, bakerles, dyeworks, laundrles, vlnegar makers, and others use them. The distinctions between cisterns, tanks, vats, and troughs are not always clearly drawn. The use is given more consideration than the shape in assigning names to the different articles. In this assigning names to the different articles. In this report all wooden containers too large to be classed

report all wooden containers too large to be classed with cooperage, and constructed to hold fluids, are considered under the general caption of cisterns and tanks. Sllos might properly be included, but none were reported in the state.

Manufacturers of cisterns and tanks in Louislana export many to the West Indies and to Central America. Belize and British Honduras are good customers. Most of the cisterns sent to Central American countries are for rain water in towns which have no water works. Some that go to Panama, Mexico, Cuba, and Porto Rico are for use in manufacturing establishments. Shipments are regularly made to several European countries, and occasionally to South Africa.

ally to South Africa.

An examination of Table 11 will show that cypress is used almost exclusively. The longleaf plne, white oak, and Texan oak together amount to only 30,000 feet, a quantity so small in comparison with the cypress that it is almost negligible. Cypress is an ideal wood for this purpose, and stands as high as any in the United States. It lasts many warms even in warm of deare although the cypress of the comparison of the comparison with the cypress is an ideal wood for this purpose, and stands as high as any in the United States. It lasts many years, even in warm and damp situations which induce speedy decay in most woods. Some of the old cisterns in New Orleans which are now being removed because the installation of city water works renders them unnecessary, were built before the Civil War, and often there is not a stave in them

Table 11. TANKS.

				Grown in Lou	isiana.—	Grown Ou	tside La.
		Av. cost			Av. cost		Av. cost
	Quantity				per 1,000		per 1,000
Species—	ised annually		711 1 1 1	Quantity	feet at	Quantity	feetat
	(Ft. B.M.)	tactory.	Total cost.	(Ft. B.M.)	factory.	(Ft. B.M.)	factory.
Cypress		\$15.15	\$86,590	5,715,000	\$15.15		
Longleaf pine		20.00	200			10.000	
White oak		40.00	400			10,000	
Texan oak	10,000	40.00	400			10,000	
Totals	5,745,000	\$15.25	\$87,590	5,715,000	\$11.52	30,000	\$33.33

The manufacturers engaged in this industry report that the output for the whole state has de-clined in recent years. Water clsterns built above the ground were once a necessity in nearly all parts the ground were once a necessity in nearly all parts of the state, but particularly in the southern portion and in regions where the land lies low and flat. The decline in the use of such cisterns is not due to any change in the ground level, but to the fact that many of the larger towns have installed municipal water works, and private residences no longer need cisterns to store rain water. In many parts of Louisiana, water from shallow wells has never been a success; not that there was any lack parts of Louisiana, water from shallow wells has never been a success; not that there was any lack of ground water, but rather that there was too much of It. It rose in wells within a few feet of the surface, and often qulte to the surface of the ground. It was frequently little better than stagnant surface water, and was unfit for domestic use. The country being flat, there were few springs anywhere, and in many places none. It often happened that, with a superabundance of water everywhere, there was none fit to drink. One of the first cares of the house builder, therefore, was to provide a cistern for collecting and storing rain water. The custom prevailed in the towns as well as in the rural districts, but less in the northern part of the custom prevailed in the towns as well as in the rural districts, but less in the northern part of the state than in the south, because among the hills and rolling country of the north many wells and occasional springs met the demand.

Municipal water works have been built recently in many of the towns. New Orleans is just now completing a fine system at great expense, and thousands of cisterns in that city are approaching the end of their usefulness. It is said that New Orleans

but can be used again. However, the average life of a cypress cistern is not so long. The best and clearest lumber is used. None was reported bought for cisterns that was under one inch thick, and much was over two inches, and all was of the best grades. Some was bought as rough lumber, but most was dressed.

The waste in a cistern factory is componentially

The waste in a cistern factory is comparatively small, since the material is generally hought in the sizes and grades which can be worked with greatest economy. Pieces under size are made into small

est economy. Pieces under size are made into small tanks and tubs; and what is otherwise unsuited for the general purpose, is occasionally disposed of for screen doors, brackets, and plasterer's lath.

Many sizes and shapes of tanks and cisterns are made. A few hold 40,000 gallons, and from that extreme size the range is downward to fifty or a hundred gallons. Those bound with hoops, as all the round ones are, are smaller at the top than at the bottom, an arrangement which provests the board. round ones are, are smaller at the top than at the bottom, an arrangement which prevents the hoops from dropping off and wrecking the structure in case of shrinkage of the wood in dry weather when the water within becomes low. Many slender, two-story cisterns are seen in the crowded quarters of towns, principally in New Orleans. They are built thus to economize space where buildings stand close together and cisterns depend upon height rather than diameter for their cubical contents. The two-storied cistern, which may be twenty feet tall, has two water-tight parts, the upper and the lower. Water may be drawn from either without disturbing the contents of the other. The purpose in having two, one above the other, rather than one very tall cistern, is that the pressure may be lessened.

The weight of water in one tall tank would subject the bottom to excessive pressure, and facilitate the springing of leaks.

Table 12.

The Manufacture of Cisterns and Tanks in Louisiana Compared with Certain Other States.

1000	Quantity used	Average cost	No. of
States.	annually	per 1000 feet	woods
	Feet B. M.	at factory.	used.
Illinois	25,445,00	\$44.18	17
*Wisconsln	9,498,000	36.05	13 .
** Massachusetts.	6,815,000	14.06	11
Louisiana	5,745,000	15.25	4
**Kentucky	2,605,000	44.81	4
Maryland	2,539,000	48.13	6
*Including wind	lmills.		
**Including mu	ch cooperage.		

SHIP AND BOAT BUILDING.

SHIP AND BOAT BUILDING.

				Grown in Lou	lsiana.—	Grown Out	side La.
		Av. cost			Av. cost		Av. cost
	Quantity	per 1000			per 1,000	J	per 1,000
	used annually	feet at		Quantity	feet at	Quantity	feet at
Species—	(Ft. B.M.)	factory.	Total cost.	(Ft. B.M.)	factory.	(Ft. B.M.)	factory.
Longleaf pine	2,704,000	\$22.23	\$60,120	2,604,000	\$22.13	100,000	\$25.00
White ash	1,040,000	22.11	23,000	1,040,000	22.11		
Loblolly pine	400,000	26.00	10,400	400,000	26.00		
Cypress	255,000	44.40	11,323	255,000	44.40		
White oak	153,000	37.77	5,780	31,000	26.45	122,000	40.65
Shortleaf pine	26,000	30.00	780	26,000	30.00		
White pine	5,000	84.00	420			5,000	84.00
Sugar maple	2,000	65.00	130			2,000	65.00
Mahogany	2,000	135.00	270			2,000	135.00
Red cedar	1,000	60.00	60	1,000	60.00		
Black spruce	500	74.00	37			500	74.00
Beech	500	60.00	30			500	60.00
Lignumvitæ	300	100.00	30			300	100.00
Totals	4,589,300	\$24.49	\$112,380	4,357,000	\$23.84	232,300	\$36.23

Louislana has 3300 square miles of water. It has a coast line of 1250 miles, and including the coast line of Islands, the total shore line is 2250 miles. There are 3771 miles of navigable rivers in the state, including streams which form portions of its boundary. At certain times of the year steamboats reach all but a few of the parishes; and oceangoing vessels have easy access to a number of points in the state. Deep harbors, however, are few in comparison with the long line of coast. The lakes or bays which indent the coast, or extend far inland, are often shallow. The conditions are such as to invite water communication both between different parts of the state, and between Louisiana ports and foreign countries. Louislana has 3300 square miles of water. It has

as to invite water communication both between different parts of the state, and between Louisiana ports and foreign countries.

The boat builders of Louisiana sell their product locally and in neighboring regions. A large part of the output is for business rather than for pleasure. Barges and freight vessels are numerous. The sales are not confined to the United States, but reach to Mexico and Cuba. Longleaf pine and white ash enter into general construction and constitute the bulk of the timber used. The ash is employed for braces, but a considerable part of the million feet listed is made into oars and is sold both in and outside of the state. Most of the lobiolly pine is for barges, the white oak for general work, and the cypress for door and window frames, and other finish. Five states are drawn upon for the white oak—Louisiana, Mississippi, West Virginia, Kentucky and Indiana. The small quantity of white pine is used for patterns, the maple for fiooring, spruce for spars, red cedar for cabinet work, beech for gearwheel teeth, mahogany for staving for steam launches, and lignum vitae for sheaves and bearings. The lignum vitae came from the West Indies, red cedar from Tennessee, white pine from Maine and Canada, spruce from Maine, beech from Mississippi, maple from Michigan and Wisconsin, loblolly pine from Louisiana and Texas, and mahogany from Mexico.

The absence of live oak from the list of woods demanded by this industry is noteworthy. Its ab-

The absence of live oak from the list of woods demanded by this industry is noteworthy. Its absence is not due to scarcity of this wood, but to changes in methods of construction. There was a time when Louislana not only supplied much live oak for shipbuilding at home, but met a large demand from abroad. The United States Government, during half a century preceding the Civil War, depended upon Louislana for live oak shipknees for war vessels. These knees were hewed from that part of the trunk where large limbs or roots joined the body of the tree. The Government's search for live oak for shipbuilding began on the coast of Georgia before the close of the eighteenth century. Increased supplies were demanded, and in 1817 Louisiana was turned to for assistance. In that year several Louisiana islands, which were govern-

not one foot of it is reported used by ship builders

wood in every large ship built in that region.

Both Wisconsin and Maryland use more cypress for boats than is used in Louisiana. This is due to for boats than is used in Louisiana. This is due to the fact that it is a favorite material for pleasure boats, such as Maryland and Wisconsin build, but in Louisiana they bulld barges and ships for business purposes, where strength is needed. oak and hard pine best for this, and what cypress is employed appears as finish. In this, as in many other instances, the class of the work is the ruling factor in determining what woods shall be employed.

in Louisiana. Seventy-five years ago it would probably have represented one-half the cost of the

Table 14.

Ship and Boat Building in Louisiana Compared with the Industry in Certain Other States

Q	uantity used	Average cost	No. of
States.	annually	per 1000 feet	woods
COURS NATION	Feet B. M.	at factory.	used.
Oregon	14,900,400	\$32.03	21
Maryland	6,350,700	34.69	22
Louisiana	4,589,300	24.49	13
Massachusetts	3,931,700	50.51	21
Wisconsin	2,669,000	43.64	16
Illlnois	1,021,000	50.25	14

FIXTURES.

ment land, were withdrawn from sale. They contained 19,000 acres, and it was estimated that 37,000 live oak trees were growing on them. Some effort was made at practical forestry. Acorns were planted in vacant spaces, and in other places the promiscuous undergrowth was cleaned from among the oaks to give the branches more room to spread and form better crooks from which ship knees might later be hewed. In 1845 three other live oak Islands in Louisiana were added to the reservation, and much oak was cut. Such as was not immedi-ately needed was stored for reserve supply in the

The Civil War brought iron ships, and live oak was no longer a necessity in ship yards. The Louisiana islands which had been reserved, were neglected. Some of the land was cleared by squatters, and in 1895 all the naval timber reserves in Louislana, Alabama, and Mississippi were opened to public entry, but some of those in Florida were retained. Large quantities of live oak yet remain, but

high-class woods, and many of them are manufactured to order to fit space and to harmonize with the furniture and finish of the office or room where they are placed. Fixtures as here considered inthey are placed. Fixtures as here considered include counters, cablnets, shelving, and show cases, and the like. As in the case of furniture, two classes of wood are employed, one as inside material which is generally not intended for show, and the other an outside wood, finished for display, and usually selected for its pleasing appearance. Louisiana drew woods for this industry from eight states, but one-half of the total quantity was home grown. Two foreign woods are represented. home grown. Two foreign woods are represented, Clrcassian walnut from Turkey, and mahogany from Mexico. A portion of the magnolia was finished in imitation of mahogany and was used as such. White oak was reported from Tennessee, Kentucky, Indiana, Mississippi, and Louisiana; sweet birch from Wisconsin; chestnut from North Carolina, and

longleaf pine from Alabama and Louisiana.

Although it is probable that New Orleans alone uses more fixtures than the whole quantity reported manufactured in the state, yet exports go to Mexico, Central America, and South America, and shipments find their way to other states in this country.

country.

Cypress is employed both as exposed and concealed parts of fixtures, and serves equally well in both places; sweet birch is made into show case partitions and into finish; red oak is given place in show case and cabinet fronts; white oak is preferred for office partition; chestnut for panels and coping; magnolia for bar tops; and yellow poplar as drawers for cabinets.

The waste is small. Mahogany scraps are occasionally sold to automobile factories which make

sionally sold to automobile factories which make inlay of them, or to brush makers who can use very small pieces for backs and handles of certain patterns of brushes.

patterns of brushes.

No fixture manufacturer bought lumber in the log. It generally came as rough lumber. Some was in the form of veneer, and a little was two and three luches thick, but most of it was undressed lumber one inch thick. Some low grade stuff is demanded for hidden interior work, and for crating; but for the most part the wood is of high grade.

The average price paid for lumber in this industry was higher than that of any other in the state, and more than three times the average of all.

Table 16.

The Fixtures Industry in Louisiana Compared with Certain Other States. Quantity Average Number
Used Annually feet 1000 Feet
B. M. at Factory States 21.068.000
 Mintols
 21,003,000

 Kentucky
 6,346,000

 Wisconsin
 6,005,000

 North Carolina
 2,364,000

 Maryland
 1,658,000

 Massachusetts
 1,586,000

 Oregon
 1,585,700

 Louisiana
 211,000
 $\frac{44.12}{34.52}$ $\begin{array}{c} 23 \\ 24 \end{array}$ 11 14 18 10 40.00

MISCELLANEOUS.

The miscellaneous table is made up of various manufactures which do not belong with those previously tabulated, and cannot be separated into classes, of which each one is large enough for a table. Some woods appear here and not elsewhere among the state's industries, and no one industry lists as many woods. Some of those appearing in this table are used in small quantity. That may or may not imply that but little of the wood is de-

Table 15. FIXTURES.

				Grown in Lou	isiana.	Grown Out	tside La.
		Av. cost			Av. cost		Av. cost
	Quantity	per 1000			per 1,000		per 1,000
	used annuall;	y feet at		Quantity	feetat	Quantity	feet at
Species—	(Ft. B.M.)	factory.	Total cost.	(Ft. B.M.)	factory.	(Ft. B.M.)	factory.
Cypress	84,000	\$23.77	\$1.997	79,000	\$23.47	5,000	\$28.00
White oak	44,000	48.64	2,140	6,000	31.66	38,000	51.32
Yellow poplar	34,000	31.18	1,060			34,000	31.18
Evergreen magnolia	20,000	22.25	445	20,000	22.25		
Sweet birch	12,000	53.33	640			12,000	53.33
Mahogany	9,000	123.33	1,110			9,000	123.33
Red oak	4,000	50.00	200			4,000	50.00
Longleaf pine	2,000	30.00	60			2,000	30.00
Chestnut,	1,000	40.00	40			1,000	40.00
Circassian walnut		140.00	140		• • • • • •	1,000	140.00
Totals	. 211,000	\$37.12	\$7,832	105,000	\$23.73	106,000	\$46.04

The quantity of wood demanded in Louisiana by the manufacturers of store and office fixtures is surprisingly small, when it is considered that the state is the second largest producer of lumber in the whole country. Fixtures are usually made of

manded in the state. In the case of osage orange, dogwood, persimmon, catalpa, umbrella wood, and mulberry, the demand is probably fairly represented by the figures in the table, while two others, willow oak and water oak, though the amount of each ap-

Table 17.

MISCELLANEOUS INDUSTRIES.

				Grown in Lou	isiana.—	-Grown Out	tside La.
		Av. cost			Av. cost		Av. cost
	Quantity	per 1000		Control of the	per 1.000	1	per 1,000
	used annuall;	y feet at		Quantity	feet at	Quantity	
Species—	(Ft. B.M.)	factory.	Total cost.			(Ft. B.M.)	
Longleaf pine	6,666,500	\$ 7.28	\$48,520	6,666,500	\$ 7.28		10 St. 10
Cypress	4,011,000	19.54	78,396	4,011,000	19.54		• • • • •
Yellow poplar	801,000	35.03	28,060			801,000	\$35.03
Red gum	576,000	13.04	7,510	576,000	13.04		
Shortleaf pine	535,000	8.65	4,630	305,000	9.61	230,000	7.00
Tupelo	521,000	13.94	7,265	521,000	13.94		7.39
Cottonwood	371,000	7.40	2,745	180,000	6.66	101.000	
White elm	60,000	12.00	720			191,000	8.09
Mahogany	40.000	115.00	4,600			60,000	12.00
Chestnut	40,000	35.00	1,400			40,000	115.00
White pine	24,500	80.61	1,975	• • • • • •		40,000	35.00
Hickory	23,000	34.34	790	91 000	04.50	24,500	30.00
White ash	20,200	15.35	310	21,000	34.76	2,000	30.00
Red cedar	16.000	50.62		20,200	15.35	******	
River birch	10,000		810	******		16,000	50.62
White oak		12.00	120	10,000	12.00		
Evergroon magnelia	6,200	35.48	220	6,200	35.48		
Evergreen magnolia	6,000	15.33	92	6,000	15.33		
Loblolly pine	5,000	14.00	70	5,000	14.00		
Soft maple	4,000	12.00	48	4,000	12.00		
Texan oak	3,000	25.00	75	3,000	25.00		
Red oak	3,000	46.00	138			3,000	46.00
Persimmon	2,000	10.00	20	*****		2,000	10.00
Dogwood	2,000	12.50	25			2,000	12.50
Osage orange	2,000	12.50	25			2,000	12.50
Sugar maple	1,000	60.00	60			1,000	60.00
Cherry	1,000	10.00	10	1,000	10.00		
Hardy catalpa	1,000	25.00	25	1,000	25.00		
Umbrella wood	1,000	25.00	25	1,000	25.00		
Mulberry	500	20.00	10	500	20.00		
Water oak	500	20.00	10	500	20.00		
Willow oak	500	20.00	10	500	20.00		
Totals	13,753,900	\$13.72	\$188,714	12,339,400	\$12.11	1.414.500	\$27.93

pears small in the table, are woods in pretty general use, though almost invariably under other names. This is more fully set forth, with reasons for it, in the discussion following table 1 of this report.

Ten states and one foreign country supply the wood listed in this table, which Louisiana does not procure from its own forests. Some hickory is reported from Alabama and Indiana; sugar maple from Maine; mahogany from Mexico; white pine from Michigan; red oak from Indiana and Wisconsin; cottonwood from Mississippi and Missouri; red cedar from Tennessee; persimmon, dogwood, and yellow poplar from Alabama, and chestnut from North Carolina and Kentucky.

The articles made are sold in many parts of the The articles made are sold in many parts of the world. Wooden water pipe of handed cypress staves finds a large market in Mexico where it is used in dralning mines, or in leading water to them, or in supplying it for municipal or manufacturing purposes. Trunks have their principal foreign market in the several countries of Central America. The wood of which the trunks are made is chiefly cottonwood, cypress, red cedar and ash. Some of this is three-ply veneer. The red cedar is made into trunk trays, it being in demand for that purpose because of its odor, which is supposed to be obnoxious to moths and other injurious insects which are liable to infest stored clothing.

One of the most widely sold products of Louisi-

One of the most widely sold products of Louisi-One of the most widely sold products of Louisiana wood manufacturers is cotton ginning machinery. Practically every cotton-growing country of the world buys some of it. India and Egypt are particularly good customers. The machinery consists of feeders, presses, condensers, and elevators, with necessary appliances. Four woods are reported for these commodities, longleaf pine, red gum tupelo, and cypress gum, tupelo, and cypress.

gum, tupelo, and cypress.

Much longleaf pine is sent to the distilling plants and is converted into various commercial commodities, among them being tar, turpentine, charcoal, pine oil, tar oil, and pyroligneous acid. Most of the wood for distillation is procured from old stumps. It is therefore a utilization of waste. Limbs and defective logs unfit for lumber are also used. The extent to which this industry may be developed depends upon the market for the products and the cost of manufacture; for the supply of waste is without limit at this time. The cost of cutting the pine stumps at the level of the ground is an item of some consequence.

Cypress is the chief wood entering into refrigera-

cypress is the chief wood entering into refrigerator construction, and outside of the state, the principle market for refrigerators is in Central America. Only one wood was reported for ladders, shortleaf pine. Cypress is the most important wood for washing machines, and the product is sold in Canada, West Indies, and Europe, as well as in the United States. Some of the output is shipped in the form of cut and fitted parts, to be assembled and finished when they reach their factory destination. Coffins and caskets are made of several woods. The cheaper grades are of tupelo and red gum. More

expensive woods enter into the better grades. Among them are yellow poplar, cypress, red cedar, chestnut, and mahogany. The lasting properties of cypress have made it a favorite casket wood since the first settlements by Europeans in Louisiana. Expensive caskets are in more demand in some parts of the state now than formerly, particularly in New Orleans. When the towns and cities were poorly drained, vaults above ground were preferred by those who could afford the additional expense; but with good drainage, the manner of burial has undergone a change, and high grade caskets are growing in demand. Much mahogany is used. In some instances casket shells and burial boxes are made of wormy mahogany, because it is cheaper. It anexpensive woods enter into the better grades. Among instances casket shells and burial boxes are made of wormy mahogany, because it is cheaper. It answers as well for the purpose intended as the high grade wood. Wormy mahogany is as sound as any, so far as decay is concerned, but is perforated by small holes varying in size from a pin point to a lead pencil. The holes are the work of the teredo or shipworm, and represent a period in the mahogany log's history, on its way from forest to factory, when it was submerged in salt water for a considerable time. Most of the logs are cut in Mexico, and by various methods of transportation, by land and water, reach New Orleans. It is evident that some of the logs, somewhere on their journey, are occasionally left a little too long in briny water, and the teredo gets in its work. The perforated mahogany is very similar in appearance

to "sound wormy" chestnut, which is a very common form of that wood, regularly carried by most lumber yards. In the manufacture of coffins and caskets in Louisiana, chestnut and wormy mahogany are used for the same purpose. Yellow poplar and red cedar are employed in the manufacture of fine caskets. A large part of the trade is with foreign countries. High grade caskets are sold in Mexico, Central America, Panama, West Indies, and South America.

Longleaf pine is manufactured into paving blocks, which are creosoted, and sold in different parts of the United States and in Mexico. Shortleaf and loblolly pines are not objectionable for paving-blocks, if trees are selected with narrow annual rings. As a usual thing, the yearly rings of the longleaf pine are closer together than are those of other southern pines other southern pines.

The river birch which is listed in the table was all made into ox yokes. It is considered one of the hest woods for that purpose, because it is strong, wears smooth, is moderately light, and resists decay. Three other woods are occasionally made into ox yokes, evergreen magnolia, black gum, and tunelo. The ox yoke industry is of considerable and tupelo. The ox yoke industry is of considerable importance in Louisiana where large numbers of oxen are worked in logging operations.

Most of the white pine and some of the cypress represented in table 17, were made into patterns. The cypress is cheaper, and where it will answer, it has replaced white pine, but for exacting work, no other wood equal to white pine for patterns has been found been found.

The brush industry in Louisiana is not large, but trade in the finished product is both domestic and foreign. Elight woods are used, mahogany, white oak, white ash, sugar maple, yellow poplar, tupelo, red gum, and evergreen magnolla. No other industry paid as high a price for white oak. Following are the kinds of brushes made: Asphalt brushes with steel teeth—for sweeping asphalt pavement; casting brushes with steel teeth—for painting ships; spiral flue brushes; spiral bottle brushes; ant paste brushes—used by confectioners to keep ants out of spiral flue brushes; spiral bottle brushes; ant paste brushes—used by confectioners to keep ants out of cake and candy boxes; deck scrubs—for cleaning the woodwork of ships; house scrubs; street brooms; tar brushes—for spreading tar on roofs; car washers—for cleaning the exteriors of Pullman cars; clothes brushes; hair brushes; paint and whitewash brushes of many kinds. The magnolia reported has taken the place of holly for fine brush backs. It is sometimes made up strip and strip about with mahogany, a back with alternate dark and light stripes resulting. The mahogany used is chiefly scraps from other factories. Very small pieces can be used. At the present time, Panama buys a good many brushes made in Louisiana.

The absence of a table in this report showing

The absence of a table in this report showing the handle industry in Louisiana is due to the fact that very little such manufacturing was reported Some thousands of split hickory cant hook handles are made, and there are a few handles of other kinds. The absence of an extensive handle induskinds. The absence of an extensive handle industry in the state is remarkable, because Louisiana is a large producer of such hickory as handles are made of. All that was reported is included in Table 17. The annual use of wood for handles in several states follows: Massachusetts 770,500 feet, Wisconsin 1,650,000, Oregon 1,854,400, North Carolina 3,595,000, Illinois 12,582,000 and Kentucky 35,70,000 670,000.

Table 18. SUMMARY OF PRECEDING TABLES OF INDUSTRIES.

Industries—	Average price paid for lumber at the factories per 1,000 ft. B. M.	Apportionment of the total quantity of lumber among the industries (Approx. per cent.)
Planing mill products (Table 2)	\$11.49	90.28
Boxes (Table 4)	9.77	4.13
Doors, sash, blinds, etc. (Table 6)	17.95	2.69
Furniture (Table 7)		0.62
Vehicles and vehicle parts (Table 9)	19.46	0.49
Tanks (Table 11)		0.42
Boat and ship building (Table 13)		0.34
Fixtures (Table 15)		0.02
Miscellaneous (Table 17)		1.01
Totals	\$11.63	100.00

The ratio of total cut in the state to the amount further manufactured is not the same for all the species. The cut by species as given in the table which follows is from the Census Bureau's figures. "Forest Products of the United States, 1909," published 1911. Some of the species are grouped with others, and totals can be given for the groups only. In but one instance did Louisiana manufacture a larger quantity of a wood than its saw mills cut—yellow poplar. Table 19 shows the amounts and percentages percentages.

ANNUAL LUMBER CUT COMPARED WITH AMOUNT FURTHER MANUFACTURED.

		Amount		
	Total cut,	further manu-	Per cent.	of
Species—	Quantity	factured in 1910	manufactur	ed
	(Feet B. M.)	(Feet B. M.)	to total co	ut.
Longleaf, shortleaf, loblolly, Cuban and spruce pines.	2,736,756,000	1,070,810,494	39	
Cypress	608,854,000	216,933,500	36	
White, red, Texan, cow, overcup, willow, water and		The state of the s		
live oaks	74,490,000	10,139,900	14	
Cottonwood	47,509,000	13,281,000	28	
Red gum	34,499,000	15,193,000	44	
Tupelo	24,703,000	11,666,000	47	
Ash	11,200,000	1,731,450	15	
Hlckory	7,704,000	2,986,800	39	
Elm	1,341,000	60,000	4	
Yellow poplar	886,000	1,286,933	145	
Beech	581,000	40,500	7	
			_	
Totals of all woods	3,548,523,000	1,344,129,577	38	
In order to compare these figures with similar	Maryland	267,939,000 284,3	46,895	106
data from other states, Table 20 is given.	Massachusetts .	361,200,000 549,3	19,644	152
	Illinois	170,181,000 1,781,5	36,120	1047

Table 20.

The Lumber Output and the Amount Further Manufactured in Several States Compared.

	Annual Lumber	Quantity Further	Ratio of Manufac-
State	Cut Feet	Manufactur-	tures to
	B. M.	ed Feet B.	Total cut
		M.	per cent
Oregon1	,898,995,000	296,791,900	16
North Carolina.	2,177,715,000	676,166,250	31
Louisiana	3,551,918,000	1,354,952,578	38
Wisconsin	2,025,038,000	930,382,000	46
Kentucky	860,712,000	409,633,800	48

Those states which use more lumber in their factories than their saw mills cut bring supplies from elsewhere to make up the difference.

APPORTIONMENT OF WOODS AMONG THE INDUSTRIES.

It is shown in Table 21 how each of the woods put to use in Louisiana is apportioned among the several industries. White oak and Longleaf pine are the only woods demanded by every industry, while twenty-three of the species are employed by

Table 21.

PER CENT. OF THE DIFFERENT KINDS OF WOOD USED BY EACH INDUSTRY.

Kinds of Wood-	Boxes and crates	Fixtures	Furniture	Miscellaneous	Planing mill products	Sash, doors, blinds and general millwo	Ship and boat building	Tanks	Vehicles and vehicle parts
Basswood	100.00	,							
Beech							1.23		86.42
Black gum									
Black spruce							100.00		
Black walnut			0.47			100.00			
Biack willow Catalpa				100.00					
Cherry				50.00		50.00			
Chestnut		2.44		97.56					
Circassian walnut		100.00							
Cottonwood	95.70		1.51	2.79					
Cow oak									100.00
Cuban pine		0.04	1.00						
Cypress Dogwood		0.04	1.09	1.85	84.91	7.41	0.12	2.63	
Engeimann spruce				100.00		100.00			
Evergreen magnolia		1.23	5.22	0.37					0.03
Hickory				6.77					99.23
Lobiolly pine	1.16		1.16	0.06	87.11	5.86	4.65		
Locust									100.00
Longleaf pine		*	0.01	0.99	95.82	2.33	0.40	*	*
Llgnum-vitae Mahogany		16.21	1.80	79.04		0.05	100.00		
Osage orange		10.21	1.00	72.04 100.00		6.35	3.60		
Overcup oak									100.00
Persimmon				100.00					
Red cedar			54.06	43.24			2.70		
Red gum			22.48	3.79		3.62			0.20
Red mulberry		00 15	10.07	100.00					
Red oak		20.15	10.07	15.11	• • • • • •	44.59			10.08
Shortleaf pine			0.01	100.00	96.91	0.78	*		*
Silver maple				100.00					
Spruce pine						100.00			
Sugar maple			90.91	3.03			6.06		Ä
Sweet birch		72.73				27.27			
Sweet magnolia Texan (spotted oak)		• • • • • •	0.00	0.17		45.55		0.50	0.50
Tupelo			9.85	0.17 4.47	59.81 42.86	17.77		0.56	0.59
Umbrelia tree				100.00	74.00				
Water oak				100.00					
White ash			37.25	1.17			60.06		1.52
White elm				100.00	******				
White pine		0.54	10.58	0.08	44.54	0.75	1.87	0.12	39.07
White pine Willow oak			3.28	80.33		• • • • • •	16.39		
Yellow poplar	3.94	2.68	26.95	63.12		0.94			2.37
*Less than 1-100 o			20.00	00.12		0.34			2.01

no more than one. However, those which appear in a single industry are not demanded in large quantities.

OODS	U	SE	D	BY	IN	D	US	T	RIE	ES	11	L	OL.	JISIAN
	Grown	out of La.	Per Ct.	0.47	27.18		0.36	10.28	6.55	0.19	0.52	5.06	50.24	1.13
	Grown	in La.	Per Ct.	99.53	72.82		99.64	89.72	93.45	99.81	99.48	94.94	49.76	98.27
ouisiana.	Total cost	f. o. b.	factory.	\$13,932,586	547,384		656,565	188,714	106,120	126,287	87,590	112,380	7,832	\$15,765,458
stries in L	Average	cost per	1000 ft.	\$11.39	9.77		17.95	13.72	12.66	19.46	15.25	24.49	37.12	\$11.64
Table 22.	annually.		Per Ct.	90.28	4.13		2.70	1.01	.62	.48	.42	.34	.02	100.00
Table 22. Summary of Woods Used by Industries in Louisiana.	Quantity used annually. Average		Feet B. M.	1.223.205.884	56,004,500		36,569,667	13,753,900	8,384,800	6,490,050	5,745,000	4,589,300	211,000	1,354,954,101
Summarv			Industries.	Planing mill products	Boxes and crates	Sash, doors, blinds and general	mill-work	Wiscellaneous	Furniture	Vehicles and vehicle parts		Shin and boat building	· · · · · · · · · · · · · · · · · · ·	Totals
			Indus	Planing	Boxes	Sash,	mill-v	Miscell	Furnita	Vehicle	Tanks .	Shin ar	Fixtures	Tot

Table 22, which follows, shows how Louislana's total of 1,354,954,101 feet of lumber employed for manufacturing purposes yearly is apportioned among eight general Industries, and a number of smaller industries grouped as miscellaneous. The average cost of the woods used in the different industries calls attention to the fact that some users pay three or four times as much as others. So far as prices apply to the same species, the difference in cost is on account of difference in grades Lumber for boxes and crates is cheapest, that for fixtures is most expensive. The general average for all, \$11.64, is low, and is influenced by the cheapness of the preponderating item, plauing mill products. The lumber entering into this industry consists, for the most part, of boards and timber planed only, the planing having been done to reduce freight. Less than two per cent of all the wood used for manufacturing purposes in Louisians is brought into the state.

SPANISH MOSS.

(Dendropogon Usenoldes.)

Spanish Moss is more widely distributed through the markets than any other product of Louisiana's forests. It is sold in every state of the Union, In every country in Europe, in Egypt, South Africa Aslatic Turkey, Japan, Siberia, the Phillippines, Aus tralia, Mexico, South America, and the West In dies. It is an interesting commodity not only be cause it supplies a world-wide demand, but for the further reason that its total value places it in an important position. According to the best statistics obtainable it is worth twice as much as the annual output of store and office fixtures in the state, and more than three per cent of the entire product of the wood-working factories of Louisiana. The moss is a familiar sight in the Guif region it covers trees and clothes whole forests, hanging in festoons from branches and trunks. Many travelers through the region have admired the fantastic spectacle without suspecting how important the moss is from a commercial standpoint. It is the hasis of a leading industry. The growth of the moss, and the methods of gathering, curing, and marketing it, are replete with novelty and interest Spanish Moss is more widely distributed through

Though it is spoken of as moss wherever it is known, it is not a true moss, as botanists define it, but a leaf-bearing, flowering plant of the pine apple family, that lives on air and water, and uses the tree chiefly as a support to hang on. It seems probable that it was carried to our shores from the West Indies, but not in historic times. It from the West Indies, but not in historic times. It grows in the vicinity of the coast from Virginia to Texas. A single tree may bear a ton, though usually much less. The plant hangs in strands from a few inches long to many feet. Ten feet is not unusual, fifteen is occasional, and a single strand 21 feet long, observed in Calcasieu Parish, was the longest seen during the investigation of the industry in the spring of 1911.

