

STATE BOARD OF EQUALIZATION

OFFICE CORRESPONDENCE

440.0500

Place: Sacramento, California
Date: June 7, 1954

To: Mr. W. E. Williams

From: John H. Murray

Re: S--- I---, Inc.
E--- S--- Building
XXX --- Avenue
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Taxpayer is engaged in business of producing and selling whiskey. In the process of maturing whiskey taxpayer uses charred oak barrels. It is contended that in the maturing process materials are extracted from the barrels and become a necessary ingredient of the whiskey. The barrels can be used only once for aging whiskey. For this reason, taxpayer contends that the barrels are substantially consumed in the aging process, portions of the barrels become a component part of the finished product, and therefore tax should not apply on the sale to them of the barrels.

Considerable technical information was presented at the hearing including a reprint on alcoholic beverages from the Encyclopedia of Chemical Technology, a study by A. J. Liebmann and Bernice Scherl reprinted from Industrial and Engineering Company entitled "Changes in Whiskey While Maturing" and a transcript from the conference of October 22, 1947, between representatives of Association of Maryland Distillers and representatives of the State of Maryland on the subject of "Tax on Whiskey Barrels". The information presented, we think, may be summarized as follows:

There are five principal influences which determine the most important characteristics of the final product.

(1) The original grain formula. The proportion of small grains as against corn determines the body of the resulting whiskey. The higher the percentage of small grains, the heavier is the body of the resulting whiskey. Bourbon is required to be made from a mash containing not less than 51% corn. Rye is required to be produced from a mash containing not less than 51% rye. Malt whiskey is distilled by using not less than 51% malt, usually barley malt. Malt whiskey as a rule is used for blending purposes.

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(2) The fermentation process. This is dependent upon the yeast used, the temperature during fermentation, the length of time and the concentration of the mash.

(3) Distillation. The way in which the whiskey is distilled has a decided influence upon the body of the whiskey and can also strongly affect its aromatic properties. The proof at which the whiskey is distilled is also of considerable importance. The higher the proof, the lighter the body. The type of still is also very important - - a pot still will produce a heavier bodied whiskey than a continuous still. Also, in a continuous still, the body can be influenced or regulated by the reflux; the higher the reflux ratio, the lighter in body will be the whiskey.

(4) Carbon treatment after distillation. This treatment of whiskey after distillation with activated carbon eliminates some of the substances by adsorption, specifically the fatty acids and to a lesser degree other constituents, thus greatly improving odor and taste.

(5) Conditions of storage. After the production is complete, further changes affecting aroma and body, and quality in general, depend largely and decisively on the type and quality of the cooperage and the duration of aging. The quality and condition of the barrel, including the depth of char, are of considerable importance as are the surrounding conditions such as temperature, humidity, and purity of air. Wood extractives form a part of what is generally considered the body and these extractives are proportionately greater when the whiskey is aged at higher temperatures.

(Encyclopedia of Chemical Technology,
Volume 1, at p. 298.)

We are concerned with the last of those five conditions.

First, it should be noted that rulings of the United States Treasury Department require that straight whiskey be aged for not less than 24 months in charred new oak containers. When once used these containers cannot be reused for the aging of straight whiskey. They may be used, however, for the storage of wine and other uses not connected with the aging of whiskey. Whiskey will not mature properly unless the charred oak barrel is new.

In the article by Liebmann and Scherl the authors report a study conducted over a period of years of the changes that take place in whiskey while maturing in the charred oak barrels. There had been similar studies made previously but apparently none of them were carried out under such scientific conditions and with the use of such a large number of samples.

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It appears that the charred oak barrel acts as a semipermeable membrane through which water and alcohol pass to the outer atmosphere and oxygen enters the barrel. The alcohol molecules, being larger, do not pass through the barrel at the same rate as the water molecules. For this reason, although there is some evaporation of water and alcohol during the aging process, the water evaporates more rapidly than the alcohol and the proof tends to increase.

While the whiskey is aged, there are a number of characteristic changes which take place. Some of these are due to the extracts from the barrel and some to chemical changes. It is believed that the alcohol and water go into the small pores of the charred wood, oxygen comes into those pores and there takes place a reaction between the various organic substances present in the wood and the whiskey with the formation of new products. These new products appear to be esters, aldehydes, and acids. Certain solids extracted from the barrel contain acids and are responsible for the reddish brown color of the matured whiskey.

