

CHAPTER ONE

CARPENTRY

Syllabus.—Extended description of the classification, structure, conversion, seasoning, preservation, defects, characteristics and uses of timbers; preparation of timber, and machines employed. Double and framed floors; determination of sizes of joists; floor finishes, including boards, blocks, plywood, parquet, cork and rubber. Stoothed, trussed, terra-cotta, concrete, plaster, asbestos-cement and glass partitions. Sound-proofing. Double and queen post roofs; laminated trusses. Timbering of deep trenches and centres up to 10-ft. span.

TIMBER

A SHORT introduction appears on pp. 55-59, Vol. I.

CLASSIFICATION.—Trees are classified (a) botanically and (b) commercially.

(a) *Botanical Classification.*—Timbers are grouped into families, each family being divided into *genera* (large classes) and each genus into several *species* (smaller classes) of trees which closely resemble each other in essential features. Thus, the classification of the pine family (botanical name *Pinaceæ*) is as follows:—

Family.	Genera.	Species.
Pinaceæ (Pine)	<i>Abies</i> (firs)	<i>Abies alba</i> , white fir; <i>A. balsamea</i> , balsam fir, etc.
	<i>Larix</i> (larches)	<i>Larix decidua</i> , European larch; <i>L. sibirica</i> , Siberian larch, etc.
	<i>Picea</i> (spruces)	<i>Picea abies</i> , European spruce or white-wood; <i>P. glauca</i> , Canadian spruce, etc.
	<i>Pinus</i> (pines) etc.	<i>Pinus strobus</i> , yellow pine; <i>P. sylvestris</i> , Scots pine or redwood, etc.

As shown, the Latin botanical name of each tree consists of two words, the first defining the genus to which it belongs, and the second the particular species. These names are now standard in all countries and indicate definitely the natural relationships of the timbers.

(b) *Commercial Classification.*—Timbers used commercially are divided into softwoods and hardwoods.

The softwoods are members of the conifer class or *Coniferae*, and include the pines, firs, spruces, etc. These cone-bearing trees have needle-like leaves, and, with few exceptions, are *evergreens*. Most of the timber used for constructional work is of this class, as, in general, it is sufficiently strong for most purposes, is easily worked on account of its softness and straightness in the

grain and is relatively cheap. A list of some of the principal softwoods is given in Table I, and the regions from which they are obtained are shown in Fig. 4.

The hardwoods belong to the broad-leaf class or *Dicotyledoneæ*, and include the oaks, mahoganies, beeches, birches, etc. Most hardwoods are *deciduous*, i.e., they shed their leaves in autumn. They are chiefly used for decorative purposes, as for panelling, veneering and furniture, and certain of them are selected for constructional use because of their high strength and durable qualities. Table II includes a number of the many hardwoods used commercially, and their disposition is shown in Fig. 4.

As pointed out in Vol. I, whilst the division of timbers into softwoods and hardwoods is firmly established and universally recognized, it is conventional only, as some softwoods are harder than certain hardwoods.

STRUCTURE.—Wood has a complex cellular structure. The thin tubular cells vary in size and shape in different kinds of trees and their function is to (1) conduct water and soluble salts absorbed from the soil by the roots to the leaves, (2) provide storage of food during the winter and (3) give strength to the tree.

A part log is shown in diagrammatic form at A, Fig. 1. The chief structural parts are indicated at the cross, radial and tangential sections.

The diameter of the trunk and branches of a tree is increased by the addition of successive irregular concentric layers on the outside immediately within the bark. In the temperate climate of this country, and under normal conditions, a fresh ring of wood is produced yearly, and the term *annual ring* which is applied to it is therefore descriptive. In the tropics the growth does not always agree with annual periods and more than one ring may be formed annually; the term *growth ring* is then a better description. A cross-section through a log may show a big variation in the thickness of the rings; thus, a narrow ring formed during a droughty season may be adjacent to a relatively wide growth ring produced under better climatic conditions. An irregularity in the thickness of a ring will be caused if the tree is exposed to more sun on one side than the other.