The plant bears a small, solitary green flower, so inconspicuous that few persons notice it. The seed is covered with fine hairs which render it sufficiently buoyant to float long distances on the wind.

seed is covered with fine hairs which render it sufficiently buoyant to float long distances on the wind. When the seed strikes the slde of a tree, or a branch, the hairs adhere to the bark and hold the seed until it has had time to germinate. Rootlets fasten themselves in minute crevices of the bark and the plant hangs there and grows. Strands wind themselves around twigs limbs or network wind themselves around twigs, limbs or protuberances of bark, and the rootlets soon decay. Thenceforth the plant, or moss as it is called, hangs like clothes on a line, and all the nourishment it gets comes from air and water. It may be propogated without seed. Tufts of the moss may be blown by wind, or carried by birds in building nests, and if securely fastened to the branch of a tree, they may grow. The plant more frequently spreads by that means than by the sectionize of scale may grow. The plant more frequently spreads by that means than by the scattering of seeds.

The moss is used in upholstery—for stuffing mat-

tresses, cushions, and saddles—and has been so employed for generations. It is not, therefore, a new thing, but its use has greatly increased in recent years. Louisiana is said to furnish much more than half of the world's supply, and a brief account of the industry there should be of interest.

Harvesting the Crop.

Though the moss is planted naturally, and grows wild, its gathering and preparation for use must be done with due regard to season. Practically all the crop in Louisiana is harvested by negroes who go about it singly or in small companies at times of year when plantation work is slack. The moss hangs on trees along the borders of swales and in deep swamps, some of it near the ground, other on branches all the way to the tops of the tallest trees. The gatherer's chief care is to bring it down. Sometimes he climbs the trees, pulls it loose and lets it fall. He often takes serious chances by going out on limbs to make a clean pick. Others do not climb, but use long poles with sickle-like hooks to bring the moss down. Still others content themselves with gathering what may be reached by hand, or such as may be blown down by wind. Since most of the moss, if left to grow, will sooner or later be blown down the horwestors have only Since most of the moss, if left to grow, will sooner or later be blown down, the harvesters have only to bide their time, and they will secure most of it on the ground. Many of the swamps are covered with water most of the time. In such places the gathering is done in boats that are pushed among the trees; but this method has its disadvantages, the chief of which is that overhanging branches constantly rake the moss from the boat into the water. The moss-gatherers find their best harvest when timber cutting is carried on where moss is plentiful. They can harvest the whole crop without climbing. When moss is stripped from standing trees, a new crop grows in a year or two. Though it will hang a considerable time after the tree that bears it has died, it seldom, if ever, at though it will hang a considerable time after the tree that bears it has died, it seldom, if ever, attaches itself and grows on a dead tree. Some insist that moss kills trees, but this view should be accepted with reserve; for a tree has borne its load of moss as long as the oldest resident can remember, with no noticeable injury to the tree's vitality.

Curing Moss.

After moss is picked from the trees it is rotted After moss is picked from the trees it is rotted or cured after the manner of flax, and for the same purpose, namely, to get rid of the waste portion of the stalk. It is the inner, hard stalk of flax which is objectionable; but it is the outer, powdery bark of the moss which the rotting removes. The real body of the moss, the fibro-vescular skeleton, is a long, slender, horsehair-like thread extending the whole length of the plant. This is the valuable part, and it is separated from the outer bark by the whole length of the plant. This is the valuable part, and it is separated from the outer bark by rotting. To do this the moss is piled in heaps on damp ground, or in water, and is covered with thin earth. Its slow combustion generates sufficient heat to burn off the outer bark, and a mass resembling black horsehair is left, and that—after it has received certain other treatment—becomes the moss of commerce. The time allowed a heap to complete its rotting process varies—depending on the owner's hurry to sell it. At the end of ten days the heap is hot enough to burn the hand if thrust beneath the surface. At the end of thirty days much of the huil or bark has disappeared, and the moss

has grown dark, but is not yet black. If the owner but receives a low price, because the product is yet in a crude state—known in the trade as "gray moss." He may receive a cent or a cent and a quarter a pound when he has carried it to the dealer. The longer it is left in the rotting pile the blacker it becomes and the more it is worth. It is dealer. The longer it is left in the rotting pile the blacker it becomes, and the more it is worth. It is not profitable, however, to leave it more than three months, and few leave it that long. The best three-months moss sells for four cents per pound. The bulk and weight diminish as the rotting process. cess is lengthened, and though the price per pound increases, there are fewer pounds.

Process of Drying.

Dealers insist that moss offered for sale must be comparatively dry. If it is otherwise, they deduct liberally for its dampness, and the seller has learned by experience that there is iittle profit in wet moss. Therefore, he makes an effort to dry it before it goes to market. In traveling through the moss-producing regions of Louisiana, one often sees the fences, sheds, clothes lines, and other objects about cabins covered with moss, hung there to dry, after it has completed the process of the rotting heap. Wind and sun dry it in a day or two, and it is ready for its first market. It should be expialned that the moss usually passes through two successive markets before it reaches the nitimate successive markets before it reaches the ultimate consumer. The first is the country store which buys it from the people who gather it; second is the wholesaler who gins it, bales it, and ships it to near and distant regions.

The Market.

Local dealers, generally country merchants, barter with gatherers for their moss. Payment is sometimes made in money, but usually in merchandise, such as groceries, shoes, and clothing. The moss finds its way to the country stores by many modes of conveyance, in sacks carried on shoulders or head, in wagons, carts, sometimes by boat or canoe; and in quantities ranging from a ton or more down to a few pounds. The country or village store-keeper puts it up in bales weighing several hundred pounds, and bound with old rome or eral hundred pounds, and bound with old rope or wire. He ships it to the wholesalers in New Orleans or elsewhere. Much goes to that city by boat, and immense piles of it may often be seen at the wharfs, whence it is hauled to the wareat the wharis, whence it is hauled to the ware-houses and gins to be cleaned, rebaled, and sent all over the world. The annual crop in Louisiana amounts to millions of pounds when bought by the country merchants, and the gatherers receive ap-proximately \$250,000 for it. The wholesalers who clean it and sell it to consumers expend considclean it and sell it to consumers expend considerable money in the process, and by ginning it reduce the weight almost one-half; but they receive higher prices, and their annual sales reach about half a million dollars. The best is worth ten cents a pound.

Ginning.

When the moss reaches the wholesaler it is filled with many impurities which must be removed before it is fit for the consumer. It contains twigs, sticks, leaves, and bark. Some of the wholesalers clean the moss by hand, paying operators by the pound for the work. Hand-picked moss is usually rated a little higher than that cleaned by machinery, because the threads are less broken. Until a few because the threads are less broken. Until a few years ago all moss was cleaned by hand, and if dyed, as much of it was, it was afterwards dried like clothes on lines. Some still do it that way; but the gin now does most of the cleaning. An up-to-date moss gin requires an engine of 100 horse power. The moss arrives in bales of some hundreds of pounds. It is fed into machines which remove the impunities frequently as much as 2000 removes power. The moss arrived of pounds. It is fed into machines which remove the impurities, frequently as much as 800 pounds for a ton of crude moss. Although every known appliance for preventing the escape of dust into the air is made use of, the process is very trying on the lungs of operatives. The position of feedappliance for preventing the escape of dust into the air is made use of, the process is very trying on the lungs of operatives. The position of feeders—the putting of moss into the machines—and off-hearers of refuse are so trying that few can de the work. However, men are occasionally found who fill the places without apparent discomfort, though much of the time almost lost from sight in clouds of dust. The operatives are nearly all negroes, men and women, and some have done the same tasks many years, with little vacation or holiday. The dirt which is removed in the process of ginning supplies a considerable part of the factory's fuel. The moss which goes into the machines a gray mass, comes out clean black. Electric holsts gray mass, comes out clean black. Electric holsts pick up hundreds of pounds at a time and carry it to dye vats where it is made a shining black. after which it passes through dryers, and is then pressed into bales of from 40 to 100 pounds, and is ready for the markets of the world. It looks like halr, and many persons who buy it in cushions and upholstery suppose it is hair. There is a test which upholstery suppose it is hair. There is a test which will determine this. A hair drawn between the nails

of the finger and thumb will pass smoothly its whole length. A thread of moss so drawn will show a joint or rough place every two or three inches. The cost of hair is about 50 cents a pound, the cost of the best moss 10 cents. A moss mat-tress or cushion, under usual conditions, is good for eight or ten years.4

*In ginning moss constant vigilance is required to prevent solid bodies from going into the machines. The temptation to put heavy objects in the bales to make them weigh more seems well nigh irresistible. Stones, brick, plough shares, flat irons, log chains, and axes, are neatly stowed away in the center, and in one case a large iron pump was found, and in another a 98-pound lump of lead. Inasmuch as the wholesalers tag every bale as it comes in, they are generally able to ship the stones and bricks back to the men that solid them, but iron and lead are worth more by the pound than the crude moss, so these are sold to junk dealers.

Dealers prefer winter-picked moss, for it is then dryer, as it does not grow in cold weather. They claim that moss growing on some trees is much better than that on others, and experts who handle much of it claim to be able to determine the species of trees on which it grew by simply examining the moss. The strongest moss grows on cypress, and for most purposes is conidered the best; but that growing on live oak is more elastic. Next in the scale comes tupelo moss. The bulk of the sup-ply comes from these three species, probably be-cause they are more abundant than other species in the swampy tracts and fog belts where moss reaches its best growth. Moss from pine trees is said to be unmarketable. In fact, little moss grows on pines, perhaps because they usually occupy dry tracts. Dealers, however, with one accord, declare that pine moss is worthless.*

*No attempt is here made to reconcile the conflicting claims of botanists who say that the moss takes nothing from the tree, but simply hangs on it, and the moss buyers who declare that the quality of moss depends upon the species of the tree which bears it. Perhaps there is lack of data to support the statement that the moss prefers certain species, other things being equal, but willow seems remarkably free from its presence, while live oak, cypress, tupelo, and hackberry though mixed with the willows, are often loaded with it. In fact, observations in more than thirty parishes of Louisiana, in course of this study, failed to show a single instance of moss growing on willow, though dead bundles, carried by wind, frequently hang on the branches of this tree.

As a forest resource, moss in Louisiana is in no immediate danger of exhaustion. The present demand is met without difficulty. Little moss is new being gathered north of Lakes Pontchartrain and Maurepas where much grows, and many other producing regions are practically untouched. The depletion of the supply will probably not come until the swamp forests have been cut.

USES OF WOOD.

Manufacturers and others in Louisiana report uses for different woods as follows:

AMERICAN HOLLY-Brush backs.

BASSWOOD.—Boxes, horse collars (bark).
BEECH.—Boxes, crates, gearwheel teeth, heavy
wagon felloes, veneer, wagon bolsters.
BLACK CHERRY.—Furniture, plane handles, to-

bacco pipes.
BLACK GUM.—Boxes, crates, excelsior, ox yokes,

BLACK JACK .- Chair backs, chair seats, table legs, wagon tongues, reaches, bolsters, sandboards,

felloes, spokes.

BLACK SPRUCE.—Boat spars.

BLACK WALNUT.—Taborets, screen doors.
BLACK WILLOW.—Baseball bats, boats, boxes,

crates, furniture shelving, wagon beds.
BUCKTHORN BRUMELIA.—Boxes, crosscut saw handles, fence posts, small cabinet work.
CATALPA.—Boat knees, brackets, newel posts,

small furniture.

ELM.—Chair stock, hoops, trunk slats,

CEDAR ELM.—Chair stock, hoops, wagon poles.

CHESTNUT.—Caskets, coffins, office fixtures.
CHITTIMWOOD.—Saw handles, wedges.
CIRCASSIAN WALNUT.—Finish, furniture.
COTTONWOOD.—Carriage panels, cracker boxes, egg cases, excelsior, furniture shelving. kitchen tables, sugar barrel heading, trunks, wagon beds.
COW OAK.—Canthook handles, chair stock, furniture, vehicles, axels, bolsters, felloes, hubs. hounds, reaches, spokes, tongues, wagon bed bottoms, woven or braided chair bottoms and backs, woven haskets for laundry and plantation.

toms, woven or braided chair bottoms and backs, woven baskets for laundry and plantation.

CUBAN PINE.—Balusters, bed slats, boats, boxes, car siding, ceiling, doors, excelsior, flooring, frames,

car siding, ceiling, doors, excelsior, flooring, frames, grain doors, molding, wagon bottoms, weatherboarding.

CYPRESS.—Balusters, barges, beer vats, blinds, boats, boxes, brackets, bric-a-brac, butter tubs, cabinets, car siding, caskets, ceiling, chairs, china closets, churus, cisterns, coffins, columns, conduits, cotton gins, cross arms, doors, doughtray, drying racks, dyetubs, fence lath, finish, flooring, frames, furniture, garden sash, gavels, hothouse frames, hothouse sash, ladders, lath, mantels, milk buckets, molding, motor boat finish, newel posts, panels, pat-

31

terns, pedestals, pews, pickets, poker tables, pulpits, railing, sample cases, sash, scrolls, shingles, show-cases. siding, stair work, steam pipe, tables, tanks, tent poles, tomato sticks, toys, trunks, tubs, vinegar vats, wagon slats, wagon tanks, water pipe, wedges, well curbs, well tubing.

DOGWOOD.—Shuttleblocks, wedges.

DRUMMOND MAPLE.—Gunstocks, violins.

ENGELMANN SPRUCE.—Screen doors.

EVERGREEN MAGNOLIA—Boats, bar fixtures, boxes, broom handles, brushes, crates, door panels, dugouts, excelsior, furniture shelving, interior fin-

boxes, broom handles, brushes, crates, door panels, dugouts, excelsior, furniture shelving, interior finish, ox yokes, panels, wagon boxes.

FLORIDA MAPLE.—Broom handles, fluish, frames for drying clothes, furniture, rustic furniture.

GREEN ASH.—Broom handles, car finish, chairs, oars, office fixtures, furniture.

HACKBERRY.—Barrels, buggy bodies, farm implements, furniture. hoe handles, interior finish, kegs, rakes, stair rails, steps, table legs and tops, tubs, wagon parts.

HICKORY.—Caut hook handles, golf shafts, handles for axes and picks, spokes, poles, shafts, etc., for buggles.

etc., for buggles.
HONEY LOCUST.—Fencing, scaffolding, sheath-

ing, sub-floors.

LOBLOLLY PINE.—Blinds, boxes, bridges, car material, ceiling, crates, doors, finish, grain doors, flooring, frames, lath. molding, railing, sash, ships

flooring, frames, lath. molding, railing, sash, ships and boats, slding, wagon beds.

LOCUST.—Buggy hubs.

LONGLEAF PINE.—Balusters, bed slats, boats, bridges, boxes, car slding, casing, ceiling, cotton ginning machinery, charcoal, crates, distillation, fence lath, flooring, furniture, grain doors, kitchen safes, molding, lumber dollies, paving blocks, pickets, pine oil, pyroligneous acid, railing, screen doors, ships slding, spindles, stair stock tar for oil tur-

ets, pine oil, pyroligneous acid, railing, screen doors, ships, siding, spindles, stair stock, tar, tar oil, turpentine, wagon bottoms.

LIGNUMVITAE.—Bearings, sheaves (boats).

LIVE OAK.—Vehicle stock.

MAHOGANY.—Brushes, caskets, coffins, interior finish, screen doors, stairs, steam launch staving.

OVERCUP OAK.—Balusters, bar tops, brackets, cart bodies, chair stock, dining tables, doors, felloes, finish, flooring, furniture, grilles, hubs, mantels, molding, newel posts, office fixtures, railing, screen doors, spindles, spokes, stair work, staves, veneer, wagon bolsters.

OSAGE ORANGE.—Canes, clock cases felloes

OSAGE ORANGE.—Canes, clock cases, felloes, furniture parts, hubs, inlay, ring mauls, vehicle

parts.

PECAN.—Wagon tongues.

PERSIMMON.—Brushes, shuttleblocks,

POST OAK.—Balusters, bolsters, brackets, chairs, chiffoniers, doors, finish, furniture, hubs, molding, morris chairs, newels, railing, spokes, stair work, staves, tables, vehicle hounds, wagon felloes, wagon tongues

RED CEDAR.—Dresser bottoms, trunk trays,

RED CEDAR.—Dresser bottoms, trunk trays, wardrobe shelves.

RED GUM.—Balusters, brackets, brushes, butter boxes, conduits, cotton ginning machinery, coffee boxes, furniture, interior finish, kegs, molasses barrels, molding, newel posts, pails, railing, stair work, steam pipe, stands, sugar barrels, tables, vegetables crates, veneer, wagon panels, water pipes, wardrobes, well curbs, well tubing.

RED MULBERRY.—Finish, furniture parts, novelties.

ties

RED OAK .- Finish, furniture, show cases, stair

work, vehicles.
RIVER BIRCH.—Ox yokes.
SASSAFRAS.—Dugout canoes, fence posts, floor-

ing.
SHORTLEAF PINE.—Balusters, blinds, boats, shortlear Pine.—Balusters, blinds, boats, bridges, car siding, ceiling, cots, crates, excelsior, finish, flooring, foundry flasks, frames, grain doors, kitchen cabinets, lath, lounges, molding, paving blocks, sash, screen doors, ships, siding, spindies, springs for cots, veneer, wagon beds, weather board-

ing.
SOFT MAPLE.—Boat floors, porch seats, rustic

chairs.

SPANISH OAK.—Chair backs and seats, heavy felloes, log trucks, stair rails, stone wagons, sugar barrels, wagon hounds, boisters, tongues, spokes.

SPRUCE PINE.—Doors, frames.

SUGARBERRY.—Car finish, furniture, railing, slack cooperage, stair steps, table frames, tool handles, vehicle bodies.

SUGAR MAPLE.—Boat floors, brush backs, cot frames.

frames . SWEET BIRCH.—Doors, fixtures, screens, show

SWEET MAGNOLIA.—Boxes, excelsior.

SWEET MAGNOLIA.—Boxes, excelsior.

TEXAN OAK.—Bar tops, boats, boisters, cabinets, car stock, chair stock, crates, dump carts, felloes, fixtures, furniture, hubs, interior finish, molding, newel posts, railing, show cases, spokes, stair work, vehicle axles, wagon bottoms, wagon tongues.

TUPELO.—Balusters, boxes, brushes, carriage panels, ceiling, coffins, crates, excelsior, finish, flooring, kitchen safes, lath, molding, ox yokes, railing, siding, shelving, slack cooperage, spindles, stair

work, tables, vegetable crates (veneer).

TURKEY OAK.—Bottoms of wagon beds, brackets, brushes, car stock, doors, flooring, frames, furniture, interior finish, mantels, molding, morris chairs, panels, railing, spindles, stair work, staves, stock for chairs, wagon parts, felloes, bolsters, axles, hubs, hounds, tongues, spokes, standards, sandboards,

reaches, wardrobes.

UMBRELLA WOOD.—Brackets, newel posts, pedestals, stands, table tops.

WATER LOCUST.—Boxes, crates, platforms.

sheathing.
WATER OAK.—Bridge floors, dump carts, hidden parts of furniture, staves, wagon stock; holsters, axles, spokes, tongues, sandboards, hounds, felloes, reaches

WHITE ASH. -Balusters, baseball bats, boat oars, WHITE ASH.—Balusters, baseball bats, boat oars, boxes, broom handles, brushes, butter tubs, car finish, coal wagon panels, counter tops, crates, fixtures for offices. flooring, hoe, rake and shovel handles, house finish, kitchen safes, molding, pump handles, railing, refrigerators, sculls, shelving, show cases, slack cooperage, stairs, table legs, trunk slats, wagon stock, wardrobes, wash stands, woodenware

WHITE ELM.—Boats, cellar floors, crates, furniture, hoops, hubs, slack cooperage, trunk slats, wagon tongues.

WHITE OAK.—Ash trucks, balusters, bedsteads, brushes, cabinets, chair stock, coal wagon beds, counter tops, dining tables, doors, dressers, felloes, flooring, furniture, finish, lounge backs, mantels,

flooring, furniture, finish, lounge backs, mantels, molding, morris chairs, newel posts, railing, screen doors, showcases, spindles, spokes, stairs, taborets, tobacco sticks, wagon hubs, tongues, bolsters, axles, hounds, felloes.

WILLOW OAK.—Agricultural implements, balusters, bar tops, bedsteads, bottoms for vehicle beds, bridge approaches and floors, bureaus, cart bodies, chair backs and bottoms, church pews, cot frames, doors, frames, freight station floors, interior finish, livery stable floors, lounge frames, molding, newelposts, platform floors, pulpits, railing, screens, slack cooperage, stair work, stands, store fixtures, tight ccoperage, wagon axles, bolsters, hounds, reaches, sandboards, spokes, tongues.

ccoperage, wagon axies, bolsters, hounds, reaches, sandboards, spokes, tongues.
WING ELM.—Agricultural implements, boxes, crates, hoops, slack cooperage, suit cases, trunks. vehicle parts, wagon tongues.
YELLOW OAK.—Car stock, crates, furniture (inner parts), refrigerators, rough floors, screen doors, which parts beleters and boards tongues believes. vehicle parts; bolsters, sandboards, tongues, hounds. bed bottoms. YELLOW POPLAR.—Boxes, brushes, buggy bo-

dies and panels, cabinet drawers, caskets, coffins furniture, interior finish, lounge frames, morris chairs, office fixtures, wagon beds, wardrobes. morris

LIST OF MANUFACTURERS.

Below is a list of Louisiana manufacturers who supplied much of the information on which this report is based. The names are grouped by industries, and where a name appears under more than one industry it means that the firm is a manufacor of more than one commodity.

Name and Postoffice—

Boats and Ships.

Clooney Construction and Towing Co., Westlake. Hurlihy & Brown, Denham Springs.
Johnson-Crutti Co., New Orleans.
Moorman, Ell S., Baton Rouge,
New Orleans Dry Dock and Shipbuilding Co., New Orleans,
U. S. Naval Station, New Orleans
Westwego Shipyard, Westwego.

Boxes and Crates.

Albany Box and Veneer Co., Tangipaboa,
American Box Co., New Orleans,
Baton Rouge Veneer Works, Baton Rouge
Busch Box Factory, New Orleans,
Calcasleu Veneer Box and Crate Co., Lake Charles
Central Mannfacturing and Lumber Co., New Orleans
Cole, W. M., Lake Arthur
Ginbe Packing Company, New Orleans
Hammond Box & Veneer Co., Hammond
Hasam Box Factory, New Orleans
Henry Rose Mercantile and Manufacturing Co., Shreveport
Independence
Jahncke Navigation Co., Madisonville
New Orleans
Poit Barre Lumber Co., New Orleans
Port Barre Lumber Co., Port Barre
Powell Box Co., New Orleans
Republic Box Co., New Orleans
Republic Box Co., Raton Rouge
Werling Manufacturing Co., New Orleans

Cisterns and Tanks.

American Cistern Works, New Orleans Cole, W. M., Lake Arthur Heinrich, J. C., New Orleans Larls, Peter J., New Orleans Merhoff, Fred C.. New Orleans Rigamer & Wahling, New Orleans Riggs & Brother, New Orleans

Fixtures.

Henrichs, J. H., New Orleans Knight & Moskau, New Orleans Meyn, Anthony, New Orleans

Moses, Harry L., New Orleans Southern Cabinet and Refrigerator Co., New Orleans.

Furniture.

Boh & Co., New Orleans
Crescent Bed Company, New Orleans
Moses, Harry L., New Orleans
Muller Furniture Manufacturing Co., New Orleans
New Orleans Furniture Manufacturing Co., New Orleans
Stedel Furniture Co., New Orleans
Wright, M. C., Plain Dealing

Planing Mill Products and Sash, Doors, Flnish, Etc.

Alexandria Lumber Co., Alexandria
Albert Hanson Lumber Co., Garden City
Alglers Saw & Planing Mill, New Orleans
Aligners Saw & Planing Mill, New Orleans
Alien Lumber Co., Abreno
Antrim Lumber Co., Autrino
Ascension Red Cypress Co., Cotton Port
Baton Rouge Lumber Co., Baton Rouge
Bentley, J. A. Lumber Co., Baton Rouge
Bentley, J. A. Lumber Co., Baton Rouge
Bentley, J. A. Lumber Co., Bernlee
Bertha Lumber Co., Bernlee
Bertha Lumber Co., Bernlee
Bertha Lumber Co., Jennings
Berwick Lumber Co., Jennings
Berwick Lumber Co., Alberta
Big Pill, Lumber Co., Bolinger
Rrown Lumber Company, Shamrock
Caddo-Rapides Lumber Co., Alexandria
Carre, W. W. Co., New Orleans
Code & Bushong, Bogalusa
Code & Bogalusa
Code & Bushong, Bogalusa
Code & Bushong, Bogalusa
Code & Bogalusa
Code &

Vehicles.

Antaine Lumber Co., Wyatt
Bayne, Thomas, Oak Grove
Brinker, Frank, New Orleans
Buede, O. F., New Orleans
Dixie Vehicle Co., New Orleans
Gillett Brothers, Ville Platte
Oster Brothers, New Orleans
Phillip Forschler Wagon Co., New Orleans
Snyder Wagon Co., Shreveport
Thompson Brothers, New Orleans
Veglla, Louis, New Orleans

Miscellaneous.

American Turpeutine and Tar Co., New Orleans Baucroft, Ross & Sinclair Co., New Orleans Beyerbach, Phillip P., New Orleans Bullon, D. C., & Co., Bolinger Carroliton Excelsior & Fuel Co., New Orleans Connell Iron Works New Orleans Crescent City Moss Ginnery, New Orleans Crescent Felt Mattress Works, New Orleans Crescent Trunk Co., New Orleans Puffy Trunk Co., New Orleans Fields Mauufacturing Co., Shreveport Gullett Gin Co., Amite Ifallett Manufacturing Co., New Orleans Hammond Building and Manufacturing Co., Hammond Kyle Lumber Co., Franklin Laitner Brush Co., New Orleans Lesile, J. I., Ringgold Louisiana Creosoting Co., Wiunfield Mass, Jacob & Co., New Orleans Murphy Iron Works, New Orleans Murphy Iron Works, New Orleans Orleans Manufacturing Co., New Orleans Orleans Manufacturing Co., New Orleans Swoop, Julian M., New Orleans Swoop, Julian M., New Orleans Southern Mattress Works, New Orleans Southern Mattress Works, New Orleans Wels & Lesh Manufacturing Co., Delhi Wyckoff, A., & Son., Alexandria

APPENDIX.

'The Bureau of the Census, In cooperation with the Forest Service, collects and publishes year 1 year statistics showing the output of lumber, lath, year statistics showing the output of lumber, lath, shingles, cooperage, veneer, and certain other for est products in the United States and in the separate states. That work is independent of the studies of the manufactures which the Forest Service has made in several of the states. The latter supplements the former, and care is taken that work done by the Bureau of the Census is not duplicated. The Forest Service begins where the Census leaves off—after lumber leaves the sawmill. There are certain products which are in their finished form when they appear in the Census figures, and for that reathey appear in the Census figures, and for that reason they are outside the scope of the Forest Service's study, because they are not subject to further manufacture. If, however, a state's wood-using industries are to be fully presented, it becomes necessary to include some of the census statistics. Such is the purpose of this appendix. The figures which the census gives are for all states, but such only as relate to Louisiana are here presented and in condensed form * in condensed form.*

*Those who wish to examine the statistics more in detail are referred to "Forest Products of the United States 1909," issued in final form May 19, 1911, Government Printing Office, Washington, D. C., compiled by the Bureau of the Census in Cooperation with the Forest Service Department of Agriculture.

SHINGLES

Table 23 which shows the cut of shingles is approximate only, for longing to Louisiana. for It may luclude some not be-

Table 23.

Cut of Shingles in Louisiana. (Approximate only.) Wood Number Equivalent | Value. | Board Feet. | Cypress1,386,722,000 | 194,141,000 | \$2,815,000

LATH.

A complete list of woods used in making lath cannot be given, because this commodity is often a by-product in saw mills and is cut from slabs, crooked logs, and odds and ends of all species which come to the mill. The usual woods for this purpose in Louisiana are pine, cypress, and tupelo. Figures are presented in Table 24.

Table 24.

Output of Lath in Louisiana. Equivalent in board feet Woods. Number. Various 377,708,000 Value. 105,756,000 \$868,728

SLACK COOPERAGE.

Cooperage is divided into two general classes, that meant to contain fiulds, and that intended for dry commodities. Each class is divided into numerous grades or kinds. Tight cooperage may hold molasses commodities. Each class is divided into numerous grades or kinds. Tight cooperage may hold molasses when it will not do for alcoholic liquors, because the pores of some woods are so open that alcohol will pass through. In the same way, a slack barrel may do well enough for apples or potatoes while granulated sugar will sift through the cracks and be lost. The maker of a barrel, whether slack of tight, must know the commodity which will be carried in it; and the buyer of the barrel must be careful, also, and not accept what will not answer his purpose. The best woods and the most efficient workmanship are required in the making of whisky barrels, and white oak—under which name a number of species are included—is the best. Wine, vinegar, and oil barrels are less exacting, but comparatively few woods answer well even for these. The makers of slack barrels have more woods to choose from, and so various are the commodities to be carried, that a barrel which will not do for one—sugar, flour, or cement—may be satisfaceory for others, such as potatoes, poultry and cabbage.

Three articles make up a barrel, the staves, the eading, and the hoops. Table 25 shows the number heading, and the hoops. Table 25 shows the number of staves, their equivalent in board measure, and the species of wood of which they are made.

Table 25.

Output of Slack Cooperage In Louisiana Staves.

		Equivalent in
Woods.	Number.	board feet.
Red gum	12,659,000	2,531,000
Cottonwood	7,460,000	1,492,000
Black willow	3,073,000	614,000
Elm	400,000	80,000
Oak	300,000	60,000
Plne	. 258,000	52,000
Ash		30,000

wood is reported in Louisiana for heading than for staves. This does not necessarily mean that it takes more wood to make a barrel's heading that it takes more wood to make a barrel's heading than to make its staves. The two commodities are separately made, and it happened in Louislana that more lumber went into heads than into staves. The reverse might be the case in other states.

Table 26.

Output of Sla	ck Cooperage	in Louis	iana.Heading.
		Number	Equivalent in
Woods.		(Sets)	board feet.
Cottonwood		1,251,000	3,252,000
Tupelo		537,000	1,396,000
Red gum		1,54,000	400,000
Black willow .		104,000	270,000
Ash		94,000	244,000
Pine		20,000	52,000
Oak		1,000	2,600
Elm		1,000	2,600

5,619,200 Tight barrels also need hoops, but they are usually of metal, while many of those for slack barrels are of wood. Wire hoops, however, are used in large numbers. The hoop pole business has been important in this The hoop pole business has been important in this country since cooperage began, but it has undergone change to meet changed conditions. It was once supposed that hickory was about the only wood sultable for barrel hoops, and young hickories, from one to two inches in diameter, were cut from New England to Florida in unnumbered millions for the hoop pole market. The old style tobacco hogshead—the kind that was rolled to market and gave the English language the word "rolling house," which word went cut of use when the hogshead ceased to roll—was an extravagant user and waster of hoops in its day. out of use when the hogshead ceased to roll—was an extravagant user and waster of hoops in its day. Two or three full sets of hoops were often required for a hogshead, for it was customary to cut the hoops whenever a prospective buyer wanted to look at the tobacco. Other barrels used immense numbers, and the drain upon the forest's straightest, smoothest, most promising young trees was beyond calculation. Finally coopers began to learn that hoops could be made from large trees as well as from sprouts. A tree which would make only one hoop when four years old might make a thousand when it reached the age of fifty. A marked change likewise came about in the kinds of wood found available. An inspection of Table 27 will not show one foot of hickory or oak which were once almost the only species cut for hoop poles.

the only species cut for hoop poles.

A cooper of a century ago would have thought pine and red gum as utterly unfit for hoops, yet Louisiana makes nearly all its hoops of these two woods.

Table 27.

Output of Hoops in Louislana.

Woods. Pine Red gum Elm	*6,755,000	Equivalent in feet, B. M. 2,160,000 1,823,000 13,000
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H. M. H. S. S.

Tight Cooperage.

More wood is required for a stave or a set of heading in tight cooperage than in slack. and heads are thicker. There are, of course, different sizes and classes of barrels in both slack and tight cooperage, and any comparison of one with the other must be in a general way only. A stave for a huge crockery hogshead, which is slack cooperage, is larger than a whisky barrel stave; but comparing class with class, tight cooperage staves are larger than slack.

Table 28.

Output of Tight Cooperage in Louisiana.

		Equivalent ln
Class.	Number.	feet, B. M.
Staves	17,288,000 p	cs 15,559.000
Heading	864,739 s	ets 4,496,000

17 of this report. Such articles are generally called woodenware.

VENEER.

Table 29 shows the cut of veneer in Louisiana, reduced to feet, log scale. It was practically all rotary cut. A log is held in a machine and made to revolve against a strong knife which pares off the wood round and round, like peeling an apple. The shaving thus cut off is a wide as the log is long, often three or four feet, and is usually about as thick as a sheet of pasteboard. The thicknesses range from 5-16 down to 1-50 of an lnch. There are three kinds of veneer, classified according to the method of manuveneer, classified according to the method of manufacture: the rotary cut, the sliced, and the sawed. The sliced veneer is cut on the principle of a carpenter's plane cutting a shaving. The cutting machine is very strong and rigid. Sawed veneer is produced like any other lumber, but the saws are very thin, in order that unnecessary waste may be avoided. Ususally, but not always, the rotary veneer is the cheapest, and is cut from cheap woods, while the sawed and the sliced represent expensive material. sawed and the sliced represent expensive material. The woods cut into veneer in Louislana were of the cheaper sort—compared with mahogany, Circassian walnut, and white oak. The most of the product probably went into boxes and crates. The quantity seems small, and it is difficult to reconcile it with seems small, and it is difficult to reconcile it with the 56 million feet of wood made into boxes and crates in the state (See Table 4). It is not possible to say what proportion of the boxes and crates were made of veneer, for statistics of lumber and veneer in that industry are not kept separately, but much veneer is used for boxes—apparently much more than the whole reported output of veneer in the state

Table 29.

