Cork and Cork Products

At least $20,000,000 worth of cork products are annually manufactured in the United States, and efforts are being made by annual plantings of cork oaks in 25 States eventually to relieve American industry of its present total dependence upon foreign sources to supply the cork for this production.

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Previous articles on cork (1, 2) have informed the reader about the culture of this product in Spain and experimental plantings in California. It is of interest to point out that plantings of the cork tree are made annually in 25 States in the warmer parts of the United States. This cork-planting program was initiated by the late Charles E. McManus, former President of the Crown Cork & Seal Company, in California in 1939. The widespread interest and response to his efforts in California led Mr. McManus to extend his program into all States where the cork tree might grow and to establish the McManus Cork Project. The purpose of the Cork Project is to add to the natural resources of our country and to provide in the United States a source for at least a part of the nation’s cork requirements. In a comparative study of climatic and soil conditions in the cork-producing areas of Europe and Africa with the United States, Ryan (3) has shown that all or parts of 27 States in this country are suitable for growing cork trees. The McManus Cork Project is a long-range program, and it is gratifying to note that results of initial efforts are encouraging.

Cork has numerous important applications. For more than 2,300 years it has served many useful purposes, and for centuries has been a valuable article of commerce. Cork is a necessary material for our national economy both in war periods and in peacetime. For normal manufacturing requirements in the United States about 160,000 tons of cork are imported annually.

In addition to its valuable cork bark, the cork oak produces each year large acorns in generous quantities. This annual crop is used in Europe as a supplemental stock food, and in Portugal alone 200,000 tons of cork acorns are fed to hogs each year. A bushel of cork acorns (about 70 pounds) will make approximately 6.5 pounds of pork.

The cork oak is an evergreen and makes an attractive ornamental shade tree. The tree grows well under favorable conditions, and in four or five years attains attractive size. Its heavy green foliage during the winter months is a delightful contrast to the bare branches of deciduous trees.

Thus, we see, the cork oak returns to its owner much more than many other trees. In addition to wood and shade we obtain from the cork oak, cork, a material essential to our national economy; an annual acorn crop that is excellent for livestock food; and ornamental beauty throughout the year. For these reasons the cork oak may be grown either as an ornamental shade tree or as a forest tree.

Baled cork is brought to the United
CORK AND CORK PRODUCTS

States in large freight boats. The bales vary in weight, ranging from about 150 to 250 pounds. During the transfer from boat to storage shed the bales are classified into groups according to quality.

As with all other materials the characteristics of cork determine its uses. Accordingly, before discussing the uses of cork, a brief summary of the physical and chemical properties is presented.

Structure and Characteristics

Under high magnification the characteristic cellular structure of cork can be seen. The cork cells vary in size but are very small, and they number about two hundred million to the cubic inch. They are filled with air and held together by a natural resinous binding substance. Professor Lewis (4), of Harvard, has shown that the cork cell possesses fourteen sides, six of them being quadrilaterals and eight of them hexagons. This formation is due to nature's method of giving the cells the greatest possible volume with the least amount of surface while permitting the cells to lie compactly together.

The physical attributes of cork are a direct result of its characteristic air-filled cellular structure. Cork is compressible and resilient, and these properties enable it to give a perfect seal when used as a crown cap liner. Each tiny cork cell functions as an air cushion, permitting the crown cap to be compressed firmly against the mouth of the container and constantly exerting a back pressure, thus making a tight and permanent seal.

When cork is placed under a heavy load the air in the cork cells is compressed and the cork is reduced in thickness. When the load is removed the air in the cells expands to normal volume and the cork returns to ninety-five per cent of the original size. One inch cubes of cork have been subjected to a pressure of 10,000 pounds per square inch without any side spread. After the pressure was released the cork returned to ninety-five per cent of the original height.

Both the natural resinous binder and the air-filled cork cells are impervious to water, giving cork many uses where a waterproof material is required. Cork is also oil-resistant, and on account of its non-capillarity, which results from its unique cellular structure, penetration of cork by liquids in general is extremely difficult. For this reason cork can be used as a bottle closure for innumerable solutions and liquids.

Cork is very light, its specific gravity varying between 0.15 and 0.20. This lightness is due mainly to its air-filled cells. The cork cell walls and the natural cell-binding material are also lightweight substances. This property of cork gives it many applications where floats and articles of low density, such as insoles for shoes, are required.

Air in finely divided spaces is the best thermal insulator known, next to a vacuum. The tiny air spaces in cork are responsible for the heat-insulating property of cork. The thermal conductivity of cork is very low, and corkboard is an excellent material for low temperature insulation. This property, coupled with its lightness and its resistance to penetration by water, makes corkboard an ideal insulator for refrigerators and air-conditioned buildings.

Cork with its characteristic air-filled cellular structure makes an efficient machinery isolation material. Vibration and wear are greatly reduced by mounting motors and machines on cork. 

[FIG. 1 (Upper). Unloading a shipload of cork at an American port.]

[FIG. 2 (Lower). In manufacturing molded inlaid linoleum the pattern is stenciled in the desired colors onto the burlap backing. (Courtesy Cork Institute of America.)]