Output of Veneer In Louisiana

Output of veneer in Louisiana.	
Species. Feet, log scale.	
Cottonwood 2,559,000	
Yellow pine 202,000	
Red gum 178,000	
Tupelo	
Evergreen magnolia 88,000	
Total 3,164,000	

TURPENTINE AND ROSIN.

The seven states, Alabama, Florida, Georgia, Lonisiana, Mississippi, North Carolina and South Carolina, produce practically all of the rosin and turpentine in the United States. The output of turpentine in five of those states is declining, and in two, Florida and Louisiana, it is on the increase. In five of them the yield of rosin is increasing, and in two, South Carolina and Mississippi, it is decreasing. The increase in Louisiana from 1904 to 1909 was nearly 600 per cent for turpentine and about 800 for rosin. Similar increases are shown for no other state. In the whole country in 1909 the output of turpentine was 28,989,000 gallons, and of rosin 913,920,000 pounds. Table 30 shows the output and the 920,000 pounds. Ta value in Louisiana.

Table 30.

Output of Turpentine a	nd Rosin in Louisiana.
Class.	Quantity. Value.
Spirits of turpentine 1	1,452,000 gallons \$689,000
Rosin 46	3,760,000 pounds 690,000

OTHER PRODUCTS.

The Bureau of the Census gives statistics of output for railroad ties, telegraph and telephone poles, and wood distillation, but not by states, and it is impossible to allot Louisiana's portion of the whole. The sawed railroad ties are included in the lumber cut; but most ties are hewed. Such data on wood distillation as were secured during the field work in the state are included in Table 17

SUMMARY.

The saw mills of Louisiana cut more lumber mill than those of any other state, the average being

5,400,000 feet. That is about twenty times the average cut of the mills in the state of New York. Owing to the fact that statistics for poles, hewed ties, and wood distillation are not in form for use in state reports, the total of Louislana's forest products cannot be given. Table 31 gives all available figures showing amounts. Though in cut of lumber, the latest statistics show Washington a little ahead of Louislana, the grouping of all known data for each state shows that Louislana's forests little ahead of Louisiana, the grouping of all known data for each state shows that Louisiana's forests yield more wood than those of any other state. Whether an apportionment of hewed tles, poles, and wood distillation to the states where they belong would change the relative rank of these two states cannot be told with certainty, but it would probably leave Louisiana still two hundred million feet ahead of any other state in total output. That may be proper subject for congratulation by the business men of Louisiana, but it calls up a question of a serious kind: How long will the state's forests hold out with a drain of five billion feet a year, and what is being done in the way of providing a future supply? It is a fact apparent to all who travel through the state that the forests are not reproducing any-

ply? It is a fact apparent to all who travel through the state that the forests are not reproducing anything like they do in some other regions. Young cypress trees are almost unknown, and when the present stand has been cuf, the end of cypress lumbering in that region will come. Even if young cypresses were coming on, it takes two hundred years for one sawlog to grow. Longleaf pine is in nearly the same situation. Occasionally vigorous stands of seedlings are seen, but the areas

are usually small and far apart. The end of the end of the cypress. Longleaf pine seedlings have bark so thin that a moderate fire kills them—even when they have reached sapling size—and fires are frequent in Louislana. They do not attract as much attention as the fires in the Northwestern states, which frequently becomes prestagalar, configurations. which frequently become spectacular conflagrations; but as destroyers of future forests, it is not lim probable that the slow, easy-going fires of Louisiana do as much damage as those of Idaho or Wash-

There is a little more hope for the shortleaf, loblolly, and Cuban pine in Louisiana, for they seem to possess more vigor, reproduce better, and grow

faster, but unless those species are given some encouragement, they cannot supply sawlogs in quantity sufficient to keep future lumber yards stocked. In some parts of Virginia and North Carolina lobfolly pine overran abandoned plantations in past years, and grew so rapidly that large lumber operyears, and grew so rapidly that large lumber operations are now carried on in old cotton and tobacco fields. The same pine would probably repeat the process in Louisiana and solve part of the problem of supply, if the chance were given; but the Louisianans are showing no disposition to abandon their plantations. Therefore, the future sawlogs must come from elsewhere than from old fields. The state has broad stretches of as fertile land as can be found anywhere; but it has much other soil that is thin, and it is the thin soil which must produce the lumber, for the rich land is and will be in too

the lumber, for the rich land is and will be in too much demand for cultivation for much of it to be spared for trees, except along swamp edges and estnaries where willow and cottonwood will repay well those who give them a chance to grow.

The people of the state might assure an adequate supply of lumber by keeping the poor lands growing pines, and the wet lands in willow, cottonwood, willow oak, white oak, and other oaks, red gum, and a few others; but those things will not come about of their own accord; and the present forests are going at a rate never seen elsewhere in the United States as the following table shows.

Black I. Table 31.

Summary of Louislana's Forest Products.

	Annual Output
Products.	Feet B. M.
Sawed Lumber	3,551,918,000
Shingles	194,141,000
Lath	105,756,000
Tight cooperage	20,055,000
Slack cooperage	14,474,000
Veneer	3,164,000
Fuel	*1,285,862,000

Total 5.175.370.000 *This number is calculated on the basis of 600 feet board measure to the cord of wood. The number of cords, 2,143,104, is taken from Forest Service Circular 181, "Con-sumption of Firewood in the United States.

Industries of Texas

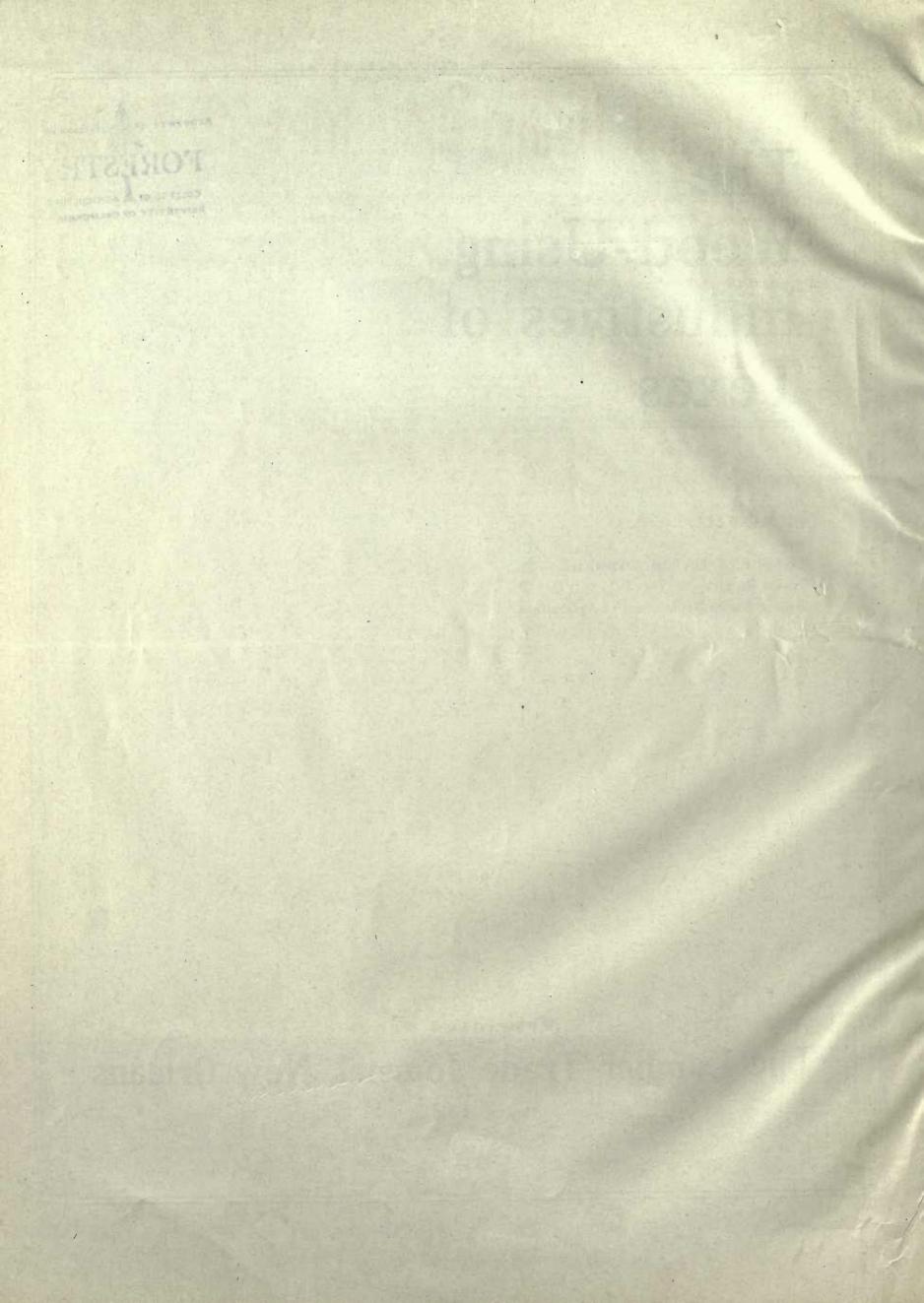
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HU MAXWELL, Expert, CHARLES F. HATCH, Statistician, Forest Service, United States Department of Agriculture.

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The Wood Using Industries of Texas

Plants Already Established and Tells of Great Forest Resources Available for New Establishments in the Future—Increasing Number of Woodworking Industries Is Shown by Report—Diversified Interests Involved in Present Plants, but Need for a Larger Utilization of the State's Lumber Production Is Evidenced by the Investigations.

NOTE

The following report was prepared by Hu Maxwell, expert, and Charles F. Hatch, statistician in forest products, attached to the Office of Wood Utilization, U. S. Forest Service, Chicago. It is published and thus made available to the public through the courtesy of The Lumber Trade Journal, New Orleans, La.

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PREFACE.

Texas is the largest State and has more forested area than any other, though the total stand of its timber is much below some of the rest. The area of its woodland has been placed at about 40,000,000 acres; but it is difficult to draw the line between forested and unforested land in the State. There are all grades and degrees from the heavily timbered pline belts of the east to the thinly covered brush land in some of the central, southern and western parts. Much land is covered with tree growth and yet is incapable of producing a large amount of merchantable lumber, because the trees are too small for milling purposes. There is room for difference of opinion as to where the lines should be properly drawn between the timbered and untimbered portions of Texas. The estimate of 40,000,000 acres of forest land includes only that which now is capable of yielding a reasonable amount of saw timber per acre, and does not include wide expanses of brush.

Texas is 825 mlles long and 780 wide and varies in altitude from sea level to 8,382 feet at the summlt of Baldy Peak In Jeff Davis County. The surface varies greatly as might be expected in an area so large. Flat plains of deep, fertile soil are succeeded by rolling hills and ilmestone ridges; steep rocky slopes with practically no soil, and mountains rugged and sterlie. In the low plains of the south frost is seldom seen. In the high plateaus of the northwest the mercury sometimes falls below zero. In the eastern part rains are abundant; in some of the western regions there is not enough to support much vegetation.

It might be expected that a region so large, and varying so greatly in its climatic and physiographic features, would support forests both valuable and interesting. Such is the case. Practically the whole range of forest trees known to the temperate zone are represented here by species, genera or familis. The cypress and tupelo which flourish with their roots burled in water most of the time reach fine dimensions along the rivers or within reach of the brackish water which the winds or the tides force inland from the arms of the Gulf of Mexico. The other extreme in the scale of vegetation also flourishes in Texas, the xerophytic cacti of the high and dry western plateaus. Between these extremes there are perhaps 150 species of trees, ranging from the fallest pines and the largest red gums to the small, hard and beautiful acacias which are found in the thorny jungles along the Rio Grande. All weights of wood are represented, from

the almost iron-like density of lignum vitae and koeberlinia to the lattice-like stems of the opuntias on the western mountains.

on the western mountains.

No careful estimate has ever been made of the standing commercial timber of Texas. Figures have been published giving such estimates for a few of the best-known species. The longical pine area has been placed at a little less than 3,000,000 acres, with a stand of about 30,000,000,000 feet. That would average 10,000 feet to the acre, and some might regard it a pretty high average for so large an area. The oaks are found in extensive regions, but not in stands as pure as the pines.

In taking up this study of the wood-using industries of Texas the Forest Service purposed to supply information not available in any public or pri-

In taking up this study of the wood-using Industries of Texas the Forest Service purposed to supply Information not available in any public or private report. The Bureau of the Census, co-operating with the Forest Service, collects and compiles annually statistics showing what the country's total sawmill output is; what the output in each State is; what is the mill value for each kind of wood in the several States; what kinds of wood and how much of each one are manufactured into lumber in each State, and in all the States. But this stops short of giving all needed information on the subject. It does not go beyond the rough lumber, and presents no statistics to show what becomes of the lumber after the sawmills turn it out in the rough state. The present report takes up the subject where the census leaves off; that is, it considers rough lumber as raw material for further manufacture, and shows what becomes of it, what it is used for, and what products are manufactured from it. For instance, the census statistics give figures showing how much red gum the sawmills cut into rough lumber, but that is all. This report follows that lumber until it has been made into finished commodities, such as furniture, vehicles, finish for houses, ships and boats, musical instruments, and whatever it goes into. It is thus shown what becomes of the wood which sawmills convert into lumber and stack in their yards. This report, however, does not take up the wood which is not further manufactured after it leaves the sawmills. If oak or any other wood goes into rough construction, or rallroad ties, or bridge timbers, or is taken for any other purpose which uses it in the rough, it is not considered as raw material for further manufacture. A State's sawmills may turn out a large quantity of a certain wood, and little of it may be further manufactured. In that case, if no explanation were offered, it might appear that the difference between what the mills cut and what the factories account for is unreasonable.

SUMMARY OF KINDS OF WOOD USED IN TEXAS.

	Table 1.					Grown
KINDS OF WOOD.	Quar	ntlty	Average	Total cost	Grown	out
Common Name. Botanical Name.	Used and	nuaily.	cost per	f. o. h.	in Tex.	of Tex.
	Feet B. M.	Per cent	1,000 ft.	factory.	Per ct.	Per ct.
Shortleaf plnePinus echinata	331,388,685	43.47	\$12.64	\$ 4,189,267	98.56	1.44
Longleaf pinePinus palustris		33.27	12.71	3,223,614	83.99	16.01
Lobiolly pinePlnus taeda		14.31	11.51	1,255,370	100.00	
Red gumliquidambar styraciflua		3.28	13.87	346,786	83.36	16.64
Cypress		1.84	23.07	323,441	50.20	49.80
White oakQuercus alba		.79	28.86	173,461	73.90	26.10
CottonwoodPopulus deitoides		.56	21.21	90,728	59.10	40.90
Texan oakQuercus texana		.37	18,91	53,216	98.93	1.07
White ashFraxinus americana		.31	21.66	51,850	76.37	23.63
TupeloNyssa aquatica		.27	12.50	25,327	100.00	
Willow oakQuercus phellos		.26	12.00	24,000	100.00	
Western yellow pinePinus ponderosa		.20	53.82	80,939	.47	99.53
Chinquapin oakQuercus acuminata		.15	15.22	17,532	100.00	
Wing elmUlmus alata		.14	12.27	12,700	100.00	
Post oakQuercus minor		.11	23.81	19,335	100.00	
BirchBetula (—)		.10	55.39	42,458		100.00
Evergreen magnolia Magnolia foetida		.09	12.89	9,308	100.00	
Sugar pinePinus iambertiana		.07	48.04	24,229		100.00
Yellow popiarLiriodendron tuliplfera.		.05	56.60	21,480		100.00
White pinePinus strobus		.05	58.05	21,932		100.00
Black gumNyssa sylvatica		.05	13.81	4,970	100.00	22222
Mahogany (American). Swietenia mahogani		.05	154.59	53,831		100.00
White elmUimus americana		.04	19.35	5,341	81.88	18.12
Pin oakQuercus palustris		.03	, 15.30	3,290		100.00
Hickory Hicoria (——)		.02	68.20	12,749	88.26	11.74
Black walnutJuglans nigra	135,000	.02	74.48	10,055		100.00

Vivna	on Woon	t and a Owner to	***		m-4-34		Grown
Common Name.	Botanical Name.	Quant Used ann	naliy.	Average cost per	f. o. b.	Grown in Tex.	out of Tex.
Mexican white pine	Pinus strombiformis	Feet B. M. 130,000	Per cent	1,000 ft. 48.46	factory.	Per ct.	Per ct. 100.00
Overcup oak	Quercus lyrata Quercus rubra	108,000	.01	25.44	2,747	100.00	
Osage orange	Toxylon pomiferum	100.026	.01 .01	79.38 93.99	8,335 9,401	100.00	100.00
Douglas fir	Pseudotsuga taxifoiia Tilia americana	100,000 62,200	.01	40.00 34.69	4,000 2,158		100.00
Black willow	Salix nigra	50.000	*	10.00	500	100.00	
Chestnut	Castanea dentata	40.000		90.78 35.00	3,849 1,400	3.30	96.70 100.00
Spanish cedar	Cedrela odorata Acer saecharum	40,000 21,062	*	31.13 64.71	1,245 1,363		100.00
Hackberry	eltis occidentalis	20.000	COVINGE.	12.50	250	100.00	
Gambel oak	Picea sitchensis Quercus gambelii	15,000	***************************************	60.00 20.00	1,200 300	100.00	100.00
Mountain juniper	Juniperus sabinoides Juniperus monosperma.	13,000 12,000	*	90.00 90.00	1,170 1,080	100.00 100.00	
Teak	. Tectonia grandis	8.000	*	220.00	1,760		100.00
Western white pine	Fagus atropunicea Pinus monticola	3.500		60.00 50.00	300 175		100.00
Mesquite	Prosopis juiiflora Juniperus virginiana	3.000	*	16.00	48	100.00	
Mahogany (African) .	Khaya senegalensis	500	****	30.00 150.00	60 75	100.00	100.00
Agarita†	Berberis trifoliata Juniperus pachyphoea .						
American holly	llex opaca						
Anagua	Ehretia elliptica			• • • • •			
Angelica tree	Aralia spinosa Hicoria minima		• • • • • •				
Biack haw	Crataegus douglasii					• • • • •	
Blue beech	Quercus marilandica Carpinus caroliniana						
Biue gum	Eucalyptus giobulosaQuercus breviloba						
Liue oak	Quercus oblongifolia Condalia obovata					•••••	
Box elder	.Acer negundo						
Bur oak	Quercus macrocarpa Ulmus crassifolia		• • • • •				·····
Chaiky ieucaena (mi-	.Lencaena pulverulenta.						,
Chinquapin	Castanea pumeia						
Cholla	Opuntia fulgada Quercus Michauxii		• • • • • •				
Deciduous holly							
Downy basswood	Tilia pubescens		• • • • •	• • • • •			
Drooping juniper Dwarf sumach	. Juniperus flaccida Rhus copallina		• • • • •				
Emory oak	Quercus emoryi						
Fremont cottonwood .	Populus fremontii						
	Sophora secundiflora Quercus gambelii						
Green ash	Fraxinus lanceolata Gleditsia triacanthos						
ornbeam	.Ostrya virginiana						
	Parkinsonia acuieata Acacia farnesiana						
	Cyrilia racemiflora Kalmia latifolia			• • • • •	• • • • • • • • • • • • • • • • • • • •		
Koeberlinia	Koeberlinia spinosa				• • • • • • • • • • • • • • • • • • • •		
Live oak	.Quayacum angustifolium .Quercus virginiana						
Longieaf willow	Salix fluvitalis Salix occidentalis long-			• • • • •			
	gipes						
Mexican palmetto	Arbutus xalapensis Sabal mexicana		• • • • •				
	Diospyros texana Jugians rupestris						
Mistletoe (a parasite)	Phoradendron flavescens Celtis occidentalis reti-				• • • • • • • • • • • • • • • • • • • •	• • • • • •	
	culata						
	Piospyros virginiana Pinns edulis						
Poison sumach	.Rhus vernix						
	cuiis						
	Opuntia tuna Persea berbonia						
Red maple	.Acer rubrum	• • • • • • • • • •	• • • • •				
Rocky mountain oak.	.Quercus unduiata		• • • • •				
Scarlet haw							
	Prosopis odorata Bumelia lanuginosa					• • • • • •	
Silver maple	Acer saecharinum					•••••	
Sophora	Uimus pubescens Sophora affinis		• • • • •				
	Yucca truculeana Quercus digitata					• • • • •	
Sweet magnolia	Magnolia giauca						
Texas ebony	Piatanus occidentaiis Zygia flexicaulis			• • • • •			
	Acacia wrightii						
	Melia azedarack umbra culifera						
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One hundred and twenty-nine woods were found in use in Texas for manufacturing purposes. Four were foreign, and all the others grow in the United States, and all but ten in Texas. The State, therefore, has 115 species of trees that are in commercial use. Some are used in a very small way at present, and there are a few others fit for use, but in the course of this investigation they were not found in actual use and for that reason are not included in Table I

The forty-eight species reported by manufacturers foilow:

Basswood.—The manufacturers in Texas use little basswood,—The manufacturers in Texas use fittle basswood, and none of it is cut in the State, though an occasional tree is found near the eastern border. It is one of the whitest, cleanest woods of the forests, and high price aione stands in the way of its use for boxes in which to ship food products, and for weadenware of many kinds

for woodenware of many kinds.

Beech.—Although the natural range of beech extends as far west in Texas as the Trinity River, it does not appear that any of this wood reported by wood workers in the State was home grown. An average price of \$60 a thousand is unusually high for this wood for it is not generally expensive. average price of \$60 a thousand is unusually high for this wood, for it is not generally expensive. That cost is explained by the fact that the amount used was small, and was of the highest grade. Beech never has been an important tree in Texas forests, and it is not likely that it ever will be. It grows slowly, demands ideal forest conditions to develop good wood, and the best of it is not weil liked except for a few purposes. None of that reported in Table I grew in Texas.

Birch.—At least three kinds of birch are used in Texas, but only one grows there—the river birch.

Texas, but only one grows there—the river birch. The yellow and sweet birches come from the northern and northeastern States, and are the species generally employed by furniture makers and the manuerally employed by furniture makers and the manufacturers of high-class articles of wood. The two go to market as one in the Lake States, though the trees are easy to tell apart as they grow in the woods. River birch has a wider range than the others, but is best developed south and east of the Ohio River. Its wood lacks figure and color, and unless artificially treated it is used only where a very plain material will answer. It takes stain well and may be colored and finished as a satisfactory imitation of mahogany. The tree may be recognized along water courses by its rough, ragged bark, which often hangs in shreds and tatters.

Black Cherry.—This tree is scarce in Texas.

which often hangs in shreds and tatters.

Black Cherry.—This tree is scarce in Texas, though it is found in both the eastern parts and in the western mountains. It is small, and only an occasional log finds its way to the sawmills. Most of the small quantity used by manufacturers in the State comes from outside regions. The highest development of the species is found in the mountains of Pennsylvania and West Virginia.

Black Gum.—Sometimes tupelo in Texas is called black gum, and it is probable that some listed in Table I as black gum was tupelo. It is certain, however, that the cut of black gum in the State is considerable. Its bark is the roughest and blackest of the gum woods—hence. its name, If the bark is considered, there is little likelihood that this tree will be mistaken for any other except persimmon, to which it bears some resemblance. The wood is tough and difficult to split. It has no figure and is one of the plainest woods in the country. It poishes well, and panels made of it bear a little resemblance to plain maple, or the sapwood of yellow poplar.

Black Walnut. The netural range of black real popiar.

Black Walnut.—The natural range of black wal-Black Walnut.—The natural range of black walnut covers northeastern Texas, and a little is cut each year, but the wood is not important as a resource of the State. Five mills reported it for the census returns of 1910. It is a long-lasting and a beautifni wood, and has been in use in Texas since the earliest settlement. Two hewed beams in the Alamo at San Antonio were found in a sound condition in 1912 when the work of restoring the old building was under way. It could not be assert. tion in 1912 when the work of restoring the old building was under way. It could not be ascertained with certainty at what date the beams were placed in the walls, but certainly very early, and a service of about 195 years was claimed for them. Decay had produced no visible effect, and a fresh cut in the wood released the characteristic walnut oder. Black walnut is usually regarded as the highest-priced native wood of the United States. The best comes from old trees with heartwood soild and black. Young walnut produces little valuable lumber, and for that reason plantations will he a long time in attaining size fitting them for market. When the tree is young most of the trunk is white sapwood, which is undesirable.

Black Willow.—This has not generally been considered other than a minor species in this country, yet in some localities it filis an important place. The amount used in Texas is not very large, but an

of it grows in the State. It is a cheap wood, and as it will not pay the freight charges on long shipments it is apt to be used in the region where it grows, or not at all. Wet lands, but not too swampy,

KINDS Common Name.	or Wood. Botanical Name.	Quant Used ann		Average cost per	Total cost	Grown in Tex.	Grown out of Tex.
Common Name.	Botanicar Hame.	Feet B. M.	Per cent	1.000 ft.		Per ct.	
	***			1,000 11.	lactory.	rei ct.	rei ct.
	.Hicoria aquatica						
Water oak	.Quercus nigra						
Whiteleaf oak	.Quercus hypoleuca						
Wild china	.Sapindus marginatus.						
	.Prunus americana						
	.Aesculus octandra						
	Quercus velutina						
Yopon holly							
Totals		762,336,112	100.00	\$13.30	\$10,144,925	91.51	8.49
*I ogg thom 1/100							

†This and 79 species which follow were not reported by any manufacturer but were found in use.

suit it best, and when it finds conditions just right it grows nearly or quite as fast as any tree in this country. Twenty or thirty years will produce small sawlogs, and twice that period suffices for trunks occasionally two feet or more in diameter. Being a waste land tree, it is worth the consideration of those who think of planting woodlots for commercial the latest recognized for the seeds are scattered. those who think of planting woodlots for commercial timber growing. Its light seeds are scattered far and wide by the wind, and if suitable tracts are made ready, the planting will generally be done by nature if seed trees nappen to be in the vicinity. The wood is strong and reliable, but not handsome. Chestnut.—Texas grows none of the chestnut which its factories use, but imports it from the States in the Angicablan region or the Ohio valley.

States in the Appalachian region, or the Ohio valley. Though it is an excellent wood for certain purposes, it does not belong in the indispensable class, and if it were withdrawn from market its place could be filled with something else. Considered for the whole United States, it is probably the most important wood in the manufacture of coffins and caskets. Custom controls that use. Undertakers insist that no reason can be given for the demand made upon chestnut for burial cases, except a long-standing custom which had its origin no one seems to know where. The wood is still abundant, but the cut is heavy, both for lumber and tanning extract; and in recent years the appearance of a diseased condition affecting this timber in some of the hest chestnut affecting this timber in some of the best chestnut regions of the country has caused concern for the future.

Chinquapin Oak.—This oak seems to supply a large quantity of wood to manufacturers in Texas. It is possible that some reported by this name was Its range does not extend westward of other oak. the Guadaloupe Mountains, and it attains its best size and form in the eastern part of the State. Trees eighty feet high and three feet in diameter are occasionally found. The wood is strong, of good grain, and is serviceable for many purposes. The leaf resembles that of the swamp white oak and

the chestnut oak, though it is smaller than either.

Common Cottonwood.—Texas is not a large producer of this wood and in 1910 only fourteen mills in the State reported any in their output. Many mills cut small amounts and did not report it in the census returns for that year. This tree is able to eke out an existence in nearly any kind of soil, and it can get along with comparatively little water, but it does not prosper under such circumstances. It wants plenty of moisture and a fertile soil to show best results. It is a frontier tree, and not only in Texas but elsewhere in the Plains States it was found by explorers and first settlers miles in advance of the fringe forests of other species. The seeds are light, and the wind carries them long distances. Some of the millions thus scattered found lodgment near springs of water and in damp situations along water courses, and thus the outposts of the forests were planted. The trees' custom of grow-ing where the ground is damp often saved it from prairie fires in the days when grass was burned yearly. The fact that cottonwood grew farther out on the plains than most other trees gave it an importance in early years which it does not hold now. Frontiersmen built corrals and barns of cottonwood logs when they could procure nothing else. At the present time it has taken its place as a material for manufacturing, and is bought and sold on its merits as far as supply will permit. It is becoming scarce. The sawmili cut in the country is less now than it was ten or twelve years ago. There is no immediate danger that cottonwood will fail entirely either in Texas or in the country generally, but the best has already been cut in most States, and dependence must be placed on young trees now coming on.

Cypress.—Cypress in Texas is of less importance than the pines, and the yearly output of this wood will likely decrease until it reaches a low place in the State's list of natural resources. Nature has confined it to overflow land and many tracts of that kind in Texas produce no cypress. It grows in certain river bottoms, but usually not in extensive bodies. The State has no large cypress mills, as Louisiana has, and the total cut is only moderate. There iana has, and the total cut is only moderate. are few young cypress trees coming on. Wh When the

old trunks have been cut, or when they fall in course of nature, their piaces will be left vacant, unless some other kind of tree fills the openings. It is a tree that grows very slowly, and two or three centuries are required to produce a trunk large enough for first-class sawlogs. It can not be expected that young cypress will be set apart for future cutting. The returns will be too far in the future, and if any tree planting is done, some species of more rapid growth will be chosen.

Douglas Fir.—This wood was unknown in the eastern and middle regions of the United States a few years ago, and, as a comparatively new comer it has met with favor. Most of it is cut in Wash ington and Oregon, but it abounds in the nonrthern Rocky Mountain States. A common name for it is Oregon pine, and it is occasionally called red fir. The trees attain great size, and very large timbers are cut from them. In Texas it enters into competition with longleaf pine probably oftener than with any other. The two woods are much alike in many ways. Both are very strong and stiff, and are used for similar purposes. Douglas fir is cut in larger quantity than any other wood in the world, except the southern yellow pines, and is so cheap in the regions where it is produced that it is able to force its way into markets hundreds or thousands of miles away. Its high price in Texas limits its competition with its great rival, longleaf pine. It costs more than three times as much as the pine.

Evergreen Magnolia.—This is not a timber tree of first importance in Texas or anywhere else. A few years ago it was seldom cut except in very small quantities; but it was found to possess good qualities, and now it goes regularly to the mills which saw hardwoods in the region where it grows. The wood of different magnolia trees, or even the wood of the same tree, shows tack of uniformity. Some of it looks like yellow poptar and compares favorably with it in several particulars, white other of it is very dark, with hard flinty streaks which not only presents a poor appearance, but duli the tools of the wood-working machines and create an unfavorable impression of the wood generally. This magnolia holds pretty closely to the damp lands in eastern and southeastern Texas. The amount of the annual cut is not known, because it goes in with the minor species in most places and no separate ac-count is taken. It is coming into more notice every year, and some manufacturers have been so success tul in finding ways to make it serviceable that the best grades are easily sold. The wood does not hold its color very well. The light-colored sapwood is apt to become darker after exposure to the air, and the dark heartwood fades a little. The tree is so handsome in the forest that it is occasionally spared when the surrounding trees are removed. purely ornamental purposes it is one of the finest of all southern trees. In the parts of Texas where it grows naturally, it is destined to survive most of its associates, and in years to come it may be re-

garded as more ornamental than useful.

Gambel Oak.—This tree will never be important except locally. It is scarce in Texas of a size fitting it for commercial purposes, and much of the woou contains hard and dark colored streaks. When a choice tree is found the wood makes good furniture and finish. It is found in the western part of the State where woods are scarce, and this gives it more value than it would have if its range lay in the wooded regions of the east. Nearly any kind of tree is valuble when it is the only one to be had.

Hackberry.—A good deal of confusion exists in Texas between hackberry and sugarberry. One is frequently mistaken for the other. They are so nearly alike, however, that for all practical purposes they might be considered the same. Botanists more than wood users try to keep them separate. Though hackberry is cut in rather large amounts in Texas, as well as in more than a dozen other States, the census returns of the lumber cut of the United States do not mention this wood, not even among the minor species. That is because it loses its identity when it reaches the sawmill. Hackberry iumber is seidom heard of. It goes as ash, or else by no name at all. Users generally consider it not quite as strong as ash, ,and with grain and figure

less pronounced, but otherwise it compares favorably with white ash. Mature trees often have little ably with white ash. Mai or no colored heartwood.

Hickory.—Texas is not an important producer of ickory. Thirteen mills reported it in their output in 1910, the latest census figures. Wood users lise hickory. Thirteen mills reported it in their output in 1910, the latest census figures. Wood users listless than 200,000 feet a year. Hickory approaches its southwestern limit in Texas, and the species known as pecan is the only one that is fairly abunther though five other species grow in the State. dant, though five other species grow in the State. Users of hickory generally make no distinction between the species in listing them for statistical purposes, but they clearly recognize a difference when selecting the material for use. Few manufacturers will buy pecan hickory on equal terms with bitter-nut, shagbark, or pignut. The six species of hickory found in Texas are, mockernut (Hicoria alba), pecan (Hicoria pecan), bitternut (Hicoria minima), water hickory (Hicoria aquatica), shagbark (Hicoria ovata), pignut (Hicoria glabra). The only one of these to attain its best development in Texas is pecan. Along some of the water courses in the southwestern part of the State, pecan trees grow four or five feet in diameter.

Mahogany.—Two species of mahogany are imported by Texas manufacturers. The most common is the American species, which, speaking from the standpoint of the botanist, is the true mahogany, the kind that has been in use four hundred years. It is cut in Mexico, Central America, the northern States of South America, and the West Indies, and is usually imported in the log. The other kind re-ported in Texas is the African species. The two hear close resemblance, and some manufacturers prefer one and some the other. There are other woods which pass commercially for mahogany, but none were reported in Texas. Wood staining has been so far perfected that many common American woods are finished in such close imitation of mahog-

ny that they successfully pass for it.

Mexican White Pine.—This tree is more abundant
Mexico than north of the international boundary, but it occurs in the southwest, where some call, it Arizona pine, or simply white pine. Competent judges have pronounced it the nearest approach in good qualities to the white pine of the Lake States of all the woods of this country. It has not yet been much used in the United States. Large and fine forests of it are said to exist among the moun-

tains of northwestern Mexico.

Osage Orange—This valuable wood is of peculiar interest to Texas, because of its unique history and because of its probable future importance when country shall be brought to depend on planted trees for wood supply. Osage orange has been planted for wood supply. Osage orange has been planted in perhaps every State of the Union, and grows suc-cessfully in most of them. It is one of the most widely distributed of American forest trees, but its distribution has been chiefly artificial. It was found originally in a very restricted region, from which it was carried for hedge and ornamental planting far and wide. Its natural home, to which it was confined when first discovered, embraced little more than 10,000 square miles, and probably half of that small area produced no trees of commercial size. Its northern limit was near Atoka, Okla., its southern a little south of Dallas, Texas; a range north and a little south of Dallas, Texas; a range north and south of approxximately one hundred miles. Its broadest extent east and west was along Red River, through Cooke, Grayson, Fanning, Lamar and Red River counties, Texas, about 120 miles. Some osage orange of commercial size grew outside the area thus demimited, but no large amount. Much of that region, particularly south of Red River, was prairie, without timber of any kind; but scattered here and there were helts strips thickets, and clumps of there were belts, strips, thickets, and clumps of osage orange mixed with other species. On the very best of its range, and before distributed by white men, this wood seldom formed pure stands of as much as 100 acres in one body, and since the country's settlement, the stands have become smaller or have been entirely cleared to make farms. All or have been entirely cleared to make farms. All accounts agree that the osage orange reaches its highest development on the fertile lands along Boggy and Blue Rivers in Oklahoma, though fine bodies of it once grew south of the Red River in bodies of it once grew south of the Red River Texas, and much is still cut there, though choicest long ago disappeared. Few trees are exacting in soil, ,yet when it can make choice it chooses the best. In its natural habitat it holds its chooses the best. In its natural habitat it holds its place in the black fertile flats and valleys, and is seldom found on sandy soil. It is not a swamp tree, though it is uninjured by occasional floods. The tracts where its grows are sometimes called "bodark swamps," though they are marshy in wet weather only.

Thirty or forty thousand square miles of north-eastern Texas are fenced with osage orange posts, and nearly half of the houses in the same region and nearly half of the houses in the same region stand on blocks of this wood. It is equal to any timber in this country in resulting decay. It has been much used as bridge piling, and to a less extent for telephone poles. Ten or twelve thousand wagons are made yearly with osage orange felloes. The wood shrinks and swells very little, and wheels stand the hot dry roads of the southwest better than if made of any other wood. They are not recommended for rocky roads, because osage orange felloes are so unyielding that they will splinter by jolting over rocks.

Osage orange is popularly supposed to be of slow growth, but such is not always the case. Growth depends on soil and situation. Planted hedges have been known to produce posts in a few years. A log in the University collection at Austin is twenty-three

In the University collection at Austin is twenty-infection has been been added in the street in forty-two years. A tree less than thirty-five years old near Victoria, Texas, is twenty-four inches in diameter.

Overcup Oak.—The acorn usually is the means of identifying this tree in the woods, but the wood so closely resembles white oak that one may be taken the street of the str

closely resembles white oak that one may be taken for the other. Their qualities and uses are much the same. It is often called swamp white oak in Texas. It is probable that more of it was cut than Table I shows, because some manufacturers put it down as white oak in their reports.

Pin Oak.—Nearly a quarter of a million feet of this oak was reported by Texas manufacturers, at an average price of \$15.30 a thousand feet. There is some reason to doubt the correctness of this identification, and those who reported it may have applied the name to some other species. It is customary in the name to some other species. It is customary in the name to some other species. It is customary in some localities to give this name to several species of oak. The true pin oak (Quercus palustris) beare a general resemblance to the true red oak, but its leaves are deeper lobed and sharper pointed, the bark is smoother in young trees, and the trünks are bristling with small branches set at right angles like pins. (Hence the name.)

Post Oak.—The wood of this tree bears very close resemblance to the trne white oak (Quercus alba), and for most purposes is as good It grows in Texas westward to the 100th meridian, and south to the San Antonio River. Some of the users consider that the post oak in Texas is inferior to the same species in the northeastern part of the United States. Similar complaints are made against some of the other oaks that grow in Texas and which are found also in the cooler and damper parts of the country.

Red Cedar.—The 2,000 feet of red cedar listed in Texas. It seems to imply that red cedar is one of the least important of the State's native wood, while Post Oak.—The wood of this tree bears very close

the least important of the State's native wood, while the fact is it is one that promises much. The species grows in at least half the State, and in the recies grows in at least half the State, and in the region about Austin, between that city and San Antonio, and south and southwest as well as in the west over parts of the Edwards Plateau, this tree is found growing by untold thousands. The growth is usually small, the trunks often making only posts on small poles; but what is wenting in size is made. is usually small, the trunks often making only posts or small poles; but what is wanting in size is made up in quantity. The dry rocky ridges in the vicinity of the eastern escarpment of the Edwards Plateau are thickly covered with cedars which have appropriated practically all of the ground to themselves. Train loads of posts are hauled from the region into surrounding agricultural country. In some places the loose bark is removed from the posts and is sold in the towns for kindling wood. It may be put up in bales somewhat like hay to facilitate the handling. When near enough to markets, the limbs handling. When near enough to markets, the limbs and tops are cut into stove wood. When this is done, utilization is almost complete. But in districts more remote it is not practicable to work up the refuse so closly.

Red cedar is now and will continue to be a valu-

able forest resource in Texas. What the osage ange is for fence posts in the northeastern part What the osage orthe State, red cedar is In the south, but not in the extreme south. Much that is too small for posts makes stakes to strengthen wire fences. Young cedars spring up where the old are cut, and though the growth is not rapid, there is always a supply coming on. It is a "poor land" tree, and by contenting itself with thin, rocky soils, it leaves more favored situations for farm crops. As the country develops, the demand for fence material will increase and red cedar will be one of the standard woods for this purpose

woods for this purpose.

Red Gum.—Red gum is cut in the eastern half of Texas and is one of its important timbers. It has won its way in spite of much prejudice against it. It is not an easy wood to season, and for a long time the belief prevailed that it could not be dried in a way to fit it for any but rough purposes. Experience has snown that its seasoning is practicable, and it has taken its place among the best furniture and finish woods of this country. The same tree has two kinds of wood, white or pale yellowish sap, and device selected beauty. nas two kinds of wood, white or pale yellowish sap, and darker colored heart. Occasionally a tree of large size is nearly all white, while others are largely heartwood. Red gum may be worked to show a pleasing grain. It is made to imitate walnut, oak, cherry, birch and other expensive cahinet woods

Red Oak.-Many oaks pass as red oak, but the United States Forest Service applies that name to one species only (Quercus rubra), and that does not grow in Texas. It is a northeastern tree, and its commercial range approaches no nearer Texas than

where it is found in central Tennessee. It is hard to identify it by the wood alone by tests available the ordinary user, as several of the red oaks bear ose resemblance. The names of several of them close resemblance. The names of several of them are so confused that they afford no assistance in identification. Red oak is a standard, first-class furniture and finish wood. For most purposes it is fully equal to white oak.

Sitka Spruce.—This Pacific Coast wood comes principally from the State of Washington, and its high cost by the time it reaches Texas excludes it from all uses except the most important. It is received in stock so free from Imperfections that waste in its conversion at the factory is reduced to a minimum. The average tree of this species in the most favored regions of its range is three or four times as large as the average spruce tree of the northeast, and of course it yields more clear lumber.

spanish Cedar.—Spanish cedar is the most important eigar box wood in this country. It does not grow in the United States, but comes from Mexico, Cuba and other Spanish-American regions. It is imported in various forms, but much comes as logs of different diameters and lengths. The tree attains large size if left to grow to an old age. Early Spanish explorers in the West Indies and along the coast of Mexico and Central America spoke of canoes hewed from cedar trunks large enough to of canoes hewed from cedar trunks, large enough carry thirty or forty persons. It would now be difficult to find trees of anything like that size near the coast. Much of the cigar-box material comes to the coast. Much of the cigar-box material comes to this country as logs the size of telegraph poles. This is converted into thin lumber or veneer. If lumber is used, the cigar boxes are of solid wood; but if veneer is employed it is very thin, scarcely thicker than paper, and is pasted on the backing of other woods. When that process is followed, the cigar box is apparently solid cedar, but is really made with very little of that wood.

Sugar Manle—The hard manle of commerce is

with very little of that wood.

Sugar Maple.—The hard maple of commerce is nearly all cut from the sugar tree, the same from which sugar is manufactured in the north. The tree touches the eastern part of Texas, and there reaches the southwestern limit of its range. It is too scarce to furnish much lumber, and only a chance tree is cut in logging operations or when land is cleared. All of the reported sugar maple in Texas was shipped into the State from the North. Texas was shipped into the State from the North. The usual name applied to the wood is hard maple. The average cost in the State is more than twice what it is in Illinois, but the small quantity used in Texas is responsible for the extra high price.

Sugarberry.—The description of hackberry applies

equally well to sugarberry, as the two woods are so nearly alike that users do not distinguish between them. Both are bought and sold as ash in Texas, though for some purposes the wood is not quite as

satisfactory as ash.

Sugar Pine.—California supplies this wood, and Texas manufacturers use half a million feet of it yearly. The tree is so named because on its native mountains a sap or juice oozing to the surface where the wood has been injured is condensed by evaporation into a white sugary substance not unpleasant to the taste. It is the largest of the pines in this country. Single trees sometimes saw 20,000 feet of lumber, a large percent of which is of high grade. In the central and eastern States, sugar pine is often taken as a substitute for white pine. It is cheaper than white pine of the same grade where both are

than white pine of the same grade where both are shipped the same distance.

Teak.—This high-priced wood, greatly admired for boat finish and heavy doors, comes from India and Siam. Its principal value is due to the wearing qualities where it receives rough usage; but I ts heavy is also appreciated. It heavy some resome beauty is also appreciated. It bears some resemblance to mahogany, but its color is less rich. It was the costliest wood imported in Texas, and the whole 8,000 feet was employed in boat building. An oll in the wood has a tendence to preserve iron from rust, and ship builders appreciate this prop-

erty. Texan Oak.—The most aboundant oak in the State is the Texan oak, which is commonly called red oak by those who use it. Others know it as spotted or Spanish oak. It belongs to the red oak group, and is cut in the eastern and central portions of the State. It is put to practically all uses for which any oak is suitable. It is quarter sawed, and the grain and figure compare favorably with those of the gen-

and figure compare favorably with those of the genulne red oak of the Ohlo valley. The acorns of this species ripen in two years, the same as other members of the red oak group. The acorns of the white oaks ripen in one year.

Tupclo.—Tupelo is cut in the forests and goes to market under other names. In some localities it is called bay poplar, in others simply gum, or black gum. In the past the wood has been responsible for many seasoning troubles, but these have decreased in recent years as the handling of tupelo has become better understood. It is a swamp tree and it can stand in water most of the year, and still prosper. In that respect it is in a class with cypress. It is a slow grower and a tupelo tree is not worth much until it has a century or more to its credit.

Its slow growth makes it impossible that tupelo can have much place in this country's future forest pol-

icy.

Western White Pine.—This wood comes from the Western White Pine.—This wood comes from the northern Rocky Mountain region, chiefly Idaho. It is often substituted for the white pine of the Lake States, but it has not yet gained much foothold in Texas, as is shown by the small quantity reported in Table I. The wood is light in weight and color, works well, holds its shape after seasoning, and is a reliable material. By the time it pays freight on the long haul from Idaho to Texas it is by no means a lowerized wood. It should not be confused with a low-priced wood. It should not be confused with western yellow pine, which is often called white

Western Yellow Pine .--When the wood Texas it is frequently called California white pine. It is a western species, covering the region from the eastern base of the Rocky Mountains to the Pacific Coast. Its range extends into some of the western Coast. Its range extends into some of the western counties of Texas, but the timber there is small and of comparatively little value. The best comes from California and Oregon, and from certain favored localities of the Rocky Mountains and the Basin States. The wood belongs with the yellow rather than the white pine, but it bears some resemblance to the latter. It is soft and is easily worked, and less resinous than longleaf pine, though experiments have shown that naval stores may be obtained from the western species. It was formerly believed that the Rocky Mountain form of this tree, including that found in western Texas, was a separate species from the Pacific Coast form, but at present they are considered to be the same species. considered to be the same species.

White Ash.—This is the common ash in the east-

ern and central parts of the United States. Texas supplies more than three-fourths of this wood used by its factories. The species reaches its southwestern limit in the State. It is a wood of all-round use-

ern limit in the State. It is a wood of all-round usefulness, and most industries employ it

White Elm.—This elm is widely distributed over the United States east of the Rocky Mountains, and within that range most regions have enough of it to meet their needs. It has half a dozen names, not including "rock elm," which is applied to all species of elms in some parts of their ranges, though it is not the proper name of any of them. Workers in wood say that few trees show as readily as elm the effect of soll upon wood. One soll may produce brash wood, another a very tough one; and there seems to be much difference in weight and color, which is accounted for by differences in soils. This may explain why in one locality the name rock elm is applied to a certain species, and in another locality plied to a certain species, and in another iocality the term is applied to an elm of a different species.

the term is applied to an elm of a different species. The wood of all the elms is coarse and characterless, and is never employed where handsome appearance is the object sought.

White Oak.—The range of the white oak overlaps the northeastern region of Texas. It reaches its best development in the Ohio valley and among the Appalachian mountains, but it has extended its range over the whole eastern and central portion of the United States and in Texas it reaches its southwestover the whole eastern and central portion of the United States, and in Texas it reaches Its southwestern limit. Some of the white oak timber in Texas is good, but most of it falls below the quality growing in Kentucky and Indiana. Woods generally lose In quality as they approach the limits of their ranges. There is only one white oak which is properly called by that name, but there are several species belonging in the group of white oaks. The wood of some of them closely resembles that of the true white oak, and when the different kinds are mixed it is very difficult to separate them according to species. In

and when the different kinds are mixed it is very difficult to separate them according to species. In practice it is not done. White oak is so named because the bark and the wood present a whitish appearance; but the wood and the bark of post oak are as white, and several other species are nearly. The oaks may be broadly divided into four groups if the shape of the leaves is made the basis for division. The white oaks, including a dozen or more species, have leaves with rounded lobes; red or black oaks, with a score of species, have lobes with sharp points; the chestnut oaks, with four or five species, have notched leaves like those of the chestnut, and the willow oaks have leaves like the willow or laurel, without notches or lobes. Representatives of all

the willow oaks have leaves like the willow or laurel, without notches or lobes. Representatives of all four groups are found in Texas. There is a representative species for each group. The white oak is the type for the round-lobed species; the red oak for the pointed-leafed group; the chestnut oak for those with notched leaves; and the willow oak for those with smooth-edged leaves.

The men who work in factories are not necessarily acquainted with the appearance of the trees as they stand in the forests. They judge a wood by its ap pearance, and not by the shape of the leaves, which they may never see. They are for that reason less exact in designating species than is the man who works in the woods. They class as a white oak all light-colored oak that works like true white oak and they follow the same course with red oaks. In actual they follow the same course with red oaks. In actual practice nearly all oaks are considered either white oak or red oak. The compiler of statistics often finds it necessary to make special inquiry to determine the exact species. If this were not done, most state reports of wood uses would name few species of oak other than white and red.

White Pine.—The reign of the white pine in the United States is a thing of the past, though a large amount is still demanded. It does not grow in the state, and the lumber now used here comes principaily from the Lake States, where it was once lumpaily from the Lake States, where it was once lumbered in enormous quantities, but now to a much less extent. Much white pine lumber is still in the market, but not all that passes for white pine is the genuine article. Some is Norway pine cut in the Lake States and Canada; some is the western white pine, a different species from the northern Rocky Mounfain states; the California sugar pine furnishes some of it, and the western yellow pine more, and a small amount is the Meylean white pine. These several some of it, and the western yellow pine more, and a small amount is the Mexican white pine. These several species pass as white pine in the lumber market, and it is difficult to determine how much of the total is the real article. All are good woods, and for some purposes are doubtless as good as white pine. No manufacturer expects, nor should the buying public expect, to obtain much white pine now of a grade equal to that on the market when the original pine forests of New England, New York, Pennsylvania and the Lake states were available.

Willow Oak.—This tree is nearly but not quite an evergreen in the extreme southern part of its range.

without Oak.—In the extreme southern part of its range. Its thick, willow-shaped leaves adhere to the twigs until the new crop of the following year pushes them off. The wood resembles red oak, and it often passes under that name. The tree grows rapidly and the annual rings are broad and clearly defined. It the annual rings are broad and clearly defined. It is one of the most promising species of eastern Texas. Not only is the wood of high grade and useful for many purposes, but the tree increases in size so rapidly that few species promise better returns from planted stands. It has not yet been planted to any extent. One factor not in its favor is that it is somewhat exacting in its soil and moisture conditions. It must have plenty of water or the trunk becomes sturted. It may be expected to do

ure conditions. It must have plenty of water or the trunk becomes stunted. It may be expected to do well in Texas only in the eastern half of the state, and there only near water courses where the soil is deep and damp.

Wing Elm.—This wood passes under various names, and those who use it are apt to call it eim without any qualifying term. The wood differs little from white eim, but some consider it a little harder and tougher. It is not called wing elm because its seeds are equipped for flying,, as might be supposed, but because its small twigs are provided with flat keels, often a half an inch or more wide. The wings are of no use to the tree, as far as is known, but they are an easy mark of identification. The tree is called cork elm and rock elm, but these names are applied to other species of elm as well, and cork elm is the proper name of one of them.

Yellow Pines.—Three species of yellow pine grow in Texas, and are cut in large quantities by sawmills and are made into finished commodities by manu-

and are made into finished commodities by manufacturing plants. The three kinds of pine are some times spoken of collectively as yellow pine or southern yellow pine; but it often happens that it is necern yellow pine; but it often happens that it is necessary to be more exact in specifying the kinds, and they are listed according to species as longleaf, shortleaf and lobiolly. Sawmiil output, as it is handled by the census, usually groups ali three under the common name of southern yellow pine. The purpose in that case is merely to separate them from the western yellow pine of the Rocky Mountains and Pacific coast regions, and the other pines figured in the lumber cut of the United States. That general classification is considered sufficient in reporting the sawmill output, but factories which work the lumber into finished products find it necessary the lumber into finished products find it necessary to separate the general groups of woods into spe-

Shortleaf Pine.-Factories in Texas report the use of 48 species of wood, but more than ninety per cent of all consists of the three species of yellow cent of all consists of the three species of yellow pine. Shortleaf leads in quantity, with longleaf second, and lobiolly third, according to the reports of manufacturers. The principal supply of shortleaf pine comes from the northeastern section of the state; the lobiolly belt is south of that, and the long-leaf nearer the coast. The belts of the different pines are not clearly defined in all places and there is much overlapping of ranges.

Shortleaf nine has a number of characteristics

is much overlapping of ranges.

Shortleaf pine has a number of characteristics which separate it from its relatives in the yellow pine group. Its leaves are shorter than those of any other timber pine in Texas, and that usually makes the identification of the standing tree easy; but it is often desirable that the logs or lumber be identified when far removed from where the trees grew. It is not always easy to do that, particularly to dis-tinguish shortleaf from loblolly pine in the log yard or lumber pile. There are some general features belonging to each of the species which will assist in distinguishing one from another. Longleaf has comparatively thin sapwood and much heart. Both shortleaf and lobiolly pine have thick sapwood and comparatively little heart. These features alone usually are sufficient to identify longleaf pine iogs,

if compared with those of the two other species; but shortleaf plue and lobiolity are so nearly the same in the proportionate amounts of heartwood and sapwood that some other mark of distinction must be sought and it is not always possible to find It on a general view of the logs.

Shortleaf pine grows rapidly the first thirty or forty years of its life, and the yearly rings showing the growth are wide. But after that age is reached the tree develops a tendency to grow more slowly and the annual rings are narrower. Upon examining the end of a shortleaf pine log, therefore, the broad rings and the outer part of be found made up of broad rings and the outer part of narrow rings. The rule does not always hold, but generally does. Loblolly pine grows rapidly and has wide rings until the

trunk attains large size.

Shortleaf pine is at this time the most extensively used wood in Texas, and the greatest demand for it is by manufacturers of doors, sash, and interior house finish. It is a soft wood and joins nicely. It is not difficult to season, and it retains its shape well. The figure is handsome, and the grain holds and displays points and stains. It works easily.

The belief is quite general among workers in pine

that there are two species of shortleaf in Texas, one whiter and softer than the other, but botanists have whiter and softer than the other, but botanists have not been able to work out two species and hold that the differences in wood are due to soil, climate and other factors of environment. In some Instances the soft variety of shortleaf is called Texas white pine. The best of it closely resembles the white pine of the Lake states.

The cutting of this species is gaining rapidly on the growth and the supply must run short before many years. It is said that pines have encroached a good deal on the prairie land in Texas since the country was settled, and the Indian fires stopped.

country was settled, and the Indian fires stopped. The young growth coming on is not enough to make up the yearly drain to supply the mills.

Longleaf Pine.-A considerable amount of small growth of longleaf pine is met with in places near the southeastern border of Texas; but the fact is apparent that the end of this fine wood, as a timber supply, is only a question of a few years or decades. Large tracts which were once heavily wooded are now bare of trees. In many instances farmers followed the lumberman, and crops grow among the stumps. In other cases, stumps dot wide expanses

stumps. In other cases, stumps dot wide expanses of pasture.

This plue possesses great strength, stiffness, and hardness, and is fitted for special places. It is the great bridge wood of the central and eastern part of the United States. Its chief competitor in that line is the Douglas fir of the Pacific coast. Each holds the field nearest it, and in the broad belt of country, midway between the two, they meet In sharp competition. In good qualities they are pretty evenly matched. The western wood may be had in larger pieces, but the southern pine is sawed in dimensions large enough for all ordinary purposes. The hardness as well as the strength of longleaf

The hardness as well as the strength of longleaf pine qualify it for use as flooring. It wears well, is not inclined to splinter under hard usage, and is of handsome appearance. Car manufacturers use it for framing timbers, as well as for flooring and siding. The long beams cut from the shapely trunks of this species constitute excellent frames and trusses for large buildings.

and trusses for large buildings.

The iongleaf forests of Texas are now coming in as a source of naval stores, such as rosin, pitch, turpentine, and oils. A few years ago Texas contributed little to that industry. Georgia was once the chief field; then it moved westward successively into Alabama, Mississippi, and Louisiana. The gradual shifting of the center of the navai stores supply westward marks in a general way the depiction of longleaf pine. Texas has the farthest west and the last of the large stands.

Loblolly Pine-In some instances loblolly is cali-Loblolly Pine—In some instances loblolly is calied longleaf pine, and in others it is classed as shortleaf. Its needles are midway in length between longleaf and shortleaf, and when compared with the former they are short, and in comparison with the latter they are long. It is not improbable that the figures for ioblolly pine in Table 1 are far too small because of the custom of calling this wood either longleaf or shortleaf pine. The wood bears much closer resemblance to shortleaf than to longleaf pine, and is made into doors, frames, and different kinds of finish.

Lobloliv pine is an aggressive tree. It pushes

Loblolly pine is an aggressive tree. It pushes into vacant land wherever it finds it, and takes possession and generally crowds out most other species. It prefers old farms as a seeding ground, and cies. It prefers old farms as a seeding ground, and so prompt is it in improving opportunities of that kind that it is apt to distance its competitors in the race. In some of the Eastern states, particularly Virginia, Norh Carolina, and the eastern shore of Maryland, it has taken possession of thousands of old fields where corn and tobacco once grew. In Texas there are few worn-out fields, and the spread of iobiolly pine over land of that character is not common; but the species is spreading where forests have been cut, and also into many prairie tracts

where no trees grew half a century ago. If one may judge the future by present indications, this tree wiil be the longest survivor of the pines of Eastern Texas. The longleaf wiil be the first to give up the fight because of its inability to compete for space, and the loblolly will be last because it will win in that competition.

Yellow Poplar.—This fine forest tree is not found growing in Texas in commercial quantities. Its range is in the Appalachian region, but demand for the wood exists in practically every manufacturing section of this country. It once competed with pine, but it is no longer a competitor, having risen above most of the pines in refinement of uses. Its high price excludes it from many places where it above most of the pines in refinement of uses. Its high price excludes it from many places where it was once common, but it has a few places which it continues to hold in spite of cost. One of these is in the manufacture of fine carriage bodies, where broad panels, particularly those of curved form, are demanded. No wood surpasses yellow popiar in smoothness of finish and in ability to hold high-class paints

class paints.

One-Seed Juniper.—The one-seed juniper is a desert tree that comes down into western Texas from the mountains. It is not of good form for lumber, the trunk being short and rough. The numerous knots are apt to be much darker in color than the body wood; but that is not necessarily a defect, for in making clothes chests, the remarkable contrast In color between the knots and other wood gives the articles a peculiar and attractive appearance. trunks are sharply buttressed and deeply creased. Sometimes the folds of bark within the creases almost reach the tree's heart. The sapwood is thin, the heartwood irregular in color. Some is darker than the heartwood of the southern red cedar; other

than the heartwood of the southern red cedar; other is clouded and mottled, pale yellow, cream-colored, or streaked with various tints.

This tree can be economically worked only as small pieces. It takes a soft, pleasing finish. It is a lathe wood and shows to best advantage as balusters, ornaments and small posts; and as Indian clubs, dumb-bells, balls and lodge gavels. It has been made into small game boards with fine effect, and it is excellent material for small platture frames. and it is excellent material for small picture frames. Furniture makers find for it several uses. It ought to be valuable in the manufacture of small musical instruments where fine polish and novel figures are desired, but inquiry failed to discover that it has ever been so used in Texas. It is not an abundant wood, nor is it convenient to market.

Mountain Juniper.—This tree has several local names in Texas, among them being juniper cedar, mountain cedar, juniper and rock cedar. It grows in southwestern Texas, and is closely related to the red cedar. When mountain juniper grows under adverse circumstances it assumes fantastic and distorted forms which bear little resemblance to any of its relatives. It has been planted for ornament to a small extent, along the coast about Corpus Christi and between there and the Rio Grande. That Christi and between there and the Hio Grande. That region is outside of the species' natural range, and the trying climatic conditions strangely affect the tree's form, and the trunks often resemble twisted and interwoven bundles of lead-colored vines—buttressed, fluted and gnaried. The branches under these circumstances lose the horizontal or upright positions which they have in their natural environment and droop in regard festions; and the wind ment, and droop in raged festoons; and the windin winter whips most of the foliage from them. Few in winter whips most of the foliage from them. Few of the planted trees are yet above a foot in diameter or more than twenty or thirty feet high. In its natural range the tree may attain a diameter of two feet and a height of 100 feet. Even in its natural range the creases in the trunk are often so deep as almost to divide the trunk in two; and trunks of planted trees are sometimes entirely divided, forming two or more stems.

The sapwood of the mountain juniper is very thin. It is not a tree that can be profitably cut into lum-

It is not a tree that can be profitably cut into lumber of the usual kinds and sizes, because of its odd-shaped and irregular trunk. It lends itself more economically to the manufacture of articles made up of small pieces. Some of the wood is extremely beautiful, having the color and figure of French walnut. There is great difference, nowever, in color and figure, and the wood from one tree is not a sure and figure, and the wood from one tree is not a sure guide to what another may be. Boards a foot wide,, or even less, may show several figures and colors. Some pieces of the wood suggest variegated marble; others are like plain red cedar. Some is light yellowish in color; other has a tinge of blue. Smail spindles, such as are made into grills, show to fine advantage. It may be highly recommended for picture-frame molding and for small panel work and turned ornaments. Fine stair balustrades have been made of it, including newel posts and railing. Furniture makers use it. Those well acquainted with it say that the wood varies greatly in hardness, even in the same trunk. Some is tough and fility, other soft and brittle enough for lead pencils. It has been substituted for red cedar by clothes-chest makers; and goblets, cups, rings, dishes, trays and other ers; and goblets, cups, rings, dishes, trays and other small wooden-ware are turned by the lathe.

Mesquite.—Persons well acquainted with Texas,

both past and present, say that the mesquite area is at least double now what it was when the state came into the Union. Old stands were scattered here and there, but hundreds of square miles which were in grass only, and little of that, half a century ago, now support forests of mesquite. It is perhaps a misnomer to designate some of these stands as forests, for they present a rather ragged and sorry appearance, but they are forests in the process of forming. The old growth, which is found principally in the counties bordering on the lower Rio Grande, is made up of trunks of large size, but the stands that have come on within the past fifty or sixty years are of smaller trees. A large mesquite trunk is from one to three feet in diameter; a small one from one foot down to an inch or two. A person would need to hunt from center to cir-A person would need to hunt from center to cir-cumference of Texas to find many mesquite trunks that would make a straight saw-log twelve feet long. The tree is generally one of the most crooked, deformed and unpromising in the whole country; and its habit of dividing into forks near the ground, like a peach tree, makes it still more difficult to make use of. In fact, in winter when mesquite trees make use of. In fact, in winter when inesquite trees are bare of leaves the appearance of a forest reminds the observer of an old, neglected, diseased, moss-grown peach orchard in the eastern states; but in summer the leaves conceal much of the trunk scaliness and deformity, and there is something positively restful and attractive in the prospect of a wide range of these trees, covering hills and prairies. The leaves are compound like the acaclas, and are delicate and graceful.

The spread of mesquite in the last fifty or seventy-five years has been attributed to the checking of grass fires which Indians once set yearchecking of grass ness which indians once set yearly to keep the prairies open. The dispersion of the trees is facilitated by the scattering of seeds by cattle which feed on the pods. It is a tree hard to kill. Roots send up sprouts year after year during long periods. Sometimes, but not often in Texas, when adverse circumstances become so savere that when adverse circumstances become so severe that the mesquite tree can no longer survive above the

the mesquite tree can no longer survive above the surface, it grows beneath the ground, sending only a few sprouts up for air. "Dig for wood" is a term applied to trees of that kind, when fuel is dragged out with mattocks, grab hooks, and oxen.

The roots of the mesquite penetrate farther beneath the surface for water than any other known tree in this country. Depths of fifty or sixty feet are occasionally reached. Well diggers on the frontiers learned to go to the mesquite for water. Large trunks never develop unless their roots are abundantly supplied with moisture. Railroad engineers abundantly supplied with moisture. Railroad engineers on the "Staked Plains" of Northwestern Tex-

neers on the "Staked Plains" of Northwestern Texas turned that knowledge to account in boring wells. Though mesquite is seldom or never mentioned in the lumber business, it is and has been one of the most important trees of the state. Its fuel value is very great. It has cooked more food, warmed more buildings, burned more bricks, than any other wood in Texas. The tannic acid in it injures bollers and it is not much used for steam purposes. It is a high grade furniture material, though jures bollers and it is not much used for steam purposes. It is a high-grade furniture material, though it is difficult to work because of its exceeding hardness. Ordinary wood-working tools and machinery will not stand it. Sultes of nine pieces are sold in San Antonio at \$200 or \$300. The merchants find difficulty in getting mesquite furniture made. Factories do not want to handle it, though the articles sell higher than mahogany. Large, heavy tables, deeply carved, are sold in some of the cities, but all seem to be made to order and largely by hand. The appearance of the pollshed and finished wood The appearance of the pollshed and finished wood is a little lighter in color than mahogany. It is not uniform in color, but shades from tone to tone in the same plece. A little of the lighter colored sap-wood is worked in with pleasing effect. Some of the tones resemble black walnut, and some suggest

wood is worked in with pleasing effect. Some of the tones resemble black walnut, and some suggest the luster of polished cherry.

House movers in Central and Southern Texas make rollers of mesquite. It is of such hardness that some claim a set of mesquite rollers will outlast three of maple or black gum. The wood is brittle, however, and is apt to break if subjected to heavy blows or jolts. Notwithstanding its brittleness, it has always been used for lintels and short beams. The Indians so used it in New Mexico before the Spaniards reached the country, three hundred years ago, and the Spaniards in Southern and Western Texas used it in constructing their forts, churches, and missions. The heartwood is almost immune from decay. Fence posts outlast the men that set them. A timber taken this year from the Alamo at San Antonio was said to have served more than 190 years, with no sign of decay. It was set apart for manufacturing souvenirs. Paving blocks at San Antonio, Brownsville, and other places are reported to wear longer than stone pavement subjected to the same wear. Railroads in the vicinity of Brownsville employ this wood for crossties, but it is so hard that holes must be bored for spikes.

Mesquite baskets are made by hand of splits the size of knitting needles, some of white sapwood.

Mesquite baskets are made by hand of splits the size of knitting needles, some of white sapwood, others of dark heartwood. Such baskets, large

enough to contain five quarts, sell in the curlo shops at San Antonio for \$1.25 each.

Some wagon makers insist that mesquite is in the same class with osage orange for wagon felloes In hot, dry regions; but it does not appear that much of it is so used. The brittleness of the wood is against it, in use as felloes, except for vehicles of the heavlest sort where large pleces are demanded.

Among the uses of mesquite, by-products are an important consideration. The pods are food for farm stock. Before the first railroad reached San Antonio mesquite pods were a regular market commodity. The Mexicans know how to make bread and brew beer from the fruit; tan leather with the resin; dye leather, cloth, and crockery with the tree's sap; make ropes and baskets of the bark. Parched pods are a substitute for coffee; bees store honey from the bloom which remains two months on the trees; riled water is purified with a decoction of mesquite chips; vinegar is made from the fermented juice of the legumes; tomales of mesquite bean meal, pepper, chicken, and cornshucks; mucllage from the gum; and candy and gum drops from the dried sap.

One of the most promising uses for this wood is in turnery. Short lengths can be utilized to advantage. The artistic color fits it for the manufacture of lodge gavels, curtain rings, goblets, plaques, trays, and numerous kinds of novelties. Spindles for grills and stairways do not suffer in comparison with black walnut, mahogany, cherry, and teak.

UNREPORTED WOODS.

An inspection of Table 1 will show that several An inspection of Table 1 will show that several of the woods listed are accompanied by no figures giving the feet used annually. That is because no manufacturer reported those woods. As far as lists sent in by the makers of furniture, finish, boats, vehicles, and other commodities are concerned, the table might have ended with African mahogany. That wood in the table, however, is followed by others. Some of these have been mentioned in the foregoing discussion, where they were included under the names of others as the elms hickories and der the names of others, as the elms, hickories, and maples, and the reason for including others, though not mentioned by any manufacturer, will now

During the progress of the field work in Texas During the progress of the field work in Texas many parts of the state were visited, and it was discovered that several woods were being cut in the forests, sent to sawmills, cut into lumber and at that stage they disappeared from view. If this lumber were used in the rough—as in construction of buildings, fences, and the like, and was not further manufactured—this investigation was done with it; for it took into account such lumber only as passed through further stages of manufacture. Careful inthrough further stages of manufacture. Careful in-quiry developed the fact that much of the lumber which, under its own name, had dropped out of sight

which, under its own name, had dropped out of sight after it left the saws, was being shipped to factories under other names, or by no names at ali. In addition to these, many woods in Texas are employed to a small extent, or for a few special purposes, yet seldom find their way to factories. They are of some value locally, but are practically unknown to the general manufacturer; and if there were not believed to be a future for them, they might very well be passed without mention. But it may be taken for certain that every wood fit for anything has a future. It is not necessarily a quesmay be taken for certain that every wood fit for anything has a future. It is not necessarily a question of quantity. Very scarce woods may exactly meet special demands, thereby becoming valuable. There are rare woods in some of the world's markets worth from \$1 to \$3 a square foot. Woods of that kind need not be plentiful to be valuable. Texas may not have any which will ever be worth that much, yet its forests produce many hard, strong, beautifulity colored woods, and the public knows very little about them.

In collecting material for this repart on the use of Texas woods, a special effort was made to find out something more about the scarce tree species as well as the plentiful. To obtain that information it became necessary to depart somewhat from beaten paths usually followed by compilers of statistics, and to approach as nearly as possible the original

en paths usually followed by compilers of statistics, and to approach as nearly as possible the original sources of information—the people who use the woods and know about them. No tree was passed by because its trunk was small, or gnarly, or knotted, or twisted, and no pains were spared to ascertain if anybody had ever tried the wood for any useful purnose, and what success attended such trial. In the list of eighty-one minor species (so-called) which follow, not one is included which was not found to have been used for some purpose. In nearly every instance the wood was examined to ascertain as many of its properties as could be denearly every instance the wood was examined to ascertain as many of its properties as could be determined by such an inspection; and in as many instances as possible the living tree was sought in the woods, and was examined with a view to determining size and form as well as the probable quantity of the timber available. Figures showing quantity, however, if they are to be of value, should be based on more general and more widely-collected information than could be procured in the short

period given to this study in Texas.

The main purpose of the search for unreported species—those which no manufacturer listed or described—was to ascertain the kinds and qualities of such woods, and not to attempt a compilation of figures showing the total available amount of each in the state.

identification of many of the woods in use The identification of many of the woods in use was difficult. Three or four names may be locally applied to the same wood, or three or four woods pass by the same name. The identification of each species, as accurately as it could be worked out under the somewhat unfavorable and trying circumstances, is shown in Table I. The English name (if it has any) is given in the first column, and the Latin or scientific name in the second. The names, both common and scientific are those recognized. Latin or scientific name in the second. The names, both common and scientific, are those recognized as official in the United States Forest Service's check list of trees. This explanation is made because some species have many names and it is not practicable to give all of them in a table.

In studying the list of unreported and so-called minor species it should be borne in mind from the beginning that most of the woods are scarce. Few of them will ever become attractive to the manufacturer because they can be had in large amounts.

facturer because they can be had in large amounts. Their value must come from a consideration of their quality, not their quantity. Those who look for the latter in Texas will seek it in the yellow pines, the oaks, cypress, red cedar, tupelo and red gum.

Most of the minor species are hardwoods—very hard, strong, durable and many of them are of rare and beautiful colors. They are in the class with the cabinet woods such as mahagany teak prime.

fine cabinet woods, such as mahogany, teak, prima vera, ebony, walnut, cherry, and others. Their best use appears to lie in the direction of expensive wares. They ought to find place in the manufacwares. They ought to find place in the manufacture of a long list of commodities in which small pieces can be used, and first cost of wood is not a serious matter. High-grade musical instruments would come in for first consideration. Some of the acacias, ebonies, mesquites and other hard, splendidly colored woods, growing for hundreds of miles along the Rio Grande valley, could be manufactured into veneers that would compare with most of the rare tropical species. The wood carver can find material there; so can the maker of costly furniture; of artistic wooden-ware; of novelties, specialties, and souvenirs. The idea of cheapness of the finand souvenirs. The idea of cheapness of the fin-ished product should not be the controlling factor with those who turn their attention to the rare woods of southern Texas; but high-grade should hold first place.

The necessarily brief descriptions of the woods which follow, and the mention of a few uses already found for them, are offered only as suggestions to indicate the direction in which interested parties might make further investigations.

Agarita.—The value of this small tree is due to

Agarita.—The value of this small tree is due to the rich yellow color of the wood, and its fine grain. It is used in small turnery, such as napkin rings, checker pieces, handles for paper knlves, crochet hooks, button hooks, halrpin boxes, and articles of that kind. It is one of several different colored woods which are glued together in small strips, the whole forming a block large enough for turning small objects on the lathe. The strong contrast between the different-colored woods joined in the goblet, cup, ring, vase, or box, in its finished form, is tween the different-colored woods joined in the gob-let, cup, ring, vase, or box, in its finished form, is very striking. Agarita is said to possess the deep-est yellow color of all American woods. In Texas the turners who use it join it with holly, Texas ebony, junco, prickly ash, red or scarlet haw, Texas cat's claw, buckeye, sumach, and other richly col-ored woods to give the desired contrast in com-posite work.

Agarita seldom attains a diameter above five inches, and in Texas a two-inch stem is up to the anches, and in Texas a two-linch stem is up to the average. The roots are as yellow as the trunk wood and are put to the same use. It is the opinion of some persons that the growing of this small tree for its wood might be made profitable. It is grown now for ornamental purposes, and use has been made of its sour, edible berries. It reaches its best development in New Mexico and Arizona.

Alligator Juniper.—Two of the five junipers or goders of Texas were not reported by any manufactor.

redars of Texas were not reported by any manufacturers. This is one, and drooping juniper was the other. This may justly be considered the poorest in form of the cedars of the state,, though it is not the smallest. Trees have been reported five feet in diameter and sixty feet high, but such are extreme cases. Some use is made of the wood by hand-working it into furniture and clothes chests. A little goes to lathes in Austin and San Antonio to be made into noveltles, such as trays, cups, rings, and match safes. Small boxes for handkerchiefs and collars are made in cubical form by joining pieces together, and some are turned from solid blocks, the lid being also turned.

The line separating sapwood from the heartwood in alligator juniper is often irregular and vague. Patches of sap may be included in the heartwood, while streaks of the latter are enclosed in folds

of the sapwood. The heartwood is usually of a dirty, red color, the sapwood lighter. In small articles the color is attractive but it does not show very well in panel work where wide pieces are used. The best utilization of alligator juniper would seem to be in the manufacture of articles consisting of small

American Holly.-This is the common holly of the eastern and southern United States, the same that yields the red berries and green leaves for Christmas decoratious. In Texas it reaches a size of ten inches or over. The wood is white, and the largest trunks are usually of one color from the bark to the center. Local shops use holly for furniture, and lathes make novelties of it. Sometimes it is worked into parquet floors. Turned candle sticks and currings are among commodities made of this wood in the state.

Anacahuita.—A little of this wood is used in Texas in the Rio Grande valley for chair rounds, but it has little to recommend it except convenient to those who use it. The wood is brown, and rather fine in appearance, but the trees are too small to be reliable for general authorities.

valuable for general purposes.

Anaqua.—This wood, which in color and general appearance somewhat resembles maple, is usually called "Knackaway," which is evidently a careless to pronounce the real name. The tree attempt to pronounce the real name. The tree ranges from the upper San Marcos river to the Rio Grande. It is of rapid growth, and trunks up to nine inches in diameter examined in course of the wood-using study in Texas, showed no heartwood. The wood has a slight yellowish tinge. A little of it is made into molding for interior house finish, also for picture frames. It has little figure, is not plentlful, its is doubhtful. its size is small, and its future importance

Angelica Trec .--This is a small tree in Texas, and usually develops little or no heartwood. A six-inch log at Austin showed twenty-seven annual rings. The usually develops little or no heartwood. springwood, or the inner and porous part of the rings, is broad and yellow, the summer wood, or exterior part of the ring, is narrow and dark. The wood's figure, due to the marked contrast between the outer and inner portions of the rings, is strong. When finished it shows a rich yellow, but somewhat lighter than dwarf sumach which it resembles. It is made into small shop articles, like button boxes, photograph frames, pen racks, stools, and arms for rocking chairs.

Bitternut.—This is one of the Texas species of hickory not separately reported for any purpose, but it is used like other hickory, and besides is made into furniture, balusters, and thin strips with which to fasten screens in doors.

Black Haw.—A small, scarce tree, and of slow growth. A five-inch trunk that was measured had fifty-four annual rings, and had not yet developed any heartwood. It has little figure, and is whiter than iron wood which it resembles. It takes a splendid polish. Canes are made of it and small articles of turnery. Its color fits it for parquetry, and the wood's greatheast suggests that it might and the wood's smoothness suggests that it might make shuttles, though it is doubtful if enough of it

make shuttles, though it is doubtful if enough of it exists to make it commercially important.

Black Jack.—Black jack grows in most of the eastern part of the United States, and is neglected—and not without cause—everywhere. It is usually too small, and of grain too coarse to tempt the wood worker. It has some good qualities, however. A trunk of fourteen inches in diameter had one and a half inches of sapwood, annual rings vague, the heartwood ringed and splotched with different colored woods, but the general tone dark. The Texas University collection at Austin has moldings, soln-University collection at Austin has moldings, spin dles, and balusters that show the grain well, and also broad panels made up of quarter-sawed narrow strips, which exhibit the dark flecks in the wood to good advantage. It has evidently not been put to its best in furniture making or in grill and spindle

Blue Beech.—In Texas this plain, fine-figured, strong wood is used to a small extent for repairing wagons, and for sledge-hammer handles. The trunk is short and is usually ribbed and angular. The best in Texas grows in the eastern part of the state. Some know it as water beech.

Blue Gum.—It is an Australian tree and grows

fairly well in Cameron county and in other extreme southern parts of the state; but the effect of occa-sional light frosts is seen in stunted twigs. Some of the trees first planted are now eighteen inches in diameter and the wood has been tried for ax handles and singletrees. It is pronounced satisfactory as to toughness and strength, but it warps and checks so persistently in seasoning that persons who have so persistently in seasoning that persons who have experimented with it see little promise of turning it to practical account. It does not grow as rapidly nor does it appear as healthy in Texas as in central and southern California. It is locally known as

encalyptus in Texas.

Blue Jack.—This tree, often called Durand oak, grows among the rolling hills west of Dallas. Wagon shops use it as a repair material, and it has served

for bridge floors, though it is too small for much

Blue Oak.—Sawmills call this blue whistler oak and cut a little of it and sell it as white oak. It is made into furniture, stairwork, and agricultural implements. A measured trunk twenty-four luches in diameter had sapwood one and a half inches

Bluewood.-Paper knives paper weights, curtain rings, dominos, and card receivers are some of the local uses for this wood along the Rio Grande. At Brownsville it is known as Brazil wood and purple haw is another of its names. Trunks are seldom more than six inches in diameter, and ten feet long. The wood is very hard and heavy and takes fine polish. Ie has been locally used for dye by boiling the chips; but there is difference of opinion as to its value for that purpose. Some call it logwood because of its similarity to the well-known dyewood from Belize.

Box Elder.—Furniture makers employ some of this wood in their business and call it soft maple. It resembles that wood, and the name elder is misleading.

Bur Oak.—This oak is not considered of very high grade in Texas, but a little finds its way into

wagon repair shops.

wagon repair shops.

Cedar Elm.—Cedar elm goes into the various uses for which other elms are fitted. It is worked into inside parts of furniture and is liked for refrigerators because it whitens under repeated scrubbings is easily kept clean. Wagon makers regard it a little tougher than the other elms and make wheel hubs of it. The species reaches its best in the val-leys of Trinity and Guadalupe rivers where it is

fairly abundant.

Chalky Leucaena.—This tree has leaves like the craited between as the last leaves like the acaclas. It is sometimes called mimosa and is also known as "tepeguaja," which in the Spanish language is said to be equivalent to "bardwood." The best representatives of the species are found near the mouth of the Rio Grande, but the tree has been reported nearly as far north as San Antonio. It has been so much planted for ornament that it is now not easy to determine its exact natural range. It is a beautiful, finely-proportioned tree. A twelveinch trunk that was measured had one inch of yellow sapwood, and the heartwood resembled mesquite but was not quite so dark. The wood is very hard, solid and smooth, and, judging from its appearance, it might make shuttles. It is used in grill work, small pieces of furniture and tool handles. Sample jeweiry boxes made of it suggest the lighter shades of mahogany. A sample of this wood that has been several years in the State University collection at Austin is badly perforated by some small boring insect, but the riddling affects the sapwood only and does not peuetrate the heart.

and does not peterrate the heart.

Chinquapin.—A little of this wood goes into furniture factories where it passes as chestnut. It is not a large tree anywhere in the United States, but that in Texas is nearly at the species' best.

Cholla.—A species of cactus which assumes tree form, and attains a height of perhaps ten feet in vector. Toxos maybe affect in disputer, is because.

western Texas, maybe a foot in diameter, is known as cholla. The medullary rays decay after the stem dles, leaving the other fibers intact. The trunk is dles, leaving the other fibers intact. The trunk is thus perforated, resembling carved work. Small stems from the dry regions of western Texas are made into canes which are very light and strong, into shoe buttoner racks.

and into snoe buttoner racks.

Cow Oak.—The name of this species is given it because cattle eat the acorns. It belongs to the chestnut oak group, its leaves being toothed like those of the chestnut. Manufacturers class the wood as white oak. It is found in Texas as far west as Trinity river. It is used for wagons, furniture and stairwork, and in fact for most purposes where white oak is used.

Deciduous Holly.—Eastern Texas furnishes a small amount of this wood which goes to furniture factories where some of it is turned for drawer knobs. The wood differs little from the common

holly.

Devil's Claw.—An unseemly name and a mass of curved thorns are calculated to repel an approach to this, one of the handsomest cabinet woods of Texas. At Brownsville and at other points along the Rio Grande, cabinet makers use it to make small pleces of furniture, novelties, and ornaments of extra beauty. The wood is dark red, but is clouded with streaks and patches of other shades and tints which may be artistically combined to form pleasing patterns. Sometimes the wood is grayish green. So hard is the wood that those who work it drill holes for nalls and screws. An ordinary gim-let meets poor success in boring. It is so saturated with oll that it is greasy to the touch. In that re-spect, it resembles junco. In Austin this wood has been made into grills, combined with certain other woods, and at San Antonio it makes tool handles, nd small turned ware.

Though not plentiful, it is entitled to a place

among the commercial woods of Texas. Trunks reach a size above one foot in diameter. The an-

nual rings of a log eleven inches in diameter, measured in the course of this study, was thirty-one years old, with half-inch of sapwood. The wood is inclined to be contorted, due to the presence of pits and cavities which slowly close as the tree advances in age. These add to rather than detract from the wood's beauty. The tree is sometimes called "unadegato," which name is also applied to the Texas cat's claw, a different but closely related species, and confusion occasionally results. Both are acaclas. The devil's claw is known also as ramshorn.

Downy Basswood.—The difference between this species and the common basswood is too slight to be easily recognized in the wood. Both are used for the same purposes.

Drooping Juniper. This scarce and graceful evergreen grows among the Chisos Mountains of western Texas. It can never be of much commercial importance. The wood has been made into candle sticks, pin boxes, picture molding, and small square boxes. Its grain and color resemble alligator juni-per. It has been planted for ornament in this coun-

per. It has been planted for ornament in this country, Europe and North Africa.

Dwarf Sumach.—The name applied to this wood is unfortunate. It is one of the largest of the Texas sumachs, and trunks of sufficient size for turned articles are reported. It is richly striped with yellow and black. Balls turned of it, seven inches in diameter, are used for newel-post ornaments and smaller balls are made for use in darning stockings. Cups are turned on the lathe, and the bright stripes in the wood give the wares a striking appearance. A measured trunk ten inches in diameter was forty-seven years old. eter was forty-seven years old.

Emory Oak.—Not much can be said for this wood from the standpoint of use. Balusters and moldings made of it are to be seen in the university collection at Austin, and they present a rather poor appearance. The tree belongs among the mountains of western Texas where Indians and Mexicans of the accuracy. eat the acorns. A measured trunk thirteen inches in diameter showed very little sap. The wood was coarse, very dark, with but little figure, and with numerous black knots.

Flowering Dogwood.—Dogwood is one of the best materials in this country for shuttles, but none was reported cut for that purpose in Texas, although it there attains size proper for shuttles. Sticks seven inches through or larger are found and with little or no heartwood. It has been tried for small turned articles, such as small rollers. It is very hard and wears well. Some use has been made of it for rounds and other small parts of chairs, where strength is a desirable property. Small wedges used in stone quarries are made of it. The wood is lacking in figure and those is pathing attractive in its in stone quarries are made of it. The wood is tacking in figure and there is nothing attractive in its duli white color. It polishes smoothly and is valuable as cogs in small wheels.

Fremont Cottonwood.—This species does not compare favorably with the common cottonwood in Texas. It is usually smaller where it occurs among the mountains of the restaurance of the state.

the mountains of the western part of the state. A trunk fifteen inches in diameter was all sapwood as cottonwoods usually are—and the annual rings scarcely visible. Rude clumsy carts are made of it by Mexicans, and the amount of service they stand is proof that the wood is tough. A little of it finds its way into towns and is made into furniture and sideboards for wagon beds.

Frijolito.—Some call this the coral bean from its red seeds which hang in knotted pods. The beans contain a narcotic poison. The wood is yellow, and handsome canes have been made of it. In the absence of something better, it is used for small tool handles in southwestern Texas.

Gambel Oak:-This species is plentiful on the high mountains of western Texas and along nearly whole course of the Pecos river, but except a little wagon-repair material, it was not found in use for anything in course of the study of wood uses in the state. The Texas university at Austin has spindles, and small panels of this wood halusters,

on the collection.

Green Ash.—In the south of Texas green ash is a repair material for vehicles, and is used for spokes, felloes, hubs and poles. Factories employ it for furniture and stairwork, but call it white ash. It is considered more brittle than white ash.

Honey Locust.-No manufacturer reported the use locust, but it occasionally goes to furniture shops and appears to a small extent in general mili-work. The meduliary rays show in broad bands, and the wood is quarter-sawed to advantage. Its general tone is dark but with light flecks and streaks. When made into furniture it bears some resemblance to sycamore, but is not quite as coarse lu texture. Stair balusters are handsome, the flecks adding much to the wood's appearance. Pleture molding shows the grain well, while large stair posts are satisfactory from the artistic standpoint. A tree with forty-two annual rings was thirty inches in diameter.

Hornbeam.-Hornbeam has little figure except that due to prominent medullary rays. The color is

light and flat. It has been tried experimentally for stair balusters and molding, but the effect is too plain to be popular. Its most common use is for vehicle repairs and tool handles.

Horsebean.-The shape of this tree is against its extensive use as a commercial wood. It has a persistent habit of dividing near the ground into from three to a dozen stems, some of which may be a foot in diameter. It is a green-bark tree, wide-spreading and handsome, and has been planted in this and foreign countries. It grows about San Antonio, but is at its best near the Rio Grande about and above Brownsville, and between there and Kingsville, where it is called "ratama." It is armed with thorns and it seems to be able to make room for its low, wide spreading crown by shading to death other growth near it. The wood is fine grained and tinged with yellow. It lends itself well to the making of small articles, and local shops and individuals work it into paper knives, rulers, cups, goblets, paper weights and various novelties.

per weights and various novelties.

Huisache.—Along the Rio Grande they call this tree "cassie," a shortening of acacia. It is much planted for ornament about Brownsville. While the tree is standing it is clearly enough distinguished from mesquite, but the woods of the two species are so much alike that popularly they are regarded the same. Mesquite is much more abundant and reaches larger size. The sapwood of huisache is thin and logs that remain in shelter for some time are apt to be bored through the sap by beetles, but the borers ston when they come in conbeetles, but the borers stop when they come in contact with the heartwood. An examination of several tact with the heartwood. An examination of several large pieces that had been seasoning for several months showed that the wood warps and checks pretty badly. It shows well in turnery, such as table legs, spindles, maliet handles, and small egg cups, button boxes, and rounds for large chairs. It takes a high polish, and it closely resembles the best grade of black walnut, but is much harder and stronger. It was not reported from any furniture stronger. It was not reported from any furniture factory, but it is used to some extent in furniture making. The chief objection to it is its extreme hardness. It is next to impossible to drive a nail into it without first boring a hole. Some of the rail-roads near the Rio Grande make cross ties of it.

The wood resists decay many years.

Ironwood.—They make wedges and small tool handles of this white, unattractive wood. It is of slow

growth and is never large.

Kalmia.—The roots of this laurel are made into pipes, spoons, paper knives and other novelties, but not in large quantities. It is sometimes called calico bush, sometimes spoonwood, and occasionally mountain laurel.

Koeberlinia.—The local name of this peculiar tree k ococruma.—The local name of this peculiar tree is "hoonkoo" (Junco). Its nearest relative in this country is the paradise tree of Florida and the allanthus introduced from China. It has a small, thorny, crooked trunk; the wood is dark, turning nearly black with exposure; it is rich with oil; and it is very hard. The species grows in certain places very hard. The species grows in certain places along the Rio Grande. The wood is made into canes, rulers, knife handles, turned articles, and a little furniture of the smaller kinds. The trunks are too small for ordinary sizes of lumber. Samples of this wood in furniture were exhibited at the Brownsville

midwinter fair in 1911-12.

Lignum Vitae.—The range of this species in Texas extends along the lower course of the Rio Grande.

A trunk eight inches in diameter, near Brownsville, came from a tree thirty feet high. The annual rings were too vague and complicated to be counted, but the tree is evidently of slow growth. The wood is pitted and it contains cavities and creases; but the pitted and it contains cavities and creases; but the clear wood is very hard and of fine and various colors. It is dark green, brown, black, yellow and of mixed colors, and clouded effects, all in the same block. Small pieces of furniture, like bureau cabinets, present attractive combinations of colors. The wood is of such exceeding berghaves that it turns wood is of such exceeding hardness that it turns, breaks, or batters the carpenter's tools. officer at Brownsville some years ago made numerous articles of it, such as boxes, trays, souvenirs, canes, paper knives and others which are said to have attracted much attention. Candlesticks, egg cups, goblets, vases, checker pieces, and dominos are now manufactured in a small way. The local name for the wood is "guayacan" in Hidalgo county where the best of it is said to grow.

Live Oak.—Since live oak passed out of use for shipbuilding, it has been a neglected wood, and is

now almost forgotten. In some states where it grows it is not even mentioned in wood-using reports. A year or more ago a lot of solid logs three feet or more in diameter, and in or very near the city limits of New Orleans, were offered free to anyone who would haul them away, and no one took them. Yet live oak when properly sawed and finished is among the handsomest of the oaks. Trunks are short and the usual lengths of lumber cannot be had. In Texas small quantities are used for a number of purposes, among them being parquetry floor-ing, pedestais, panels, molding, grilis, balusters, or-naments and vehicles. The wood shows remarkably

well when properly finished. The general tone is dark brown and very rich. It takes a smooth polish. The medullary rays are dark, conspicuous and run in wavy lines which give a mottled effect when the wood ls made into spindles and small articles. When worked into broad panels the colors may not run uniformly, and the artistic effect is not quite so good as in balusters and small moldings.

Composite panels are manufactured by joining several narrow strips edge to edge. The small pieces may be matched in a way to form a pleasing whole. Some finished pieces of live oak suggest Circassian walnut, but would scarcely pass as an imitation of it, and some resembles black wainut. This indicates how different may be the appearance of selected pieces of this oak. There is room for the workman to select and match this wood to show the best results. The value of this species as a cabinet material has not been appreciated in the past, nor have its possibilities been suspected. The fine effect produced by made-up panels, and by turned balusters and columns, indicates that piano makers would find something new in live oak that might be worth investigating. It is one of the most abundant of the oaks in the extreme South, and the best of it does not grow far inland from the castal

Stone masons and others who use mallets and mails often prefer those made of live oak. The junction of a limb with the trunk is selected as the block from which the mallet is made.

Longleaf Willow.—Unless this species is too scarce in commercial sizes it is worth a trial as furniture material. The tone is softer and the color more pleasing than black willow. When polished it bears some resemblance to butternut. A tree fifteen inches in diameter in eastern Texas had eighteen annual rings and no heartwood. The dull white with a suggestion of yellow. The color is a dull white with a suggestion of yellow. The university collection at Austin has a twenty-four inch slab of this willow. An inspection of sample panels and balusters made of it leaves a good impression of the wood's value.

Longstalk Willow.—Osiers of this species are used

along the Rio Grande by Mexicans to thatch houses. The willow grows in dense holts on mud flats in the river's flood plain. In the absence or scarcity of other fuel, the small willows are whacked up, roots and

l, as wood for cook stoves.

Mexican Madrona.—Plane stocks and tool handles are made of madrona in Texas, but not much is used. The wood is hard, checks badly, and in color is a little lighter than apple wood which it resembles. A seven-inch trunk that was measured had no sapwood, and its annual rings were scarcely visible. The bark's wine-color readily identifies the species

The bark's wine-color readily identifies the species in the forest.

Mexican Palmetto.—In the vicinity of Brownsville, summer houses and picnic pavilions are constructed with posts or palisades of palmetto. The leaves are occasionally employed for thatching. Such posts are said to last many years. The largest posts used in that way are about one foot in diameter and twenty feet high, but trees of larger size grow along the Rio Grande.

Mexican Persimmon—The value of the Mexican

Mexican Persimmon.—The value of the Mexican persimmon lies in its dark heartwood. A trunk six inches in diameter in the university collection at Austin is nearly all heartwood. The wood is irregular in color, even in the same piece, being variegated with lighter and darker streaks, and It ought to be fine brush-back material. is worked into tool handles, lodge furniture, canes, rules, pen holders, picture frames, curtain rings, door knobs, parasol handles, and maul sticks for artists. The trunk is gnarly, and the bark smooth and thin.

Mexican Walnut.—The Mexican walnut does not reach as large size in Texas as farther west. A trunk eleven inches in diameter was the largest seen in the course of this investigation. The wood re-sembles black walnut, but is a little heavier, and does not appear as regular in color. It polishes well, and is worked into small turnery, gavels, cups, pleture frames, knife handles, and a little goes into furniture. The wood is said to be scarce. The nuts are edible, but are quite small, those growing in the canyon of Devil's river not being more than half as large as a medium sized nutmeg and bear-ing much resemblance to it.

Mistletoe.—This is not a tree, and if classed as a wood it is a peculiar one. It is a parasite, and grows on trees like a branch. No claim of commercial importance is made for it, but it has been experimented with for parasoi handles, pipe stems and pen racks. The wood is white and weak, and stocks an inch in diameter are exceptionally large.

Palo Blanco.-In Cameron and Hidaigo counties Palo Blanco.—In Cameron and Hidaigo counties palo blanco goes to the wagon shops as ash. It is hard but is said to be weaker than ash. Table legs and doubtless other parts of furniture are made of it as a substitute for ash.

Persimmon.—The heartwood of persimmon is made into mallets and gavels and other lodge furniture. The sap is white, the heart very dark;

though a trunk ten inches in diameter may have no trace of heartwood. Persimmon belongs to the

no trace of heartwood. Persimmon belongs to the ebony family.

Pinon.—Considerable of this nut pine is said to be used locally in western Texas, on the ranches, and in charcoal burning; but in the central and eastern parts of the state it was not found in use except that the university collection of woods at Austin shows samples of it worked into panels and balusters. balusters.

Poison Sumach.-Veneer for inlay and small strips rosson sumach.—veneer for inlay and small strips for musical instruments are the principal uses for this small tree. The trunk may be five or six inches in diameter. The wood is brown, streaked with red and green, and contains dark rings not apparently due to annual growth. The figure is novel and attractive.

Prickly Ash.—Some know this species as "toothache tree," "tear-blanket," and "sting tongue." The wood shows little difference in color between heartwood and sap. A measured trunk eleven inches in diameter grew in twenty-three years. The wood bears some resemblance to buckeye. It takes good polish and some of it looks like birdseye maple, but the figure does not seem to be due to adventitious buds. It has been made into picture frames and looks well. It is a rapid grower and since its color fits it for the stencil, it might be worthy of consideration for box material, when the time comes in

eration for box material, when the time comes in Texas for planting woodlots.

Prickly Pear.—Novelty stores at San Antonio and elsewhere in southern Texas sell baskets made by Mexicans from prickly pear roots the thickness of a small toothpick. The baskets have capacities from two or three to a dozen quarts. The roots are dyed in different colors and the baskets are woven in characteristic patterns.

characteristic patterns.

Red Bay.—The bright red color commends the characteristic patterns.

Red Bay.—The bright red color commends the wood for wider use than it now has in Texas. Pin trays, wooden dishes, small mirror frames, canes and cupboard shelves were the only uses found.

Red Maple.—Its bright scarlet bloom gives the red maple its name. The wood differs so little from that of ordinary sugar or hard maple that in practice the two pass for one. Their uses are consequent

tice the two pass for one. Their uses are, consequently, the same, but the red maple belongs more to the South and sugar maple in the North.

Red Mulberry.-Selected mulberry heartwood is darker in color and richer in appearance than much of the black wainut on the market. If it were more abundant it would hold a high place as furniture material. It is used for table legs, chair arms, small turned stock, grills and lattices, base-blocks and panels, and is employed for cup and gobiet turning. Mulberry is combined with agarita, prickly ash, Mexican persimmon, holly and others in making composite vases and cups by first gluing several different colored woods in one block, and passing it through the lathe. Some mulberry is made into parquetry flooring. The tree is not a quick grower. A log ten inches in diameter, measured near Austin,

Rocky Mountain Oak.—The largest trunk of this species measured was only one foot in diameter, with sapwood nearly two inches thick. The medullary rays are broad and bright, and though the logs are small they give good results in quarter sawing. The figure is distinct. Spindles and balusters for stairways, and turned capitals for newel posts have been made of this oak. The trees in Texas are not only small but they are scarce.

Sassafras.—In eastern Texas sassafras is used in furniture making. It is not abundant in that region and is only occasionally cut. It is strong and substantial, and while of deeper brown than ash it otherwise resembles that wood in appearance.

Scarlet Haw.—Red haw is the usual name for this tree in Texas. It is small and can never be of much impotrance, but it has been used in small turnery with good results. The wood is very hard and

heavy.
Screwbean.—The screwbean is much like

Screwbean.—The screwbean is much like mesquite and is put to similar uses, except that the former is smaller and more limited in its range. It occurs along the valley of the Rio Grande from the mouth of Devil's river to El Paso.

Shittimwood.—This species is abundant in portions of Texas, trees at their best attaining a height of sixty feet and a diameter of two or three. It is frequently known as "gum elastic," the name referring to a resin exuded from wounds in the wood. The resin is used locally as chewing gum. Sometimes the berries are added. A rather large quantity of this species goes to the hardwood milis. The wood is white, with a tinge of yellow, and is used for furniture, vehicles, agricultural implements, boxes, crates, and for most other purposes for which cheap ash, maple or eim is suitable. The wood is cheap ash, maple or eim is suitable. The wood is

Silver Maple.—Soft maple is the name commonly applied to this species in Texas. It is softer, weak-er and generally inferior to the sugar or hard maple (which does not grow commercially in Texas), but for some purposes silver maple is liked better. It is white and delicate, fits nicely in joinery, pol-

ishes well, and meets most requirements. it goes to the furniture and wagon shops and is often used for interior house finish, and is one of the best woodenware materials in the state. It stencils well, is clean and odorless, and this fits it for first-grade box lumber.

Slippery Elm.—Commercially this is not usually distinguished from other elms with which it is associated in Texas. It is of a little darker color, and some users insist that it is stronger than other tree of the genus. It is used for furniture, agricultural implements, boxes and crates, vehicles and fixtures. The inner bark has medicinal value and is sold in most drug stores. This tree in south Texas iscalled "oimo Colorado."

Sophora.—The color of the wood of this species gives it the name "pink locust" in Texas. It is whittied into canes which are hard, strong and

heavy. The trees are too small for lumber.

Spanish Bayonet.—Some call the tree Spanish bayonet and know the wood as yucca. At San Antonio, the novelty stores seli pin cushions, hatpin holders, and other useful and ornamental articles of this material. The rim of the trunk or stem is hard and tough, and the inside soft and spongy. Pins are easily inserted in the pith of cross sections. The articles are made in local shops. Stems three or four inches in dlameter are liked best.

Spanish Oak.—So many species of oak are locally called Spanish oak that it becomes difficult to determine to what extent the true Spanish is used in Texas. It is at its best near the coast in the eastern part of the state. It goes to wagon shops for repair work, and makers or repairers of cotton and rice machinery use it. A log twenty-four inches in diameter which was examined showed little difference in appearance between heartwood and sapwood. ples of balusters, panels, capitals, and molding in the university collection at Austin resemble white oak in color and figure.

Sweet Magnolia.—This finely-colored wood is too scarce in Texas to become commercially important, saree in Texas to become commercially important, but some excellent specimens are found. A measured trunk seventeen inches in diameter had one inch of sapwood. The heart is used as an imitation of mahogany. It takes high polish, and the brown and darker shades combine with fine effect. Small articles are turned on lathes, and spindles for arm chairs are another class of products made of this wood. By some it is called sweet bay.

Sycamore.—The common eastern sycamore grows as far west in Texas as Devil's River, but it is scarce. What little is cut is likely to go to the furniture shops. A considerable part of the supply is made into chair seats. Some is used for newel posts and railing for stairs, and for panels. A little is converted into picture-frame molding, and a rougher place for other is found in making ox yokes near

place for other is found in making ox yokes near the Louisiana line.

Texas Ebony.—The color of the heartwood gives this species its name. The roots are blacker than the trunk, and small articles made of root wood resemble the black ebony of Ceylon; but the trunk wood is apt to be striped with black, brown and medium yellow. The annual rings of growth are frequently of different colors. A trunk that was measured was twelve inches in diameter and twenty-four years old, with one and a half inches of sapwood. Many kinds of articles are made of ebony from turned candlestick, goblets, cups and rings, to cross ties and house blocks and rollers. When used for railroad ties they must be bored for spikes, for the hardness of the wood makes driving very difficult. hardness of the wood makes driving very difficult. It resists decay many years and is one of the common fence-post materials near the Rio Grande. It is in much use as fuel, but is sai dto be objectionable for stove wood because of the intense heat it produces. In open fireplaces it burns with cheerful blaze and glowing coals. Large amounts of it are sold as cordwood about Brownsville.

It is suitable for higher uses than cordwood and cross tles. It makes first-class cabinet material, and by selecting and matching colors, it is worked into furniture. Even large tables are made of it which are elaborately carved, and present a massive and pleasing appearance. At Austin it is manufactured into parquetry floors, being one of the darkest woods employed. The seeds have been used as a substitute

for coffee.

Texas Cat's Claw.—A log in the university collection at Austin is nine inches in diameter with twenty-three annual rings. In San Antonio the wood is used for chisei and gouge handles, and at Austin for small frames, scroll work, and curtain rings. In Brownsville small pieces of cat's claw furniture are exhibited in some of the shops or show windows. It is manufactured into mission lamps, candlesticks, paper weights, rulers, canes, umbrelia handles, and numerous ornaments. The sapwood is not much used as it is liable to be attacked by boring insects. The heart is dark in color and exceedingly hard. color varies, however, from nearly red to nearly hlack. The wood takes a high polish, and is among

the most handsome in the state.

Tree Huckleberry.—This is known also as farkie-

berry and sparkleberry, and reaches its best development in eastern Texas. Trees five or six inches in diameter are the maximum. The wood is hard and heavy, is light brown, tinged with red. Occasional uses of the wood are reported. It has been employed in a small way for turnery in the Texas Agricultural and Mechanical College. The wood is

hard to split but is liable to check in drying.

*Umbrella Tree.—A few small picture frames and spindles for grill work make up the uses found in Texas for this planted tree. The trunk is short, the wood coarse, and of brown color, with figure and general appearance of chestnut. It is a foreign tree

brought from southeastern Asia.

Water Hickory.—This is a member of the hickory group and is put to the same uses as the others, though it is seldom given its proper name. woods of the hickories are so similar that users do not care to separate them. This particular species been manufactured into counter tops

Water Oak.—The custom of llsting this wood as red oak rohs it of some of the credit that should come to it. Though not reported under its own name by a single manufacture in Texas, it is known to supply metasical for magnetic forms. to supply material for wagons, furniture, fixtures and general millwork. The figure of the wood is inferior to that of many species of oak, and it is objectionable on account of its poor seasoning qualities; but the wood is strong and reliable and is worthy of more consideration than has been given

Whiteleaf Oak .- The beauty of this small, evergreen oak that grows on the high regions of western Texas is in the foliage rather than the wood. Large trunks are apt to be hollow, but the sound wood is used for repairing wagons and it has been tried with some success for furniture. It will never become of other than local importance.

Wild China.—This tree is abundant in Texas, but is of poor form for lumber, the trunks being short and none too straight. It is often planted for shade. It is not a foreign tree brought into this country, as its name might imply. It grows from Georgia to Arizona, but probably will never attain to any more importance in the timber supply than it now holds. It is sometimes called soap berry because substances extracted from the roots and the fruit have been used for soap. The true soap berry is a closely related species. It is credited with being a rapid grower, but the count of annual rings in a number of trunks ln Texas did not show it so. The wood trunks in Texas did not show it so. bears some resemblance to ash, but is not as coarse. It is used for boxes, crates, furniture and vehicle

repairing, but not in large amounts.

Wild Plum.—The wood looks like apple but is of deeper red. It was found one of the woods in use in a shop where butcher-knife handles and wooden

in a shop where butcher-knife handles and wooden spoons are made. A log that measured seven inches in diameter had three-fourths inch of sapwood.

Yellow Buckeye.—A little of this wood is made into hoxes in eastern Texas, and ironing boards and bread hoards find places for a little. It is a white, soft wood, useful for many purposes, but it is not plentiful or of large size in Texas.

Yellow Oak —The vallow oak losse its forces name.

Yellow Oak.—The yellow oak loses its forest name when it reaches the lumber yard and becomes red oak, and is used wherever it is found. The wood varies in quality (like elm) in accordance with soils on which it grows. Good soil produces clear, sound, good-colored wood; poor soil shows results in brash,

defective trunks.

Yopon Holly.—The only use found for this smail. scarce wood in Texas was for wooden spoons and manicure sets; and the largest trunk measured was only three inches in diameter. The wood is white like other hollies.

INDUSTRIES.

The sawmills of Texas cut 1,884,134,000 feet of lumber in 1910, as is shown by the census figures for that year. Reports came from 466 mills. The quantity further manufactured last year was 768,-336,112 feet, according to special reports received and compiled by the Forest Service. That shows the further manufacture of the equivalent of 41 per cent of the cut of the milis. About 9 per cent of the quantity further manufactured is shipped into the State, it being largely such woods as are not abundantly produced in Texas.

Five foreign woods are used in Texas factories—

the two mahoganies, African and American; Mexican white pine, Spanish cedar, and teak. The Mexican white pine grows also in the United States and is not strictly foreign species. The combined amount of the foreign woods is only a little more than half a million feet.

It is not always an easy matter to define what is meant by and included in an industry. There are many overlappings and doubtful cases. A clear line between furniture and fixtures, for instance, can not always be drawn; nor between handles and agricultural implements; nor between tanks and coperage, and so on down the whole list. In dividing

into industries the whole amount of wood used in the State, the Forest Service follows the same sched-ules and rules in all the States in order to have uni-State with another. The classes of commodities in the trunk industry, or the musical instrument in-dustry, or the horse vehicle industry, or any other industry, are the same in all the States. ing to ascertain how Michigan compares with Texas in the tank industry can consult the reports for the two States, with the assurance that the same kind of commodities, and no others, are included in both States. The rather large group of industries which are marked "Miscelianeous" in the table is made up partly of odds and ends and of doubtfui articles which do not clearly belong in any of the listed industries. That is the place where all the left-

overs go.

After this explanation it will be of interest to compare the numbers of industries in certain States. The quantity of wood used is no gauge by which to measure the number of industries, for where development is high and utilization close, subdivisions are clearly differentiated; but where quantity is the principal item considered, industries are apt to be few. The following list by States includes "Miscellaneous" as an industry in each to be few. The following not by "Miscellaneous" as an industry in each.

	No. of
	Industries.
Louisiana	9
Mississippi	9
Texas	13
Maryland	13
Arkansas	15
Kentucky	19
Alabama	19
Oregon	20
Massachusetts	20
North Carolina	21
Wisconsin	22
Missouri	24
Iiiinois	

If there are not at least three manufacturers engaged in making the same commodity, it is not classed as an industry If less than three, they are listed with the "Miscellaneous." That is to avoid revealing the identity of any manufacturer's fig-

A comparison of prices paid for lumber in different States by firms making similar commodities would show such differences that ordinary market conditions would not afford a satisfactory explanation. The real cause of difference in cost, where it is great is often to be found in the quality of the is great, is often to be found in the quality of the products manufactured Some furniture makers, instance, pay \$20 or less for lumber, while others pay \$100; but they do not both make the same grade of furniture. When a greater difference in cost of iumber exists than freight and the ordinary market of furniture. conditions will account for, the difference will usually be found in the grades used Some white oak may be bought for \$25 a thousand, and other can not be bought for three times that It is practically impossible in a report such as this to enter minutely into grades of wood used. The average prices paid must serve as an index to the grades.

Planing-Mill Products.

The output of planing milis constitutes the largest wood-using industry in Texas, amounting to 77 per cent of all, and the average cost of the lumber used as raw material is less than in any other industry. The items are flooring, ceiling, and siding. The planing mills which turn out these products are nearly all operated in connection with and as adjuncts of sawmills. The latter make rough lumber which, when it has been properly seasoned, is run which, when it has been properly seasoned, is run through the planers, and is then considered a finished commodity ready for use, and is shipped to market. Stock sizes, kinds, and patterns are made and no special machinery is needed. The mills which saw the lumber, plane it also because it can generally be done more cheaply in that way than by shipping the rough lumber to be made into ceiling, siding, and flooring elsewhere to be planed. But some planing mills do that kind of work though they are not connected with any particular sawmilis. are so situated in relation to supply can obtain rough lumber very cheaply and can dispose of the finished product to advantage.

The three species of yellow pine, shortleaf, long-leaf, and lobiolly, contribute practically all of the wood demanded by this industry. Though eight other species are listed, their aggregate contribution is less than 1,000,000 feet, which is not a quarter of 1 per cent of the whole. White pine is highest in price and loblolly pine the lowest. Seven of the tion is less than 1,000,000 feet, which is not a quarter of 1 per cent of the whole. White pine is highest in price and loblolly pine the lowest. Seven of the eleven woods, as listed in Table II were supplied wholly by Texas, and only one, white pine, came entirely from without. The State furnished more than 98 per cent of all the raw material used by this industry.

The table does not show where the products are sold, but it is known that one of the best markets

for Texas flooring, ceiling, and siding is Texas itself. An enormous amount of building is going on; but a trade with Mexico has reached large dimensions, and an export business is carried on with several other

foreign countries that buy Texas yellow pine. There is a northern trade, also, which reaches the Central and Plains States.

Sash, Doors, Blinds and General Millwork.

PLANING-MILL PRODUCTS.

		Æ		

	Quantit	y used	Average	Total	Grown ln	Grown out
	annua	ally.	cost	cost	Texas,	of Texas
KINDS OF WOOD-	feet,	Per	per	f. o. b.	feet,	feet,
	В. М.	cent.	1,000 ft.	factory.	В. М.	B. M.
Shortleaf pine	294.292.000	50.06	\$11.89	\$3,499,682	294,042,000	250,000
Longleaf pine	196,279,500	33.39	11.75	2,306,103	186,279,500	10,000,000
Loblolly pine	96,410,000	16.40	11.45	1,103,500	96,410,000	
White oak	277,000	.05	26.39	7,310	217,000	60,000
Texan oak	152,000	.03	15.03	2,285	152,000	
Pin oak	150,000	.02	15.00	2,250	150,000	******
Red gum	100,000	.02	12.00	1,200	100,000	
Cypress	90,000	.01	31.83	2,865	90,000	
White ash	75,000	.01	18.00	1,350	75,000	
White pine	45,000	*	60.00	2,700		45,000
Post oak	2,000	*	17.50	35	2,000	
Totals	587,872,500	100.00	\$11.79	\$6,929,280	577,517,500	10,355,000

^{*}Less than 1/100 of 1 per cent.

This industry is closely related to the preceding. Planing machines have much to do with it, but other woorworking machines are employed also. In this, much of the work is done to order; in the preceding, the commodities are made and put upon the martine of the work is done to order. much of the work is done to order; in the preceding, the commodities are made and put upon the market to be sold. Of course, doors, sash, window and door frames, and many other articles belonging to this industry, are manufactured in large quantities and are sold in general markets; but stair work, grills, columns and panel pieces are usually made to order or to meet the requirements of a particular trade. They are a more highly specialized product than flooring, celling and siding, and the average cost of the rough lumber of which they are made is more than twice as much. The list of woods used is longer, Table II having eleven, and this table twenty-one. Shortleaf and longleaf plnes hold chief place in this as in the preceding industrial table; but they are not so greatly out of proportion with all the others. The western yellow pine occupies a place of no mean importance in this industry, and the high price paid for it is proof that it is not used as a matter of convenience. It is taking the place of the white pine of the Lake States in Texas, and though it costs only \$9 less seven times as much was used i nthis industry last year. Sugar pine is

another California wood which is being substituted for white pine in Texas as well as elsewhere. More than half a million feet of it appears in Table III. Loblolly pine and tupelo are the two cheapest woods. Loblolly plne and tupelo are the two cheapest woods. A few years ago tupelo would scarcely have found a place in this industry, and it is an example of a wood coming up from obscurity and neglect to an important place. Yellow poplar is missing from the industry. A few years ago it would have likely appeared. Scarcity and high price have forced it out, ago when it was pasing as yellow poplar, and could not go under its own passes. not go under its own name.

Mexican white pine appears in no other industry in Texas; but it would appear in several if it could be had cheaper. Manufacturers in different lines hold it in much favor and would buy it, except that the price is prohibitive when it comes in competition with loblolly and shortleaf; but when it competes with the northern white pine and the pines of California, it can successfully hold its own as is shown in Table III. shown in Table III.

The only African mahogany reported in Texas appears in this industry, and the only Sitka spruce, which is another Pacific Coast tree winnings its way east of the Rocky Mountains.

SASH, DOORS, BLINDS, AND GENERAL MILL WORK. TABLE III.

	Quantit	y used	Average	Total	Grown in	Grown out
	annua	ally.	cost	cost	Texas,	of Texas
KINDS OF WOOD-	feet.	Per	per	f. o. b.	feet,	feet,
	В. М.	cent.	1,000 ft.	factory.	B. M.	B. M.
Shortleaf plne	17,701,000	42.66	\$24.45	\$ 432,722	15,351,000	2,350,000
Longleaf pine	12,081,000	29.12	22.44	271,067	8,151,000	3,930,000
Cypress	3,662,500	8.83	32.11	117,592	921,000	2,741,500
Tupelo	2,026,000	4.88	12.50	25,327	2,026,000	
Western yellow pine	1,487,000	3.58	53.95	80,217	5,000	1,482,000
Loblolly pine	1,215,000	2.93	12.02	14,600	1,215,000	
Red gum	814,000	1.96	20.26	16,490	779,000	35,000
White oak	726,800	1.75	67.61	49,138	166,800	560,000
Blrch	509,200	1.23	58.96	30,023		509,200
Sugar pine	502,000	1.21	47.96	24,075		502,000
White pine	195,000	.47	63.08	12,300		195,000
Mexican white plne	130,000	.31	48.46	6,300		130,000
Texan oak	119,000	.29	33.19	3,950	89,000	30,000
Mahogany	115,000	.28	155.22	17,850		115,000
White ash	60,000	.14	28.33	1,700	60,000	
Red oak	60,000	.14	76.08	4,565		60,000
Cottonwood	40,000	.10	27.50	1,100	40,000	
Evergreen magnolia	27,000	.07	15.30	413	27,000	
Sitka spruce	20,000	.05	60.00	1,200		20,000
Sugar maple	1,000	*	. 70.00	70		1,000
African mahogany	500	*	150.00	75		500
Totals	41,492,000	100.00	\$26.77	\$1,110,774	28,830,000	12,661,200

^{*}Less than 1/100 of 1 per cent.

Packing Boxes and Crates.

Red gum is the leading box and crate material of Texas, but evergreen magnolia is cheapest of the nineteen species listed in Table IV. A small quantity of red gum and cottonwood are brought into the State, but all the rest is the home product. A large number of the boxes and crates are for shipping fruits and vegetables from the farms to the markets. The line separating boxes and baskets is often hard to define in this industry. A large part of the material is received in the form of rotary-cut veneer, and by the employment of cleats and reinforcements is worked into shipping containers.

Willow oak supplied more than 5 per cent of the box and crate material in Texas. Most of it was for crates used in shipping farm machinery, fruit trees from nurseries, hardware, and other commodities Red gum is the leading box and crate material

requiring strong crates. Hackberry is named in no other industry, but it is used in others and is often

Cottonwood is highest in price of the nineteen species in Table IV. Most of it is employed for boxes which require stenciling. The wood's white color shows lettering to good advantage. It is valued to the state of uable also because it possesses no offensive taste or odor and will not contaminate articles of food with which it comes in contact. Ash is valuable for the same reason.

Car Construction.

Twenty-four woods contribute material to this industry in Texas, a larger number than is found in any other industry. Though the average cost, as shown in Table V, is not very high owing to the

presence of cheap woods in large amounts, there are a number of species listed which are worth more than \$50 a thousand, and two above \$150. The costllest is black cherry. It is higher than the mahogany listed and it is seldom that cherry costs that much in any industry. It was used for broad panels and other finish for passenger cars. It is twice the price of the black walnut listed, though usually cherry does not cost as much as walnut.

Nearly four-fifths of the material reported consists of three yellow pines that grow in Texas—longleaf, shortleaf and loblolly. Long leaf is in large demand for car frames, and much of it is heavy stuff. Its value is on account of its strength, stiffness and its long resistance to decay. Little except heartwood is used; in fact, this wood is nearly all heart. Loblolly and shortleaf are softer and not quite as strong, and their principal use as car material is for siding and decking.

White oak is employed for heavy timbers in freight cars, and also as finish for passenger cars. A considerable quantity is demanded for repairs in

freight cars, and also as finish for passenger cars. A considerable quantity is demanded for repairs in the many car shops in the State. Chinquapin oak is listed in large amount, and as stated on a former page of this report, there is some doubt as to the identity of some of the wood listed under that

Electric cars for street and interurban rallways are an important item in this industry. The most of the demand for their construction and repair is

met by hardwoods.

The small lots of white pine and sugar pine in the The small lots of white pine and sugar pine in the table went to the pattern shops. Some of the cypress and yellow poplar also went there; but these woods are more important as finish for cars. The osage orange reported for car construction may not all have actually gone into cars, but some of it was osage orange reported for car construction may not all have actually gone into cars, but some of it was probably employed as foundations for buildings, blocks and posts for platforms, and other purposes not strictly a part of car construction. The small amount of hickory was used in making rallroad velocinedes.

Texas supplies nearly two-thirds of the wood demanded by its car factories.

Furniture.

The average cost of furniture wood in Texas Is not quite as low as in some other Southern States, not quite as low as in some other Southern States, but lower than in regions further north. The average in Texas is \$17.92; North Carolina, \$17.81; Alabama, \$13.90; Mississippl, \$13.44; and Louislana, \$12.66. Among States which pay more are the following: Arkansas, \$24.90; Wisconsin, \$25.22; Kentucky, \$26.47; Massachusetts, \$28.30; Maryland, \$29.32; and Illinois, \$39.90. Figures might be obtained to show the average cost in several other States, but they would bring out no points additional to the above, viz: that remarkable difference exists in the cost of furniture woods in near near-by regions. The locality where the material is good and In the cost of furniture woods in near near-by regions. The locality where the material Is good and is low in price should do a large business in manufacturing furniture. North Carolina is an example of developing timber resources along the line of furniture making. Texas lacks a few of the best native woods, such as maple, cherry, yellow poplar, and black walnut, but it has abundance of others for developing a valuable furniture industry. There is enough of medium-grade oak, substantial elm, and high-grade pine, cypress and tupelo for common furniture, and the forests of fine and beautiful woods, listed usually as minor species, might be drawn upon to furnish veneers for overlaying. A product might be turned out that need fear no competition with any other part of the United States. Texas possesses the material for the highest grade furniture, but it has not yet made much use of any but the more common woods. Elsewhere in this report descriptions of some of the State's rare species are given somewhat in detail, under the heading "Unreported Woods." given somewhat in detail, under the heading "Unreported Woods."

Though Texas is a little handicapped in regard Though Texas is a little handicapped in regard to cheap power, when compared with some other regions, it possesses other advantages which fully compensate for what it lacks in this. It has woods which possess grain, texture and color, little, if any, inferior to the rare imported woods. The proper utilization of these woods is in furniture making; not so much massive furniture, but smaller kinds that can make use of the medium-sized trees. Quality rather than amount should be the State's strong point, though of the more common woods it has much, and might equal any other region in volume of product.

when the state of product.

Red gum supplies nearly one-half of all the furniture wood listed in Table VI. It is one of this country's best woods for furniture, and has come to the front in recent years. Foreigners first discovered its value. The French called it satin walnut, and the French and Italians sell some of it as Circassian walnut, which it may be made to imitate almost exactly. It is largely used in this country as imitation of Circassian, English and French walnut, not only in familiary but in the manufacture of interior fin in furniture, but in the manufacture of interior fin-ish and musical instruments.

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BOXES AND CRATES, PACKING. TABLE IV.

	Quantity used		Average	Totai	Grown in	Grown out of Texas
	annua		cost	cost	Texas,	
KINDS OF WOOD-	feet,	Per	per	f. o. b.	feet,	feet,
	B. M.	cent.	1,000 ft.	factory.	B. M.	B. M.
Red gum	17,236,000	48.19	\$12.65	\$217,944	13,735,000	3,501,000
Shortleaf pine	7,752,625	21.68	15.17	117,605	7,752,625	
	3,683,500	10.30	21.07	77,625	2,183,500	1,500,000
Cotton wood	2.000,000	5.59	12.00	24.000	2,000,000	
Willow oak		3.58	10.21	13,070	1,280,000	
Lobioliy pine	1,280,000		12.00	12,000	1,000,000	
White ash	1,000,000	2.80				
ng elm	1,000,000	2.80	12.00	12,000	1,000,000	
Longleaf pine	450,000	1.26	8.29	3,525	450,000	
Evergreen magnolia	320,000	.89	7.34	2,350	320,000	
Post oak	200,000	.56	10.00	2,000	200,000	
Black gum	160,000	.45	11.69	1,870	160,000	
Chinquapin oak	150,000	.42	10.00	1,500	150,000	
	150,000	.42	10.00	1,500	150,000	
Texan oak	110,000	.31	10.18	1,120	110,000	
White elm			16.00	1,200	75,000	
Overcup oak	75,000	.21			65,000	
Pin oak	65,000	.17	16.00	1,040		
White oak	60,000	.17	16.00	960	60,000	
Black willow	50,000	.14	10.00	500	50,000	,.
Hackberry	20,000	.05	12.50	250	20,000	
Totale	35.762.125	100.00	\$13.76	\$492,059	30,761,125	5,001,000

CAR CONSTRUCTION.

TABLE V.

	Quantity	y used	Average	Totai	Grown in	Grown out
	annua	ily.	cost	cost	Texas,	of Texas
KINDS OF WOOD-	feet.	Per	per	f. o. b.	feet,	feet,
	В. М.	cent.	1,000 ft.	factory.	B. M.	B. M.
Longleaf pine	11,077,400	31.24	\$21.70	\$240,395	2,881,700	8,195,700
Loblolly pine	10,000,000	28.20	12.00	120,000	10,000,000	
Shortleaf pine	6,863,160	19.35	18.15	124,567	4,594,170	2,268,990
White oak	3,431,840	9.68	19.04	65,343	3,024,500	407,340
Texan oak	1,178,000	3.32	17.75	20,914	1,178,000	
Chinquapin oak	1,002,000	2.83	16.00	16,032	1,002,000	
Post oak	610,000	1.72	28.36	17,300	610,000	
Yeliow poplar	277,480	.78	55.99	15,535		277,480
Cypress	255,000	.72	42.00	9,450	4,000	251,000
White ash	207,140	.58	46.27	9,585	34,140	173,000
Mahogany	142,710	.40	151.82	21,666		142,710
Black wainut	127,000	.36	75.08	9,535		127,000
White pine	102,800	.29	40.08	4,120		102,800
Douglas fir	100,000	.28	40.00	4,000		100,000
Osage orange	30,000	.09	21.67	650	30,000	
Sugar maple	18,062	.05	60.51	1,093		18,062
Black cherry	12,400	.03	153.15	1,899	1,400	11,000
Cottonwood	9,800	.03	54.90	538	9,800	
Red gum	6,000	.02	40.00	240	6,000	
Hickory	2,448	sje	78.43	192	500	1,948
Biren	2,325	*	42.58	99		2,325
Basswood	2,200	*	40.00	88		. 2,200
Overcup oak	2,000	*	16.00	32	2,000	
Sugar pine	328	*	88.41	29		328
Totals	35,460,093	100.00	\$19.27	\$683,302	23,378,210	12,081,883

^{*}Less than 1/100 of 1 per cent.

FURNITURE.

TABLE VI.

	Quantity used		Average	Total	Grown in	Grown out
	annua	liy.	cost	cost	Texas,	of Texas
KINDS OF WOOD-	feet,	Per	per	f. o. b.	feet,	feet,
	B. M.	cent.	1,000 ft.	factory.	B. M.	B. M.
Red gum	3,271,000	46.34	\$15.93	\$52,099	2,846,000	425,000
Texan oak	1,010,000	14.31	18.64	18,822	1,010,000	
White oak	839,000	11.89	18.24	15,301	596,000	243,000
Shortleaf pine	395,000	5.60	17.91	7,075	395,000	
Evergreen magnolia	367,000	5.20	17.29	6,345	367,000	
White ash	347,000	4.92	20.39	7,075	347,000	
Cottonwood	230,000	3.26	18.26	4,200	180,000	50,000
Black gum	200,000	2.83	15.50	3,100	200,000	
Longleaf pine	130,000	1.84	20.85	2,710	125,000	5,000
White e'm	66,000	.93	18.50	1,221	66,000	
Birch	60,000	.85	19.50	1,170		60,000
Wing elm	35,000	.50	20.00	700	35,000	
Black cherry	30,000	.42	65.00	1,950		30,000
Loololly pine	25,000	.35	18.00	450	25,000	
Mountain juniper	13,000	.18	90.00	1,170	13,000	
One-seed juniper	12,000	.17	90.00	1,080	12,000	
Yeilow poplar	11,000	.16	60.91	670		11,000
Beech	5,000	.07	60.00	300		5,000
Black walnut	5,000	.07	80.00	400		5,000
Mesquite	3,000	.04	16.00	48	3,000	
Western yellow pine	2,000	.03	42.50	85	2,000	
Mahogany	2,000	.03	250.00	500		2,000
Cypress	1,000	.01	30.00	30	•••••	1,000
Totals	7,059,000	100.00	\$17.92	\$126,501	6,222,000	837,000

The Texas oak usually passes as red oak, and the white oak goes by its own name. Doubtless a number of other oaks go to the furniture factories, but no manufacturer listed them for Table VI. Several white woods are made into drawers and shelving, among such species being cottonwood, magnolia, black gum, elm and ash. The mountain juniper and one-seed juniper were reported for no other industry. They grow in the mountainous and arid regions of the west, and are not sufficiently abundant to give them much importance, but the peculiar mottled appearance of the wood is an attractive quality.

The mahogany reported was of unusually high

price, due to the small quantity and the good quality. The two woods next highest in price were the two western cedars already mentioned. Black gum was cheapest of the twenty-three species.

Agricultural implements.

Agricultural implements in Texas consist largely of such cotton machinery as gins and presses. Three-fourths of the wood used in this manufacture is longleaf pine; the most expensive is hickory, and

the cheapest is loblolly.

Ait of the cypress appearing in Table VII is made into windmills. Well-boring machinery is placed with this industry, though all wells are not for agricultural purposes. About 200,000 feet of white and Texas oak are manufactured into beams for plows. Texas oak are manufactured into beams for plows. These three classes of commodities—cotton machinery, weil-boring apparatus and plows—make up the agricultural implement industry as reported in Texas. Handles for rakes, hoes and shovels are manufactured in considerable numbers, but they properly belong in the handle industry.

It is apparent that Texas might do more in the way of manufacturing the farm apparatus which its

way of manufacturing the farm apparatus which its

Fixtures.

people need.

The average cost of the wood manufactured into

The average cost of the wood manufactured into fixtures is higher than for any other industry in Texas. The reason is that the best grades are demanded even when cheap woods are employed.

Fixtures are closely related to furniture. The line separating the two industries is often difficult of definition. Fixtures are generally made for a particular room or place, while furniture is not so restricted. Fixtures are adjuncts of banks, offices, stores, saloons, halis and hotels. They consist of showcases, counters, presses and cabinets, window seats, wall benches, soda fountains, exhibition racks, bars, fixed seats, shelving and many others of similar kind. They differ from interior finish which is made fast to walls, ceiling or floor, and can not be removed without considerable injury to the finish removed without considerable injury to the finish and the room.

Fixtures are made in much the same way as fur-niture; similar materials are used, and similar ef-

niture; similar materials are used, and similar effects are produced by selecting and grouping woods. Veneers are as largely employed in furniture, and shelving and panels hold the relative place which they occupy in furniture.

The wood bought by fixture makers comes about half and half from in the State and out. Mahogany is the only foreign species listed in Table VIII. In most States a considerable percentage of the material used by fixture makers is foreign wood.

Tanks.

Tanks.

Considering the large area of Texas and the need there is for tanks, eisterns and reservoirs, the tank industry as shown in Table IX does not seem large. The principal kinds are for oil wells, water wells, and those to collect and hold rain water. Large cattle ranches use many—fifty or more in some cases. The oil business in the State demands numerous large tanks. Rain water cisterns are not so generally used in Texas as in Louisiana, because well water in the former State is usually satisfactory. Only three woods are employed, and 96 per cent is cypress. Makers of tanks claim that the best cypress for their purpose grows in the Louisiana swamps so near sea level and at such short distance from the Gulf of Mexico that the winds and tides occasionally drive salt water over the surface of the ground where the trees grow. Wood from trunks so situated is said to be stronger, tougher and more durable than that from districts more distant from brackish waters. Every foot of the cypress reported by tank makers in Texas came from and more durable than that from districts more distant from brackish waters. Every foot of the cypress reported by tank makers in Texas came from Louisiana. Much of the work of the tank makers is done by hand. Those who work that way insist that the machine-made tanks lack the proper bulge in the stave to give best service.

The tank market in Texas is largely in the south-eastern part, but some are shipped to all sections and a few find their way to Mexico. Galvanized iron tanks have taken the place of wood for many purposes.

Vehicles and Vehicle Parts.

It is probable that Texas does not manufacture 5 per cent of the vehicles used in the State. Twelve woods are bought by vehicle makers, the highest in woods are bought by vehicle makers, the highest in price being osage orange and the cheapest longleaf pine. Yellow poplar, second highest in cost, is for light wagon and carriage bodies where smooth polish and good painting are wanted. It has no superior for that purpose, and though sheet metal sometimes becomes a substitute for yellow poplar, few or none insist that metal has any superiority over the wood. Ash constitutes the framework of business wagon tops, but some longleaf pine is employed in the same way. Hickory makes the shafts, poles, spokes, gears and rims of buggles, and it has no

rival for that purpose, being tougher than any other known wood, and stronger than most others. Gambei oak was reported only for this industry in the State. Its use was doubtless due more to convenience than to any special property fitting it for vehicle making. It is justly considered one of the most unpromising of the oaks from the standpoint of usefulness.

of usefulness.

Vehicle making in Texas does not differ much from the industry in many other States where a large part of the work is done in smail blacksmith shops. Repairing is of comparatively more importance in this industry than in almost any other. Most shops repair ten wagons where they make one.

Most of the farm and road wagons in northern and western Texas have felloes of osage orange, locally called bodark. Comparatively few of these wagons are made in the State, but are shipped from

wagons are made in the State, but are shipped from

cities north and east. The resistance of osage orange to shrinking, swelling and checking, under climatic changes and influences, is its chief recommendation. Tires on osage orange rims seldom work loose or require resetting, but may wear out before repairs are needed. The climate is hot and dry, and most woods shrink and check excessively in summer. Texas supplies much of the osage orange, and, in connection with Oklahoma, furnishes wagon factories with all they get, for it is not produced commercially elsewhere. It is usually considered the highest priced wood native to the United States. In making wagon rims the waste runs very high, but by turning out insulator pins as a by-product of the rim mili, most of the sound wood is saved. Much is not sound, but is so pitted and defective that it can not be used, and the final waste that results is often large. cities north and east. The resistance of osage or-

AGRICULTURAL IMPLEMENTS.

TA	RI	/FO	VI	T

	Quantity used		Average	Total	Grown in	Grown out of Texas
	annua	ally.	cost	cost	Texas,	
KINDS OF WOOD-	feet.	Per	per	f. o. b.	feet,	feet,
	В. М.	cent.	1,000 ft.	factory.	B. M.	В. М.
Longleaf pine	2,050,000	74.41	\$26.27	\$53,850	2,050,000	
Red gum	200,000	7.26	21.25	4,250	200,000	
White oak	124,000	4.50	29.03	3,600	124,000	
Cottonwood	115,000	4.17	30.35	3,490	115,000	
Texan oak	100,000	3.63	30.00	3,000	100,000	
Cypress	100,000	3.63	18.00	1,800		100,000
White ash	40,000	1.45	25.00	1,000	40,000	
Shortleaf pine	25,000	.91	15.00	375	25,000	
Hickory	1,000	.04	35.00	35	1,000	
Totals	2,755,000	100.00	\$25.92	\$71,400	2,655,000	100,000

FIXTURES.

TABLE VIII.

THE PROPERTY OF THE PARTY OF TH	Quantit	y used	Average	Totai	Grown in	Grown out
	annua		cost	cost	Texas,	of Texas
KINDS OF WOOD-	feet,	Per	per	f. o. b.	feet,	feet,
	В. М.	cent.	1,000 ft.	factory.	B. M.	B. M.
. White oak	299,000	17.74	\$69.54	\$20,792	21,000	278,000
shortleaf pine	262,000	15.55	26.15	6,852	262,000	
Longleaf pine	200,000	. 11.87	22.00	4,400	200,000	
Birch	195,000	11.57	57.26	11,166		195,000
Lobiolly pine	150,000	8.90	25.00	3,750	150,000	
White ash	143,000	8.49	44.83	6,410	111,000	32,000
Mahogany	88,500	5.25	156.10	13,815		88,500
Red gum	72,000	4.28	31.22	2,248	20,000	52,000
Texan oak	60,500	3.59	25.21	1,525	60,500	
Yellow poplar	45,000	2.67	81.11	3,650		45,000
Red oak	45,000	2.67	83.78	3,770		45,000
Chestnut	40,000	2.37	35.00	1,400		40,000
Cottonwood	35,000	2.08	15.00 .	525		35,000
Basswood	20,000	1.19	57.50	1,150		20,000
Western yeliow pine	15,000	.89	42.47	637		15,000
Cypress	12,000	:71	39.50	474	12,000	
Evergreen magnolia	3,000	.18	25.00	75 .	3,000	
Totais	1,685,000	100.00	\$49.04	\$82,639	839,500	845,500

TANKS. TABLE IX.

	Quantity used annually.		Average	Total cost	Grown in Texas.	Grown out of Texas
KINDS OF WOOD-	feet,	Per	per	f. o. b.	feet,	feet,
	B. M.	cent.	1,000 ft.	factory.	B. M.	B. M.
Cypress	833,000	96.52	\$44.12	\$36,755		833,000
Shortleaf pine	15,000	1.74	16.00	240	15,000	
Longleaf pine	15,000	1.74	19.33	290	15,000	
Totals	863,000	100.00	\$43.20	\$37,285	30,000	833,000

VEHICLES AND VEHICLE PARTS.

TABLE X.

F H I I I I I I I I I I I I I I I I I I	Quantit		Average	Totai cost	Grown in Texas,	Grown out of Texas
KINDS OF WOOD-	feet.	Per	·per	f. o. b.	feet,	feet.
T	В. М.	cent.	1.000 ft.	factory.	B. M.	B. M.
White oak	201.668	27.94	\$49.03	\$9,887	181,500	20,168
White ash	142,000	19.68	30.70	4,360	134,000	8,000
Longleaf pine	127,000	17.60	15.75	2,000	117,000	10,000
Osage orange	65,026	9.01	124.97	8,126	65,026	
Hickory	53,500	7.41	52.75	2,822	38,500	15,000
Texan oak	39,000	5.40	26.67	1.040	39,000	
Overcup oak	31,000	4.30	48.87	1,515	31,000	
Red gum	25,000	3.46	23.20	580	20,000	5,000
Gambel oak	15.000	2.08	20.00	300	15,000	
Yellow poplar	11,000	1.53	74.55	820		11,000
Shortleaf pine	6,500	.90	26.62	173	6,500	
Evergreen magnolia	5,000	.69	25.00	125	5,000	
Totals	721,694	100.00	\$43.99	\$31,748	652,526	69,168

Handles.

Handle making is another industry in which Texas is not making full use of its extensive resources. The total amount passing through the factories yearly is little more than a half a million feet. Nearly three-fourths of this is white ash and white

oak, for handles of such tools as hoes, rakes, spades, shovels and pitchforks, and the balance, which is hickory, is converted into ax and hammer handles, with a few other sorts. Nearly 70 per cent of ali the hickory reported by Texas industries goes into handles. Ash is regarded as the best handle wood for the class of agricultural tools named above. It

is stiff and strong, and is not heavy enough to be objectionable.

Trunks and Valises.

Four woods contribute to the needs of trunk and valise makers in Texas. The highest in price is white elm bought in the form of veneer and shipped from northern States. Much of the wood is bought in the form of veneer. Some of it is in single sheets as it comes from the machine, and other is built-up, three or more ply, ready for use. Generally the wood demanded by trunk and suit case makers reaches the factory in the form of slats or veneer. The slats are for the outside to strengthen the trunk. The metal knobs and reinforcements are usually attached to the slats. The box, forming the body of the trunk, is of veneer, three ply or more in thickness. The inner sheet is laid with the grain crossing that of the sheets on either side. This prevents splitting and lessens warping. Such a sheet may break under sufficient pressure, but will not split. A sheet of veneer built up in that way is much stronger than a solid piece of equal thickness. Formerly trunks were simply boxes made by nalling boards together and covering them with cloth, leather or metal, but only cheap trunks are now made that way. made that way.

The trays and other compartments for a trunk

The trays and other compartments for a trunk are not subject to strain like the outer box is, and they may be of thin boards, covered with cloth or paper, but even there a preference is shown for built-up veneers. When cheap trunks are made in the old way by nailing boards together, red gum is frequently selected. The white eim reported is practically all worked into slats and veneer. Its toughness fits it for that use.

Some of the trunk makers have little wood-working machinery, but buy the veneer, slats and other

ing machinery, but buy the veneer, slats and other wooden parts cut to proper size and ready to assemble.

The making of patterns, models and flasks is a comparatively small industry in Texas. Foundry flasks are rough boxes in which the sand is placed flasks are rough boxes in which the sand is placed preparatory to receiving the molten metal in making the casting. Nearly any wood will answer this purpose. The foundry pattern, however, is a more carefully made article, and most of the white pine listed in Table XIII went to the shop where such patterns are cut out. The pattern is shaped exactly like the article to be cast. A soft, even-grained wood is demanded and it is necessary that it hold its shape, because warping and twisting after the pattern has been cut out, would destroy its usefulness. Experience has shown that white pine has no superior for patterns. The wood's high price sometimes lessens its use and another wood is substituted. A model is usually an exact representation of a part of a machine or some other article, such as a wheel, valve, boat, column or something that is to be made of a machine or some other article, such as a wheel, valve, boat, column or something that is to be made in specified shaps. The models are sometimes called machine-shop patterns to distinguish them from foundry patterns. Hat blocks are occasionally psoken of as patterns, and there are several kinds, each having its special use. Hat flanges are used in shaping the brims of felt hats; curing hoards for brims of silk hats, stretchers for widening hats, and hat sets to lengthen or widen. The high price of sugar maple demanded by this industry is due to the small amount used and the grade required.

The aggregate quality of wood demanded in Texas The aggregate quality of wood demanded in Texas by miscellaneous industries is large. Among the articles listed in this table are insulator pins, tent poles, surveyors' stakes, tent stakes, heehives, excelsior, chicken coops, paving blocks, cigar boxes, grist milis, butcher supplies, refrigerators, coffins and caskets, and others. Some of these are not treated as separate industries because the amount of wood used is too small; in others the amount is large enough, but only one or two manufacturers are represented, and, under the ruling that data conrepresented, and, under the ruling that data con-cerning individual operations must not be divulged, the figures could not appear in a separate industry

Insulator pins are used on telephone and telegraph lines. They must be of strong material to prevent breaking under the strain to which they are subjected in time of high winds, and they must be made of wood that resists decay, for they are peculiarly liable to attack by fungus where they are inserted in the cross arms. In Texas the best wood for insulator pins is usually considered to be osage orange, but the supply is not adequate and several other woods are used, though osage orange is the only one reported.

other woods are used, though osage orange is the only one reported.

Tent poles are made of longleaf pine because of its strength and stiffness. Tent stakes and the slides for tightening the ropes are of white ash, although other woods are as serviceable for this pur-

Grown in

Texas,

Grown out of Texas

HANDL	ES.
TABLE	XI

Average

cost

Totai

cost

Quantity used

annually.

KINDS OF WOOD-	feet,	Per	per	f. o. b.	feet,	feet,
**************************************	B. M.	cent.	1,000 ft.	factory.	В. М.	B. M.
White ash	377,000	68.92	\$22.00	\$8,294	25,000	352,000
Hickory	130,000	23.77	74.62	9,700	125,000	5,000
White oak	40,000	7.31	20.00	800	40,000	• • • • • •
Totais	547,000	100.00	\$34.36	\$18,794	190,000	357,000
	7	RUNKS A	ND VALISE	S.		
an cancer (youth to a come and		TAB	LE XII.			
	Quantit	v used	Average	Totai	Grown in	Grown out
	annu		cost	cost	Texas,	of Texas
KINDS OF WOOD-	feet,	Per	per	f. o. b.	feet,	feet,
	B. M.	cent.	1,000 ft.	factory.	B. M.	B. M.
Red gum	230,000	46.47	\$20.00	\$4,600	130,000	100,000
Cottonwood	165,000	33.33	19.70	3,250		165,000
White elm	50,000	10.10	50.00	2,500		50,000
Cypress	50,000	10.10	15.00	750		50,000
Totals	495,000	100.00	\$22.42	\$11,100	130,000	365,000
		PAT	TERNS.			
		TAB	LE XIII.			
	Quantit	y used	Average	Totai	Grown in	Grown out
	annua		cost	cost	Texas,	of Texas
KINDS OF WOOD-	feet,	Per	per	f. o. b.	feet,	feet,
	В. М.	cent.	1,000 ft.	factory.	B. M.	B. M.
Shortleaf pine	226,400	82.36	\$15.00	\$3,396	226,400	
White pine	35,000	12.73	80.34	2,812		35,000
Cypress	6,000	2.18	40.00	240		6,000
Western white pine	3,500	1.27	50.00	175		3,500
Sugar pine	2,000	.73	62.50	125		2,000
Sugar maple	2,000	.73	100.00	200	•••••	2,000
Totais	274,900	100.00	\$25.27	\$6,948	226,400	48,500
		MISCEL	LANEOUS.			
		TAB	LE XIV.		,	
	Quantit	v used	Average	Totai	Grown in	Grown out
	annua		cost	cost	Texas,	of Texas
KINDS OF WOOD-	feet,	Per	per	f. o. b.	feet,	feet,
	B. M.	cent.	1,000 ft.	factory.	B. M.	B. M.
Longieaf pine	31,243,000	65.98	\$10.86	\$339,274	12,766,000	18,477,000
Cypress	9,013,000	19.04	17.03	153,485	6,012,000	3,001,000
Shortieaf pine	3,850,000	8.13	13.14	50,580	3,850,000	
Red gum	3,040,000	6.42	15.50	47,135	3,000,000	40,000
White elm	50,000	.11	10.00	500	50,000	
Basswood	40,000	.08	23.00	920		40,000
Spanish cedar	40,000	.08	31.15 23.00	1,245		40,000
Yellow poplar	35,000 11,000	.02	30.00	805	17.000	35,000
Wnite oak	8,000	.02	220.00	$\frac{330}{1,760}$	11,000	9 000
Texan oak	6,000	.01	30.00	180	6,000	8,000
Osage orange	5,000	.01	125.00	625	5,000	
Biack wainut	3,000	*	40.00	120	3,000	3,000
White ash	2,800	*	27.14	76	2,000	800
Red cedar	2,000	*	30.00	60	2,000	
Totals	47,348,800	100.00	\$12.61	\$597,095	25,704,000	21,644,800
*Less than 1/100 of 1 p	er cent.					

Beehives are manufactured from clear longleaf pine, but the frames or boxes in which the honey is stored by the bees are of cottonwood, basswood, yelodor and with pleasing color. Honey frames are one of the few commodities turned out by the woodworker that are sold to the ultimate consumer by weight, and they are sold at the same price as the boney that contain honey they contain.

The manufacture of excelsior is not important in Texas. A soft cheap wood is needed and it must possess a considerable element of toughness and elasticity. The principal use of excelsior is for packing purposes and not for upholstering, as many persons suppose. Supposers of dishes, small articles

persons suppose. Shippers of dishes, small articles of hardware, and 'of other breakable commodities, are the largest users. All of the excelsior reported in Texas was made of shortleaf pine.

The makers of chicken coops in the State use a liberal amount of wood. Some of it is pine and some white elm. The latter wood is tough and is made into the long dowels or rods forming the sides, ends and tops of coops. The elm was bought for \$10 a thousand, which indicates that it was purchased in the log form.

Paying blocks are made of both longleaf and short-

Paving blocks are made of both longleaf and short-leaf pine in Texas, and large numbers are manufactured. Wooden paving blocks have been used and experimented with in this and foreign countries for many years; many kinds of wood have been tried, and many failures and many successes have been recorded. The successes have been more than the failures, and the use of the blocks is rapidly extending. Most of the failures and unsatisfactory experiments may be checked against the use of untreated wood. wood. Since treated blocks have become the rule,

that form of pavement has grown rapidly in popularity. The blocks are about twice the size of an ordinary brick, and so cut that the wear falls on the end of the fibers; that is, on a cross section of the

Some very hard woods, as osage orange and mesquite, have been used as paving blocks in Texas; but they are objectionable on account of excessive cost, the difficulty of procuring them of proper form and size, and their tendency to wear smooth and become slippery in rainy weather. As far as their resistance to decay is concerned, they are all that could be desired. A little osage orange block pavement may still be seen in San Antonio which has well nigh outlasted the memory of those who laid it.

well nigh outlasted the memory of those who laid it. In selecting pine for paving blocks, the annual rings of growth are carefully inspected. They must not be too broad; that is, the trees from which they are cut must not be of too rapid growth. The ring, as is well known to most persons, is made up of two kinds of wood—the dark-colored, porous spring growth, and the dense wood laid on in the summer. The latter is harder than the spring wood, and wears down more slowly under the traffic to which paving is subjected. If the rings are wide, the wear gives the top of the blocks a corrugated surface, like a washboard, and makes it objectionable for sanitary reasons. Blocks of longleaf and of selected shortleaf are of such regularly-spaced narrow rings that they are of such regularly-spaced narrow rings that they wear smooth and always present good surfaces.

Four woods in Texas constitute the cigar box material—red gum, yellow poplar, basswood and Spanish cedar. The four are employed in nearly equai amounts. Red gum is cheapest, yellow poplar next, basswood third, and Spanish cedar the most expensive. Much of the cedar is made into very thin-

sliced veneer and is used as overlay or covering for the other woods. In quantity this cedar surpasses any other cigar-box wood in the United States. It is much employed as veneer, yet large quantities are worked into thin lumber and converted into boxes

worked into thin lumber and converted into boxes of solid wood.

Butcher supplies make up part of the material in the miscellaneous table, and two woods—white and Texan oak—are the only species listed.

Refrigerators are made in so small a way that they call for only brief mention. White ash and cypress are the only woods reported for this business. The market for refrigerators in Texas is excellent, and plenty of wood may be had for making them. It would seem that there is room to build up an industry in that line. dustry in that line.

A large quantity of wood is made into caskets and coffins in Texas yearly, but the statistics were not obtained in form to appear as a separate industry and are included in the miscellaneous table. Red gum and cypress are the only woods reported, three-fourths of all being cypress. A large number of the caskets used in the State are made in northern fac-tories, and many more are the work of cabinet makers who turn out a few each in the course of a year, but do not make detailed reports of their output The boxes in which caskets are always shipped are counted as part of the industry.

SUMMARY BY INDUSTRIES OF WOODS USED IN TEXAS.

Table XV is a summary of all the wood-using industries in Texas. It is a counterpart of Table I, which is a summary by species. Both tables present the same totals but interpret them in different ways. the same totals but interpret them in different ways. The first shows how much of each wood is used, the cost, etc.; the last shows how much wood of all kinds is demanded by each one of the fourteen industries of Texas. Forty-eight woods are listed in Table I and thirteen industries in Table XV. In this enumeration "Miscellaneous" is classed as an industry, though it is only a grouping of many items. It is numbered XIV. The highest average price for the wood used was by the makers of fixtures, and the lowest by planing mili products. The makers of tanks bought the smallest percentage of material in the State, and the manufacturers of pianing-mill products the largest: but no industry material in the state, and the manufacturers of planing-mill products the largest; but no industry procured all of its wood in the State, and none bought all outside. The average cost of the wood reported by all the industries was \$13.30 per 1,000 feet. That can be compared with similar data for other. States where the average costs for all wood other States where the average costs for all wood used were as follows:

	Average
State.	
Arkansas	
Louisiana	
Mississippi	
Alabama	. 12.24
Maryland	. 20.65
Massachusetts	. 21.23
Kentucky	. 23.07
Missouri	. 24.12
Iilinois	. 28.63

PERCENTAGE OF DIFFERENT WOODS USED BY EACH INDUSTRY.

Fourteen of the forty-eight woods reported by the hackberry, Gambel oak, mesquite, mountain juniper, one-seed juniper, red cedar, Spanish cedar, teak, tupelo, western white pine and willow oak. No species is used by all the industries, but four woods—white oak, red gum, cypress and white ash—appear in ten of the thirteen, and Texan oak and longleaf pine in nine. No Industry uses more than one-half of the reported woods. Car makers list 24, furniture 23, and sash, doors and blinds 21, of the 48 species; while patterns take 6 and handles and tanks 3 each. Fourteen of the forty-eight woods reported by the

AVERAGE COST OF WOODS IN EACH INDUS-TRY.

The difference in the prices paid for a wood by different industries that use it is well illustrated in Table XVII. Practically no one of them have the same average price. White oak is a wood well known and as universally used as any in this country. Some manufacturers in Texas pay three or four times as much for it as others. Longleaf pine does not show such marked difference, but some users pay double what others buy it for. Red gum ranges from \$12 to \$40; Texan oak, from \$10 to \$33.19, and white eim from \$10 to \$50. No general explanation would account for all of these variations, but difference in grade of the materials used is responsible for much of it. Freight rates have some effect on cost, and the form of the material purchased has a great deal. Some buy it in log form for half or less of what rough lumber would cost; a few purchase it by the cord, and others procure it

already partly manufactured. All of these factors must be known before the cost of a particular wood in a certain industry can be intelligently accounted

for, or the cost in one industry compared with another. The costa of the woods in Table XVII hold only a very distant relationship to market prices.

SUMMARY OF WOODS USED BY INDUSTRIES IN TEXAS.

TABLE XV.

	Quantit		Average	Total cost	Grown in Texas,	Grown out of Texas
Industries-	feet, B. M.	Per cent.	per 1,000 ft.	f. o. b. factory.	feet, B. M.	feet, B. M.
Planing-mill products	587,872,500	77.12	\$11.79	6,929,280	98.24	1.76
Miscellaneous	47,348,800	6.21	12.61	597,095	54.29	45.71
Sash, doors, blinds, and						
general millwork	41,492,000	5.44	26.77	1,110,774	69.49	30.51
Boxes and crates (pack-						
ing)	35,762,125	4.69	13.76	492,059	86.02	13.98
Car construction	35,460,093	4.65	19.27	683,302	65.93	34.07
Furniture	7,059,000	.93	17.92	126,501	88.14	11.86
Agricultural implements	2,755,000	.36	25.92	71,400	96.37	3.63
Fixtures	1,685,000	.22	49.04	82,639	49.82	50.18
Tanks	863,000	.11	43.20	37,285	3.48	96.52
vehicles and vehicle						
parts	721,694	.09	43.99	31,748	90.42	9.58
Handles	547,000	.07	34.36	18,794	34.73	65.27
Trunks and valises	495,000	.07	22.42	11,100	26.26	73.74
Patterns	274,900	.04	25.27	6,948	82.36	17.64
Totals	762,336,112	100.00	\$13.30	\$10,198,925	91.51	8.49

USES OF WOOD.

Manufacturers and others in Texas report the uses for the different woods as follows:

Bank fixtures, cigar boxes, dust guards for cars, store fixtures.

Beech.

Furniture

Bank fixtures, bar fixtures, blinds, car finish, church pews, desks, doors, door screens, drawer bottoms, molding, office fixtures, sash, store fixtures.

Biack Cherry.

Car finish, furniture.

Black Gum.

Beds, boxes, dressers, extension tables, kitchen cabinets, kitchen tables.

Black Walnut.

Car finish, coffins, furniture.

Black Willow.

Crates.

Chestnut.

Coffins, fixtures, furniture.

Chinquapin Oak. Mission furniture, vegetable crates.

Cottonwood.

Bed springs, boxes, car sheathing, cotton gins, couch frames, crates, drawer backs, drawer bottoms, egg cases, excelsior, fruit crates, kitchen cabinets, sample cases, siding, trunk boxes.

Blinds, boats, book cases, butchers' supplies, car finish, car frames, car siding, church altars, cisterns, colonial columns, columns, doors, door screens, fixtures, flooring, kitchen cabinets, models, moldings, refrigerators, sample cases, sash, sign frames, table tops, tanks, troughs, trunks, windmills, window screens.

Douglas Fir.

Car siding.

Evergreen Magnolia.

Bed-room suites, blinds, boxes, cabinets, china closets, doors, dressers, egg cases, interior finish, kitchen tables, molding, panels, sash, tables, wash stands.

Gambel Oak.

Gears for wagons.

Hackberry.

Boxes

AVERAGE COST OF THE DIFFERENT KINDS OF WOOD USED BY EACH INDUSTRY. TABLE XVII.

										rk				
, Kinds of Wood—	gricultural implements	crates,	construction				Miscellaneous.		laning mill products.	s, blinds il mill work		d valises.	and parts.	
	ne me	s and king.	str	ช่	urniture	ະຄໍ	ine.	ໝໍ	et B	n, doors, general		and	Vehicles a	
	ult	Kin	ono	Fixtures	itu	Handles	and	Patterns	du	en de	ชว์	S X	ic	
	n je	pacl		a a	E	nd	ခွ	E e	ro ii	र्च हुए	J.K	a	eb eb	
	20.11	Boxes pacl	Car	Ž.		Ia	Ais	at	Pla P	Sash,	Tanks	Trunks	Ze v	
Basswood	\$	\$	\$ 40.00	\$ 57.50	\$	\$	\$ 23.00	\$	\$	\$	\$	\$	\$	
Beech					60.00									
Birch			42.58	57.26	19.50					58.96				
Black cherry			153.15		65.00									
Black gum		11.69			15.50									
Black wainut			75.08		80.00		40.00							
Black willow		10.00												
Chestnut				35.00										
Chinquapin oak		10.00	16.00		10.00							******		
Cottonwood	30.35	21.07	54.90	15.00	18.26	• • • • •				27.50		19.70		
Cypress	18.00		42.00	39.50	30.00		17.03	40.00	31.83	32.11	44.12	15.00		
Douglas fir		7.04	40.00	95.00	17 90					15 20			95.00	
Evergreen magnolia		7.34		25.00	17.29					15.30			25.00	
Gambel oak		12.50											20.00	
Hackberry	25.00		78.43			74.62							52.75	
Lobiolly pine	35.00	10.21	12.00	25.00	18.00		*		1145	12.02				
Longleaf pine	26.27	8.29	21.70	22.00	20.85		10.86		11.75	22.44	19.33		15.75	
Mahogany (African)	20.21									150,00				
Mahogany (American).			151.82	156.10	250.00					155.22				
Mesquite					16.00									
Mexican white pine										48:46				
Mountain juniper					90.00									
One-seed juniper					90.00									
Osage orange			21.67				125.00						124.97	
Overcup oak		16.00	16.00										48.87	
Pin oak		16.00							15.00					
Post oak		10.00	28.36						17.50					
Red cedar			40.00		45.00		30.00	• • • • • •						
Red gum	21.25	12.65	40.00	31.22	15.93		15.50		12.00	20.26		20.00	23.20	
Red oak	45.00	15.10	10.15	83.78	17.01		1914	15.00	11.70	76.08	10.00		00.00	
Short'eaf pine	15.00	15.17	18.15	26.15	17.91		13.14	15.00	11.79	24.45 60.00	16.00		26.62	
Sitka spruce Spanish cedar						• • • • • •	31.15							
Sugar maple		• • • • • •	60.51					100.00		70.00		• • • • • •		
Sugar pine			88.41					62.50		47.96				
Teak							220.00							
Texan oak	30.00	10.00	17.75	25.21	18.64		30.00		15.03	33.19			26.67	
Tupelo										12.50				
Western white pine								50.00						
Western yellow pine				42.47	42.50					53.95				
White ash	25.00	12.00	46.27	44.83	20.39	22.00	27.14		18.00	28.33			30.70	
White elm		10.18			18.50		10.00					50.00		
White oak	29.03	16.00	19.04	69.54	18.24	20.00	30.00		26.39	67.61			49.03	
White pine		******	40.08		• • • • • •			80.34	60.00	63.08				
Willow oak		12.00							• • • • • •					
Wing elm	• • • • •	12.00	== 00	01 11	20.00	• • • • • •	99.00				• • • • • •		74.55	
Yellow poplar			55.99	81.11	60.91		23.00						74.55	

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PERCENTAGE OF THE DIFFERENT KINDS OF WOOD USED BY EACH INDUSTRY. TABLE XVI.

										ds work.		Vallses.	
	80	crates	construction	1000			vi			blinds mill wo		Vall	ts.
KINDS OF WOOD-	Agricultural implements	er.	nc				Miscellaneous		laning mill products.			and	ehicles and vehicle parts
	Itu	oxes and packing.	ıstı	22 (U	Furniture	vi	an	is.	g m uct	ı, doors, general			919
	cul	ck.	cor	Fixtures.	pit	Handles.	ell	Patterns.	odi	ı, d ger	× × ×	Trunks	Vehicles
	gri	Boxes	Car	ixt	i p	lan	iis	att	Plan	Sash,	Tanks.	2	ehi
The state of the s		Д							PH .		_		
Basswood			3.54	32.15	100.00		64.31		*******			* * * * * * *	
Birch			.30	25.44	7.83					66.43			
Black cherry			29.25		70.70								
Black gum		44.44			55.56								
Black wainut		100.00	4.08		3.70		2.22	• • • • •					
Black willow		100.00		100.00			• • • • • • •					• • • • • •	
Chestnut		13.02	86.98										
Cottonwood	2.69	86.10	.23	.82	5.37					.93		3.86	
Cypress	.71		1.82	.09	.01		64.27	.04	.64	26.12	5.94	.36	
Douglas fir		44.00	100.00	40	70.00								
Evergreen magnolia		44.32		.42	50.83					3.74			.69 100.00
Gambel oak		100.00											100.00
Hickory	.53		1.31			69.54							28.62
Loblolly pine		1.17	9.17	.14	.02				88.39	1.11			
Longleaf plne	.81	.18	4.37	.08	.05		12.32		77.38	4.76	*		.05
Mahogany (African)			40.00	05.40		• • • • •				100.00			
Manogany (American).			40.98	25.42	100.00					33.03			
Mesquite										100.00			
Mountain juniper					100.00								1
One-seed juniper					100.00								
Osage orange	• • • • •	00.45	29.99		• • • • • •		5.00	• • • • • •					65.01
Overcup oak		69.45 30.23	1.85						69.77				28.70
Pin oak		24.63	75.12						.25				
Red cedar							100.00						
Red gum	.80	68.96	.02	.29	13.09		12.16		.40	3.26		.92	.10
Red oak			0.05	42,86	* * * * * * *					57.14	* * * * *		
Shortleaf plne	*	2.34	2.07	.08	.12		1.16	.07	88.81	$\frac{5.34}{100.00}$	*		*
Sltka spruce Spanlsh cedar							100.00			100.00			
Sugar maple		,	85.76					9.49		4.75			
Sugar plne			.06					.40		99.54			
Teak							100.00						
Texan oak	3.55	5.33	41.85	2.15	35,89		.21		5.40	4.23			1.39
Tupelo			• • • • • • • • • • • • • • • • • • • •				* * * * *	100.00		100.00			
Western white pine Western yellow pine				1.00	.13			100.00		98.87			
White ash	1.67	41.77	8.65	5.97	14.50	15.75	.12		3.13	2.51			5.93
White elm		39.85			23.91		18.12			A		18.12	
White oak	2.06	1.00	57.10	4.97	13.96	.67	.18	0.07	4.61	12.09			3.36
White pine	• • • • • •	100.00	27.21		• • • • • •		• • • • • •	9.27	11.91	51.61			
Willow oak		96.62			3.38	• • • • • •							
Wing elm			73.12	11.86	2.90		9.22						2.90
Table Popular Transfer				27-1-17-1	and the season								N 1 4 - 1 - 1

^{*}Less than 1/100 of 1 per cent.

Hickory.

Axles, bolsters, bolster stakes, brake bars, car hoods, car seats, doubletrees, farm implements, felloes, gears for vehicles, handles, harrows, single trees, spokes, vehicles, velocipedes.

Lobiolly Pine.

Balusters, bases, bed springs, beer and soda cases, boxes, brackets, car decking, car roofing, car siding, casing, ceiling, chicken coops, columns, cots, cotton gins, crates, fencing, finish, flooring, furniture, general mili work, lawn swings, locomotive cabs, molding, novelties, porch-frame screens, running boards, sash, screen doors, screen windows, shelves, siding, stairs, store fronts, vehicles, wagon heds, wheelbarrows, windmill towers, window frames, wood turning.

Longleaf Pine.

Balusters, hases, bed springs, beehives, beer and soda cases, book cases, boxes, brackets, car posts, car sills, casing, ceiling, coops, coffins, columns, cot ends, cot rails, cots, cotton gins, cotton presses, crates, decking, doors, fencing, fixtures, flooring, frames, furniture, horse powers, kitchen cabinets, lawn swings, locomotie cabs, molding, noveltles, paving blocks, running boards, sash, screen doors, screens, shelves, shiplap, slding, stairs, store fronts, tables, tent poles, underframing, wagon beds, wagon bottoms, weil machines, wheelbarrows, wood turning, windmill towers.

Mahogany (Aprican.)

Interior finish.

Mahogany (American.)

Bank fixtures, bar tops, blinds, car finlsh, church altars, counter tops, doors, fixtures, furniture, molding, store fixtures, sash.

Mesquite.

Rollers.

Mexican White Pine,

Blinds, doors, interior finish, moldings, sash.

Mountain Juniper.

Cedar chests, closet lining, furniture, wardrobes.

One-Seed Juniper.

Cedar chests, furniture, lining for closets, ward-robes.

Osage Orange.

Felloes, fence posts, insulator pins, wagon spokes.

Overcup Oak.

Baskets, crates, felloes, freight cars, harrows, locomotive pilot beams, mission furniture.

Pin Oak.

Baskets, cars, celling, crates, felloes, finish, flooring frame work, gears, locomotive pilot beams, office furniture, plow beams, siding, spokes, store fixtures.

Post Oak.

Ceiling, church pews, finlsh, flooring, freight cars, locomotive pllot beams, logging cars, mission furniture, office furniture, slding, store fixtures, trucks, vegetable crates.

Red Cedar.

Chests, coffius, furniture, linlng for closets, ward-

Red Gum.

Bank fixtures, baskets, beer and soda cases, boxes, buffets, cabinets, car finish, chicken coops, china closets, cigar boxes, coffins, cotton gins, columns, couches, counters, crates, desks, drawer bottoms, drawers, dressers, egg cases, fruit cases, kitchen afes, lounges, novelties, panels, sample cases, show cases, store fixtures, tables, trunk boxes, turned work, vegetable packages, wagon beds, wash stands.

Red Oak.

Bank fixtures, bar fixtures, blinds, butcher supplies, cablnets, car buildings, ceiling, chalrs, doors, felloes, finish, flooring, furniture, harrows, locomotive pilot beams, mission furniture, molding, office fixtures, porch furniture, refrigerators, sash, show cases, siding, spokes, vegetable crates.

Shortleaf Pine.

Balusters, bases, bedding material, bed springs, beer and soda cases, boxes, casing, ceiling, chicken coops, church pews, columns, coffins, cots, cotton gins, crates, decking, doors, excelsior, fencing, finish, flooring, foundry fiasks, frames, freight cars, fruit packages, furniture, grain doors, lawn swings, locomotive pilot beams, logging cars, molding, novelties, paving blocks, porch-frame screens, running boards, sash, screen doors, screen windows, siding, stairs, store and office fixtures, table legs, trucks, vegetable packages, vehicles, wagon beds, wheelbarrows, windmill towers, window frames, wood turnings.

Sitka Spruce.

Blinds, doors, sash.

Spanish Cedar.

Clgar boxes.

Sugar Maple.

Blocks, car floor strips, car matting, flooring.

Sugar Pine.

Car doors, doors, patterns, sash, screen work.

Teak.

Boat finish

Texan Oak.

Davenports, mission furniture, wagons.

Tupelo.

Columns.

Western White Pine.

Patterns.

Western Yeilow Pine.

Blinds, doors, door screens, interior finish, molding, sash, window frames, window screens.

Butchers supplies, car building, car finish, carlings, cores for veneering, fixtures, flooring, fruit crates, furniture, ice boxes, refrigerators, shovel bandles, tent slides, tent stakes, vegetable crates, vehicles, windmills.

White Elm.

Cabinets, chicken coops, crates, furniture, trunk

White Pine.

Blinds, car siding, celling, cores, doors, door screens, finish, models, molding, panels, patterns, porch screens, roofing, sash, slding, window frames, window screens.

Willow Oak.

Fruit crates, vegetable crates.

Wing Eim.

Cablnet legs.

Yellow Poplar.

Automobile bodies, bread boards, car ceiling, car finish, carriage bodies, car seats, car siding, church altars, cigar boxes, counters, desks, furniture, ironing boards, store fixtures, wagon panels.

White Oak.

Balusters, bank fixtures, baskets, blinds, brackets, buffets, butchers supplies, cablnets, car building, car finish, car seats, ceiling, chairs, chiffoniers, china closets, coffins, columns, davenports, dishes, doors, door screens, dressers, farm implements, felloes, flooring, freight cars, fruit crates, harrows, hubs, interior trim, iawn swings, library tables, locomotive pilot beams, locomotives, mission furniture, moiding, plow beams, porch furniture, reaches, refrigerators, show cases, siding, spokes, store fixtures, tabies, tongues, turned work, vegetable crates, wagons, wash stands, wheelbarrows, window screens.

DIRECTORY.

Below is a list of Texas wood-using manufacturers who supplied the data contained in this report. Those manufacturing several products classified under different industries will appear in the list, with their addresses, under more than one industry:

Agricultural Implements.

G. B. Studdard, Cushing.
Continental Gin Co., Dallas.
The Murray Co., Dailas.
The Axtell Co., Ft. Worth.
Clark Handle Factory, Henderson.
Kelly Plow Works, Longview.

Boxes and Crates, Packing.

Boxes and Crates, Packing.

Mechanics Planing Mill, Aransas Pass.
Buliard Gin & Mill Co., Builard.
Conkling Mill, Box & Lumber Co., Dalias.
Dallas Show Case & Manufacturing Co., Dalias.
Silvers Box Factory, Dallas.
N. A. Slover, Dialville.
Gamer Co., Ft. Worth.
Southwestern Mechanical Co., Ft. Worth.
Texas Planing Mill & Mfg. Co., Ft. Worth.
Eiberta Box & Basket Factory, Frankston.
R. T. Chandler, Gallatin.
Eiler Wagon Works, Houston.
Houston Show Case Co., Houston.
Aber Box & Basket Co., Jacksonville.
Jacksonville Crate & Basket Co., Jacksonville.

Marshall Manufacturing Co., Marshall.
Mineola Box Co., Mineola.
T. J. Posey & Son, Neches.
Orange Box & Manufacturing Co., Orange.
Cummer Manufacturing Co. of Texas, Paris.
Paris Box & Manufacturing Co., Paris.
E. E. Brince Pittsburg. F. E. Prince, Plttsburg. B. Everett, Porta. B. Everett, Forta.
J. H. Cianton, Richmond.
Butler Bros., Rusk.
Sulphur Springs Box & Crate Co., Sulphur Springs.
Tyler Box & Lumber Co., Tyler.
P. Mailander & Son, Waco.

Car Construction.

Car Construction.

Beaumont Traction Co., Beaumont.
Fort Worth & Denver City Ry., Childress.
Gulf, Colorado & Santa Fe Ry., Cleburne.
Thompson Bros. Lumber Co., Doucette.
Ei Paso Electric Ry. Co., El Paso.
Northern Texas Electric Co., Ft. Worth.
St. Louis, San Francisco & Texas Ry., Ft. Worth.
Southwestern Mechanical Co., Ft. Worth.
Galveston Electric Co., Galveston.
Grant Locomotive & Car Works, Houston.
Gulf, Houston & San Antonio Ry., Houston.
Houston & Texas Central Ry., Houston.
Houston & Texas Central Ry., Houston.
Marshall & E. Texas Ry., Marshall.
Marshall & E. Texas Ry., Marshall.
International & Great Northern Ry., Palestine.
Trinity & Brazos Valley Ry., Teague.
Texas Midland Ry., Terreli.
Thompson Bros. Lumber Co., Trinity.
St. Louis Southwestern Ry., Tyler.
Texas Central Ry., Walnut Springs.

Fixtures.

Mechanics Planing Mill, Aransas Pass.
C. W. Georgs Mfg. Co., Beaumont.
Brown Wood Works, Dallas.
Dallas Show Case & Mfg. Co. Dallas.
Southwestern Show Case Works, Dallas.
Fort Worth Planing Mill Co., Ft. Worth.
Texas Fixture Co., Ft. Worth.
A. Steln, Galveston.
Houston Show Case Co., Houston.
W. W. Walnwright, Palestine.
H. Wagner & Son, San Antonio.
Pioneer Planing Mill, Sweetwater.
Temple Planing Mill, Temple.
P. Mailander & Son, Waco.
Yoakum Planing Mill, Yoakum.

Furniture.

Furniture.

J. D. Frank & Son, Amarillo.
O. O. Johnson, Aransas Pass.
Hume Lumber Co., Austin.
Bettis Mfg. Co., Beaumont.
C. W. Georgs Mfg. Co., Beaumont.
Chase Furniture & Coffin Co., Dallas.
Olive & Meyers Mfg. Co., Dallas.
Southwestern Show Case Works, Dallas.
Texas Cedar Chest Co., Dallas.
A. Brandt Upholstering Co., Ft. Worth.
Fort Worth Furniture Co., Ft. Worth.
Hub Furniture Co., Ft. Worth.
Meyers-Spalti Mfg. Co., Houston.
Texas Table Works, Houston.
R. G. Brown, Longview.
Longview Mattress & Bedding Co., Longview.
Model Manufacturing Co., Paris.
Rodgers Wade Furniture Co., Paris.
Acme Manufacturing Co., San Marcos.
Southern Furniture Co., Texarkana.

Handles.

J. E. Rausheck, Center. Fort Worth Planing Mill Co., Ft. Worth. Clark Handle Factory, Henderson. Ames Shovel & Tool Co. of Texas, Paris. The Timpson Handle Co., Timpson.

Mechanics Planing Mill, Aransas Pass. International Creosoting & Construction Co., Gal-International Creosoting & Construction Co., Gaveston.

Dalias Coffin Co., Dalias.
Parker Cigar Box Co., Dalias.
Texas Refrigerator & Fixture Co., Dalias.
White Manufacturing Co., Greenville.
Houston Show Case Co., Greenville.
Houston Tent & Awning Co., Houston.
Myers-Spalti Manufacturing Co., Houston.
Myers-Spalti Manufacturing Co., Palestine.
S. H. Croft, Randolph.
Sulphur Springs Box & Crate Co., Sulphur Springs.
Texarkana Casket Co., Texarkana.
National Lumber & Creosoting Co., Texarkana.

The Murray Co., Dallas.
Fort Worth Pattern Works, Ft. Worth.
Gamer Co., Ft. Worth.
Calhoun Woodworking Co., Houston.
Marshall Car Wheel & Foundry Co., Marshall.
Texas & Pacific Railway, Marshall.
International & Great Northern Rallway, Palestine.
St. Louis Southwestern Railway Co., Tyler.
Texas Central Railway, Walnut Springs.

Planing Mill Products.

Aldridge Lumber Co., Aldridge.
Blount-Decker Lumber Co., Alto.
Fabian & Taylor, Anderson.
Annona Lumber Co., Annona.
Avinger Lumber Co., Avinger.
R. A. Cope, Avinger.
R. A. Cope, Avinger.
Steger Lumber Co., Avinger.
Carter Lumber Co., Baber.
Beaumont Sawmill Co., Beaumont.
Neches Lumber Co., Beaumont.
Sabine Tram Co., Beaumont.
Z. C. Daniels, Beckville.
Grogan Manufacturing Co., Bivins.
Waterman Lumber Co., Blocker.
Livingston Lumber Co., Buck.
W. T. Carter & Bro., Camden.
Saner-Whiteman Lumber Co., Caro.
R. E. Trabue, Carthage.
Center Pianing Mill & Lumber Co., Center.
J. H. Jordan, Center.
J. H. Jordan, Center.
J. W. Cade, Chandler.
J. W. Cade, Chandler.
J. W. Allen & Co., Clarksville.
Wabrenberger Lumber Co., Conroe.
J. R. Brooks, Crockett.
Morris Planing Mill Co., Dallas.
Dayton Lumber Co., Dayton.
McShane Lumber Co., Dearborn.
Southern Pine Lumber Co., Diboll.
Crooke & Crooke, Dobbin.
Gebhart-Willlams-Fennett Co., Dodge.
Walker Lumber Co. Elmina. Southern Pine Lumber Co., Diboll.
Crooke & Crooke, Dobbin.
Gebhart-Willams-Fennett Co., Dodge.
Walker Lumber Co., Elmina.
E. F. Adams, Elyslan Fields.
Lacy & Co., Elysian Fields.
Chronister Lumber Co., Forest.
J. D. Buckley & Son, Ft. Worth.
Foster Lumber Co., Fostoria.
R. L. Findley, Frankston.
Lawrence Bros., Gllmer.
Thompson & Ford Lumber Co., Grayburg.
Trinity County Lumber Co., Groveton. Thompson & Ford Lumber Co., Grayburg.
Trinity County Lumber Co., Groveton.
Athens Lumber Co., Harrisburg.
Barber Lumber Co., Hartburg.
Geo. W. Fouke Lumber Co., Hawkins.
Henderson Lumber & Planing Mill Co., Henderson.
Rusk County Lumber Co., Henderson.
Texas Lumber Manufacturing Co., Honey Island.
Bush Bros. Lumber & Milling Co., Houston.
Kirby Lumber Co., Houston.
Palmetto Lumber Co., Houston.
Thompson-Tucker Lumber Co. Houston.
West Lumber Co., Houston.
R. W. Wier Lumber Co., Houston.
H. D. Knight, Hughes Springs.
T. G. Watson, Hughes Springs.
C. G. Barrett, Huntsville.
A. A. Atkinson, Jacksonville. C. G. Barrett, Humsyme. A. A. Atkinson, Jacksonville. Miller-Brooks Manufacturing Co., Jacksonville. A. A. Atkinson, Jacksonville.

Miller-Brooks Manufacturing Co., Jackson H. G. Bohlssen, Jasper.
Glen Lumber Co., Jefferson.
Carroll Lumber Co., Joaquin.
Angelina County Lumber Co., Keitys.
Heath, King & Heath, Kildare.
North Texas Lumber Co., Kildare.
H. T. Elder & Sons, Kilgore.
J. G. Reynolds, Lafayette.
Smith & Erwin, Lafayette.
Smith & Erwin, Lafayette.
Connor-Campbell Lumber Co., Lassater.
T. H. Leaverton, Latexo.
Newton Lumber Co., Lee's Mill.
Talbot-Duhlg Lumber Co., Lemonville.
Grogan Manufacturing Co., Linden.
Knox Lumber Co., Livingston.
R. G. Brown, Longview.
Castleberry & Flewellen, Longview.
J. H. McHaney Lumber Co., Longview.
Morgan Lumber Co., Longview.
Cotton Belt Lumber Co., Lufkin.
Lufkin Land & Lumber Co., Lufkin.
O. P. Perkins, Magnolia.
Carter-Kelley Lumber Co., Manning.
D. C. Driskell & Bro., Marshall.
Taylor-Turnay Lumber Co., Marshall.
W. M. Bridger, Maydelle.
Attoyac River Lumber Co., Mayotown.
Buckner & Seale, Melrose.
Miller & Vidor Sawmill Co., Mivid.
Langford Lumber Co., Mt. Enterprise.
Biunt-Summers Lumber Co., Nacogdoches.
L. M. Brewer, Nacogdoches.

THE LUMBER TRADE JOURNAL

The Craven Lumber Co., Nacogdoches. Frost-Johnson Lumber Co. of Texas, Nacogdoches. The Craven Lumber Co., Navasota.

J. Youens & Co., Navasota.

W. H. Baty, Neches.

T. C. Buckner Lumber Co., Neuville.

Thompson & Tucker, New Willard.
Ogburn-Dalchau Lumber Co., Ogburn.
Olive Sternenberg & Co., Olive.

Lutcher & Moore Lumber Co., Orange.
Miller-Link Lumber Co., Orange.
Wharey Lumber Co., Palestine.

Temple Lumber Co., Plneland.

Bodan Lumber Co., Pollok.

Port Arthur Planing Mill Co., Port Arthur.

Ragley Lumber Co., Ragley.

Louislana & Texas Lumber Co., Ratcliff,

J. P. Pipes & Co., Redwater.

Gilmer-Alexander Lumber Co., Remlig.

G. B. Griffin, Retrieve. Gilmer-Alexander Lumber Co., Remig Gilmer-Alexander Lumber Co., Remig B. Griffin, Retrieve.

W. H. Lee, Rusk.
E. P. Yates Lumber Co., Rusk.
Cariker Bros., Sacul.
Geo. Springman, Salmon.
Price & Downs, San Augustine.
Wm. Cameron & Co., Saron.
R. C. Miller Lumber Co., Shepherd.
Cass Lumber Co., Steep Creek.
T. C. Ripley, Sulphur Springs.
H. C. Parker & Co., Tencha.
Zink & Laroo, Terrell.
Texarkana Lumber Co., Timber.
R. S. Shipp, Timpson.
J. J. Thomas, Timpson.
Thompson Bros. Lumber Co., Trinit. J. J. Thomas, Timpson.
Thompson Bros. Lumber Co., Trinity.
Palmore & Dean Lumber Co., Tyler.
Sparkman Manufacturing Co., Ulmer.
Keith Lumber Co., Voth.
William Cameron & Co., Waco.
C. M. Trautscheld Co., Waco.
W. G. Neal, Warren.
Tyler County Lumber Co., Warren.
Waterman Lumber & Supply Co., Waterman.
Keystone Mills Co., Waukegan.
B. Boettcher, Westfield.
R. G. Andrews Lumber Co., Winnsboro.
Winnsboro Lumber Co., Winnsboro.
L. A. Butler, Winona.
Elms & Ramsey, Winona.
Elms & Ray, Winona.

Sash, Doors, Blinds and General Millwork.

Amarillo Planing Mill Co., Amarillo.
Panhandle Planing Mill Co., Amarillo.
Anahuac Saw & Planing Mill Co., Anahuac.
Mechanics Planing Mill, Aransas Pass.
Calcasleu Lumber Co., Austin.
Hume Lumber Co., Austin.
Beaumont Column Co., Beaumont.
Bettis Manufacturing Co., Beaumont.
Christopher Mfg. & Lumber Co., Beaumont.
C. W. Georgs Manufacturing Co., Beaumont.
Page Manufacturing Co., Beaumont.
H. L. Fitch, Brownsville. Christopher Mfg. & Lumber Co., Beaumont.
C. W. Georgs Manufacturing Co., Beaumont.
Page Manufacturing Co., Beaumont.
H. L. Fitch, Brownsville.
C. E. Jenkins, Bryan.
Kirby Lumber Co., Call.
Sidbury Lumber Co., Corpus Christi.
Brown Wood Works, Dallas.
Buell Planing Mill Co., Dallas.
Citizens Planing Mill Co., Dallas.
Citizens Planing Mill Co., Dallas.
City Planing Mill, Box & Lumber Co., Dallas.
W. H. Conkling & Sons, Dallas.
Dallas Screen Co., Dallas.
Southern Door & Screen Co., Dallas.
Texas Refrigerator & Fixture Co., Dallas.
El Paso Sash & Door Co., El Paso.
Acme Planing Mill, Fort Worth.
Agee Screen Co., Fort Worth.
J. D. Buckley & Son, Fort Worth.
Fort Worth Planing Mill Co., Fort Worth.
Texas Planing Mill & Hfg.. Co., Fort Worth.
Island City Wood Working Co., Galveston.
A. T. Leith, Galveston.
Moore & Goodman, Galveston.
Seaboard Lumber & Milling Co., Gaiveston.
Greenville Power & Mfg. Co., Greenville.
St. Clair's Screen Factory, Greenville.
White Mfg. Co., Greenville.
Bering Mfg. Co., Houston.
Houston Co?operative Mfg. Co., Houston,
White Pine Grille Co., Honston.
D. C. Driskell & Bro., Marshall.
Bartele Bros. Planing Mill, Martin.
Ramsey Bros., Nacogdoches.
S. L. Henderson Lumber Co., Naples.
G. H. Pond, Orange.
W. & D. G. Broyles, Palestine.
Palestine Lumber Co., Port Bolivar.
Port Bolivar Lumber & Mfg. Co., Port Bolivar. Alamo Sash & Door Co., San Antonio. Pacific Planing Mill Co., San Antonio. Schulze Bros. Mfg. Co., San Antonio. H. Wagner & Son, San Antonio. H. Wagner & Son, San Marcos. Thos. H. Sevry, San Marcos. Ploneer Planing Mill, Sweetwater. G. Brotherman & Son, Temple. Steele Planing Mill, Temple. Temple Planing Mill, Temple. Bailey Mill Co., Victoria. E. L. Moore, Victoria. T. H. Kessler & Co., Waco. C. M. Trautschold Co., Waco. Waco Sash & Door Co., Waco. N. M. Musgrave, Waxahachie. Waxahachie Planing Mill, Waxahachie. Johnson & Frazler, Winnsboro. Yoakum Planing Mill, Yoakum.

Parkersburg Tank Co., Beaumont. Parkersburg Tank Co., Beaumont.
C. E. Jenkins, Bryan.
Shirley's Clstern Factory Corpus Christl.
Sidbury Lumber Co., Corpus Christl.
Axtell Co., Fort Worth.
Gamer Co., Fort Worth.
Houston Tank Co., Houston.
Schlottmann & Lincoln, Houston.
Chas. J. Helnman, Yorktown.
Herm Mellenhaver & Co., Yorktown.

Trunks and Valises.

Henry Pollack Trunk Co., Dallas. Wilkins Trunk Mfg. Co., Dallas. R. H. John, Galveston.

Vehicles and Vehicle Parts.

Alex. Fiegelson, Beaumont.
Clty Planing Mill Co., Dallas.
Fort Worth Wagon Factory, Fort Worth.
Nic Bohn, Galveston.
Gilmer Mfg. Co., Gilmer.
Eller Wagon Works, Houston.
B. A. Riesner, Houston.
Texas Table Works, Houston.
The Martin Wagon Co., Lufkin.
Mineola Novelty Works, Mineola.
Otto Bros., Navasota.
James Travis, Navasota. Otto Bros., Navasota.
James Travis, Navasota.
S. H. Croft, Randolph.
J. H. Clanton, Richmond.
Zlnk & Laroe, Terrell.
Bender Wagon Co., Texarkana.

USES OF MINOR SPECIES.

Agarita.—Napkin rings, checker pieces, paper knlves, crochet hook handles, button hook handles, hairpin boxes.

hairpin boxes.

Alligator Juniper.—Furniture, clothes chests, button trays, cups, rings, match safes, handkerchief boxes, collar boxes.

American Holly.—Furniture, parquet floors, candlesticks, curtain rings, noveltles.

Anacahuita.—Chair rounds.

Anaqua.—Molding, picture frames.

Angelica Tree.—Button boxes, photograph frames, penracks, stools, rocking chair arms.

Bitternut.—Balusters, screen door strips, furniture.

Black Haw.—Canes, parquetry, turning.
Black Jack.—Molding, spindles, balusters, panels.
Blue Beech.—Wagons, hammer handles.
Blue Gum.—Ax handles, singletrees.
Blue Jack.—Wagons, bridge floors.
Blue Oak.—Furniture, stairwork, agricultural im-

plements.

Bluewood.—Paper knives, paper weights, curtain

Hatta out.—Faper Knives, paper weights, curtain rings, dominoes, card trays.

Box Elder—Furniture.

Bur Oak.—Wagons.

Cedar Elm.—Furniture, refrigerators, wagon hubs. Chalky Leucaena.—Grilles, tool handles, furniture, jewelry boxes.

welry boxes.

Chinquopin.—Furnlture.

Cholla.—Canes, shoe buttoner racks.

Cow Oak.—Wagons, furniture, stairs.

Deciduous Holly.—Drawer knobs.

Devil's Claw.—Furniture, novelties.

Downy Basswood.—Furniture, woodenware.

Drooping Juniper.—Pin boxes, candlesticks, picture frames

ture frames.

Dwarf Sumach.—Newel-post balls, darning balls, cups, veneer, noveltles.

Emory Oak.—Molding, balusters.

Flowering Dogwood.—Turnery, chalr rounds,

wedges. Fremont Cottonwood .- Carts, wagon beds, furni-

ture.

Frijolito.—Canes, small tool handles.

Gambel Oak.—Small panels, spindles.

Green Ash.—Wagon spokes, felloes, hubs, wagon tongues, furniture, stairs.

Honey Locust.—Furniture, millwork, stair balusters, newels, molding.

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ters, newels, molding.

Hornbeam.—Molding, balusters.

Horsebean.—Rulers, knife handles, cups, rings, goblets, paper weights, umbrella handles.

Huisache.—Table legs, spindles, mallet handles, egg cups, button boxes, chair rounds, cross ties.

Ironwood.—Tool handles.

Kalmia.—Tohacco pipes, spoons, novelties.

Koeberlinia.—Canes, rulers, knife handles, furniture, small turnery.

Kalmia.—Tohacco plpes, spoons, noveltles.
Koeberlinia.—Canes, rulers, knife handles, furniture, small turnery.
Lignum Vitae.—Furniture, boxes, trays, canes, mission lamps, vases, checker pleces, dominoes.
Live Oak.—Panels, turned newels, spindles, molding, mallets, mauls.
Longleaf Willow.—Panels, balusters.
Longstalk Willow.—Thatching.
Mexican Madrona.—Plane stocks, tool handles.
Mexican Palmetto.—Rustic pillars, thatching.
Mexican Persimmon.—Tool handles, lodge furniture, canes, rulers, penholders, picture frames, napkin rings, door knobs, parasol handles, maul sticks.
Mexican Walnut.—Gavels, turned cups, picture frames, knife handles, furniture.
Mistletoe.—Pipe stems, parasol handles, pen racks.
Palo Blanco.—Wagons, furniture.
Persimmon.—Mallets, gavels.
Pinon.—Charcoal, panels, balusters.
Poison Sumach.—Veneer, musical instruments.
Prickly Ash.—Picture frames.
Prickly Pear.—Baskets (of roots.)
Red Bay.—Pin trays, dishes, mirror frames, canes, cupboard shelves.
Red Maple.—Furniture, millwork.
Red Maple.—Furniture, millwork.
Red Maple.—Furniture, millwork.

Red Maple.—Furniture, millwork.
Red Mulberry.—Table legs, chair arms, grilles, lattices, turnery, parquetry flooring.
Rocky Mountain Oak.—Turned posts, spindles,

molding.
Sassafras.—Furniture.

Scarlet Haw.—Small turnery.
Screwbean.—Furniture, noveltles, cross tles.

Shittimwood.—Furniture, vehicles, agricultural implements, boxes, crates, chewlng gum.

Silver Maple.—Wagons, furniture, mill work,

woodenware, boxes.

Slippery Elm.—Furniture, agricultural implements, boxes, crates, wagon hubs, fixtures.

Sophora.—Canes.

Spanish Bayonet—Pin cushions, hatpin holders,

ornaments.

Spanish Oak.—Wagons, cotton gins, rice hullers, mill work.

Sweet Magnolia.—Furniture, mill work, musical instruments, panels, turnery.

Sycamore.—Furniture, picture frames, ox yokes.

Texas Ebony.—Candlesticks, mission lamps, goblets, cups, rings, turned boxes, furniture, parquetry, inlay cross ties.

lets, cups, rings, turned boxes, furniture, parquetry, inlay, cross ties.

Texas Cat's Claw.—Picture frames, molding, scroll work, tool handles, paper knives, napkin rings, martingale rings, furniture, mission lamps, candlesticks, paper weights, rulers, canes, umbrella handles.

Tree Huckleberry.—Small turnery.

Umbrella Tree.—Grillwork molding, balusters.

Water Hickory.—Counter tops, vehicles, agricultural implements.

tural implements.

Water Oak.—Wagons, mill work, fixtures, furnl-

ture.

Whiteleaf Oak.—Wagons, furniture.

Poves crates, furniture

Wild China.—Boxes, crates, furniture, vehicles. Wild Plum.—Knife handles, spoons.

Yellow Buckeye.—Ironing boards, bread boards. Yellow Oak.—Furniture, flnish fixtures, vehicles, agricultural implements.
Yopon Holly.—Manicure sets, solid spoons.

Shingles.

That year Texas mills cut 106,280,000 shingles, which was less than 1 per cent of the output in the United States.

The output of lath was 43,160,000, a little over 1 per cent of the country's cut.

Cooperage.

The slack cooperage product was 1,255,000 staves, 40,000 sets of heading, and 3,128,000 hoops. The total of these commodities that year in the whole country was 1,460,878,000 staves, 97,037,000 sets of heading, and 295,712,000 hoops.

Texas turned out for tight cooperage 1,952,000 staves and 699,193 sets of heading. In the whole country there were 304,060,000 stave sand 26,073,754

sets of heading.

Lumber Cut.

In 1910 the lumber cut in Texas, reported by 466 sawmills, was 1,884,130,000 feet, board measure, apportioned among species as follows:

Species-								· Feet.
Yellow pin	e	 	 	 	 	 		1,826,931,000
Cypress								1,416,000
Cedar								238,000

Oak	33,998,000
Maple	120,000
Red gum	11,618,000
Beech	40,000
Birch	11,000
Basswood	20,000
Hickory	781,000
Elm	431,000
Ash	3,630,000
Cottonwood	3,853,000
Tupelo	59,000
Sycamore	71,000
Wainut	92,000
All others	825,000

The total yearly amount of wood in Texas further manufactured after it leaves the sawmills is shown in Table I to be 768,336,112 feet, which is 41.5 per cent of the mill cut.

cent of the mill cut.

The making of veneers in Texas has assumed large proportions, and most of the product is pine, red gum, tupelo, magnolia and cottonwood T.he cut in 1910 was 8,584,000 feet log measure, which was nearly 2 per cent of the veneer cut for the whole United States that year. Expensive hardwoods, such as white and red oak, black walnut and mahogany, are the materials of which the highest classes of veneers are made. There are three methods of manufacturing the commodity—rotary-cut, sawed and sliced. Most of it in Texas is rotary-cut. A log a few feet long is placed in a lathe and is turned rapidly against a strong knife which peels off a thin ribbon of wood the length of the log,

round and round, until the log is cut down to a small central piece called the core. The part sliced off may consist of one piece probably 100 feet long, resembling a bolt of cloth. It is usually about as thick as a sheet of cardboard. The veneer thus cut is made into small boxes, crates and baskets for shipping fruits and vegetables; or, if it goes to a furniture factory, it is made into panels or other pieces by gluing several sheets one upon another until the desired thickness is obtained. Sometimes a thin sheet of veneer is glued upon a thick piece a thin sheet of veneer is glued upon a thick piece of some other wood, and the veneer becomes the visof some other wood, and the veneer becomes the vis-lble outer part. Much furniture and interior finish is made in that way. The finished article appears to be solid wood, but it really is a thin layer of out-side veneer upon some cheaper wood. This cheaper wood, which is concealed by the veneer glued upon it, is called "backing" or "core." The word "core" has, therefore, two meanings when used in connec-

has, therefore, two meanings when used in connection with veneer. It may mean the wood upon which the veneer is glued, or it may mean the central remnant of a log-from which veneer has been cut by the rotary process.

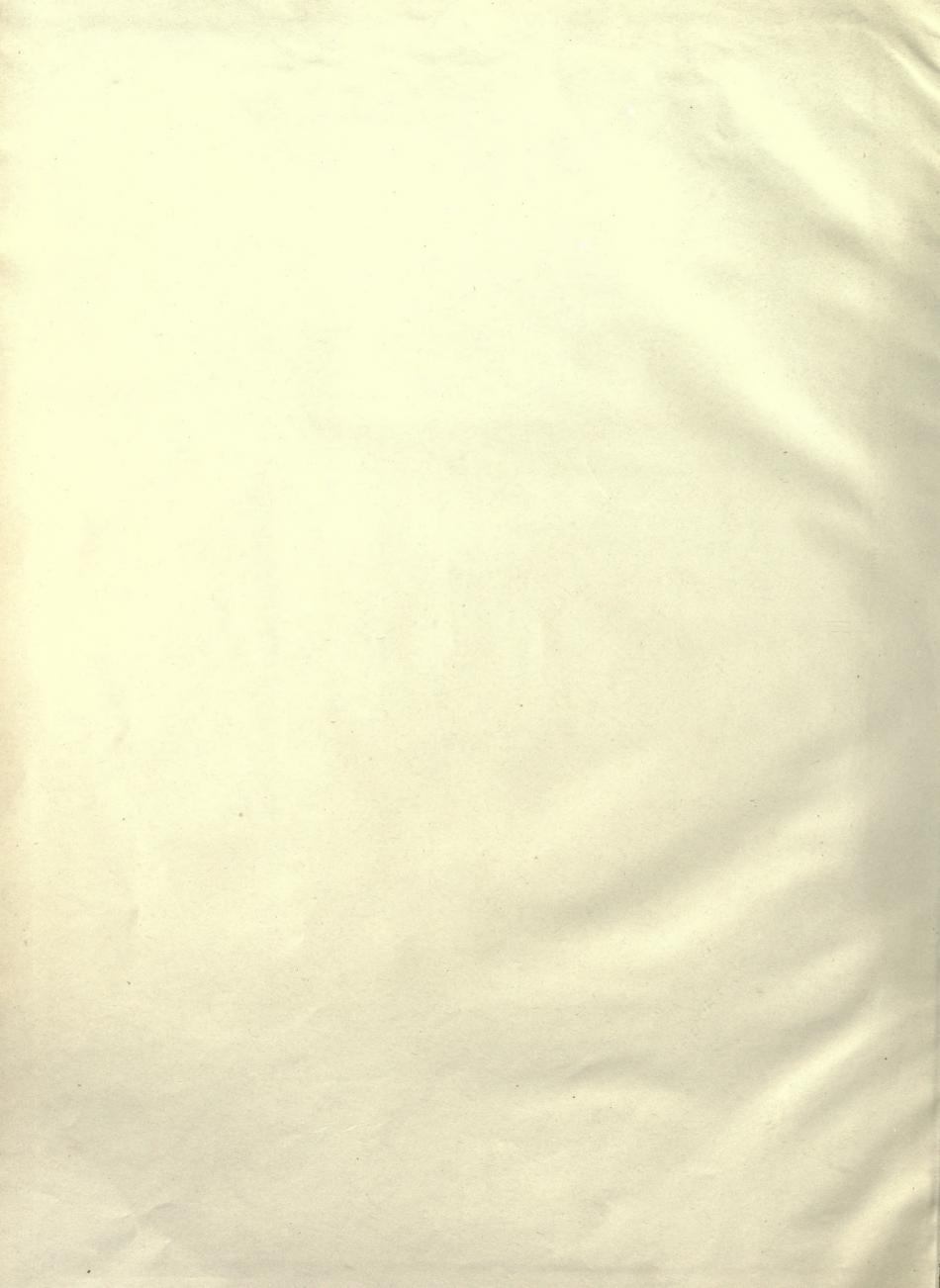
Some veneers are sawed much as ordinary lumber is cut in a sawmill, but special machinery is used. The most important part is the extra thin saw which cuts the veneer with the least possible waste in sawdust. Veneer of this kind is generally made from valuable, well-seasoned hardwoods, while rotary-cut veneer is made from logs, generally in the green state, and usually steamed to soften them. Sawed veneer is generally less than a foot in width, and runs about like ordinary lumber in length. The

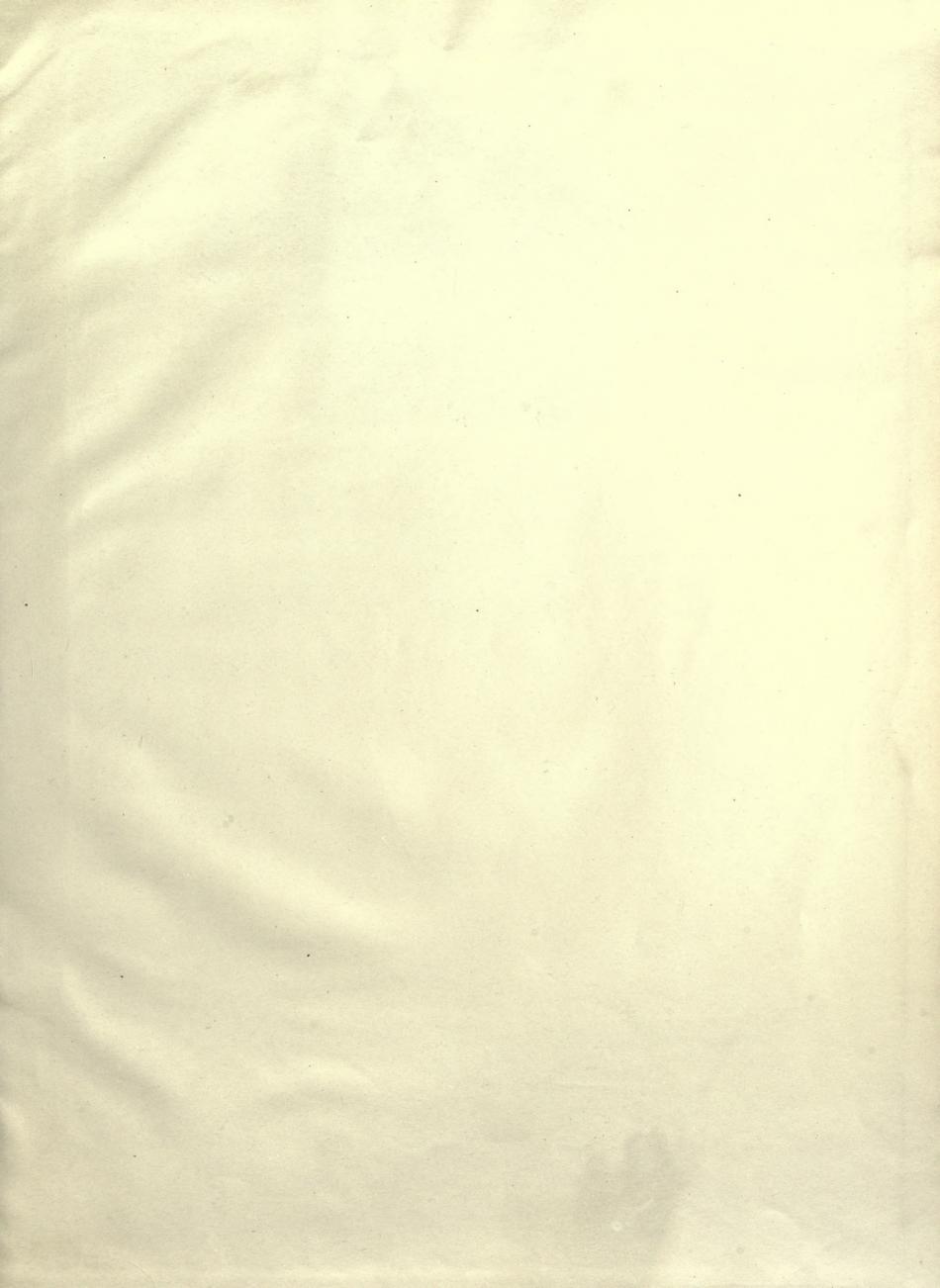
sawed product often shows the grain of the wood—quarter-sawed if the wood permits it. Sliced veneer Is cut from the side of the log like that which is sawed, but a knife is used in place of a saw, and the machine by which the slicing is done is very strong and rigid. One of the advantages of slicing over sawing is that the slice wastes no sawdust.

APPENDIX.

The Bureau of the Census, in co-operation with the Forest Service, collects and publishes year by year statistics showing the output of lumber, lath, shingles, cooperage, veneer and certain other forest products in the United States and in the separate States. That work is Independent of the studies of the manufactures which the Forest Service has made in several of the States. The latter supplements the former, and care is taken that work done by the Bureau of the Census, is not duplicated. The Forest Service begins where the Census leaves off—after lumber leaves the sawmill. There are certain products in their finished form when they appear in the Census figures, and for that reason they are outside the scope of the Forest Service's study, because they are not subject to further manufacture. If, however, a State's wood-using industries are to be fully presented, it becomes necessary to include some of the Census statistics. Such is one of the purposes of this appendix. The figures which the census gives are for all the States, but such only as relate to Texas are here presented and in condensed form for the year 1910, which are the latest available.







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