The study by Liebmann and Scherl shows first that proof increases during aging from approximately 102 proof at the beginning of the period to about 109 proof at the end of an 8-year period.

During the early stages of the maturing period there is a rapid increase in total acidity. This may be due, in a large part, to the extraction of materials from the barrels. Fixed acids, that is acids in the solids, increase rapidly during the first 12 months of the aging period. Liebmann and Scherl state that the entire fixed acidity normally is due to the extractions from the barrels. It has been suggested that some of this material may undergo degradation processes, thereby adding to the volatile acid content, but this theory has not been confirmed experimentally. Another investigator believes that some of the volatile acids may be obtained from extraction but does not furnish proof. Liebmann and Scherl state that undoubtedly the extracted material undergoes oxidation processes, and is subject to other chemical reactions which may result in additions to the volatile acid content. The aromatic nature of these constituents are of some importance as contributors to the quality of the final product. The acid content is responsible for the "tang" of aged whiskey.

During the aging process there is a fairly steady increase in the ester content. This would indicate that the esters are probably formed chemically during that process.

During the first 3 years there is an increase in aldehydes, but after that the rate of increase levels off. That is, aldehydes are probably produced by chemical reactions during the aging process.

During the early months of the aging process there is a rapid increase in furfural. Newly made whiskey does not contain this substance and apparently it is extracted from the barrel since furfural is formed in the process of charring wood.

Fusel oil (higher alcohols) constitutes an important component of whiskey as far as character and quality are concerned. Its content is dependent upon the method of distilling used. There is very

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little change in the fusel oil content during the aging period and apparently any increase is due to the increase in concentration by reason of the evaporation of water and alcohol. Some of the esters may be produced by an interaction of the various constituents of the whiskey and the fusel oil.

The solids contained in whiskey are derived entirely by extraction as are the tannins. The solids apparently affect color, the tannins the acid content.

Dr. Peter S. Valaer, Jr., stated at the conference between the Maryland Distillers and the tax representatives of that State that whiskey, when it is first distilled, consists of water and alcohol except for about .14% of what he called congeners. That is, compounds produced with the production of the ethyl alcohol. Fusel oil accounts for about 1/10 of 1% and the remaining 4/100 of 1% is composed of solids, esters, etc. During the aging process the percentages of substances other than ethyl alcohol and water increase by about five times. Thus, matured whiskey will be about 99.4 to 99.5% water and alcohol. The aging process, he indicates, consists of the extraction of some of the materials from the wood and the interaction of some of the acids on each other producing esters and at the same time alcohol is oxidized producing more acid. The aging process consists of a series of those changes. He is of the opinion that about one-half of the congeners in the matured whiskey are produced by changes taking place in the barrel and the remainder are extracted from the barrel. The body of the whiskey is determined by the fusel oil content and without it the whiskey would have no character.

From the foregoing it would seem logical to draw the following conclusions:

The maturing whiskey in charred oak barrels is one of the steps in the process of producing a marketable whiskey. The type of whiskey and much of its flavor is determined by the type of mash use, fermentation process, and method of distillation. Newly distilled whiskey is colorless and unpleasant in aroma and taste. The maturing process in the charred white oak barrels results in some of the higher alcohols and fatty acids being absorbed by the char eliminating some of the unpleasant characteristics that these substances would otherwise impart to the whiskey (Encyclopedia of Chemical Technology, Volume 1).

The whiskey attracts from the barrel various solids and other matters which give it its characteristic reddish brown color and also extracts some furfural which may affect the body of the matured product. The fusel oil which primarily determines the body of the whiskey is present in the whiskey from the time of distillation. Some acids are extracted from the barrel, other acids are formed in the barrel by oxidation of the alcohol and by interaction of the various substances upon each other esters are formed. These esters affect the odor of the whiskey and give it a distinct fruity odor. During the entire aging process the barrel acts as a semipermeable membrane allowing the evaporation of water and some alcohol and the introduction of oxygen into the material through its small pores. In this way the barrel and the charred interior act as a catalyst aiding in the various chemical changes which take place in the whiskey.

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It is readily apparent, therefore, that the barrel serves a distinct purpose as a manufacturing aid in the maturing of the whiskey. It acts as a container for storing whiskey during that period, its semipermeable nature makes possible the complicated series of chemical reactions which take place during the process, and the extractives from the barrel give the whiskey its characteristic color and impart to it some of its flavor. Thus, minute portions of the barrel become an important part of the finished product.

If the only purpose of maturing the whiskey in the charred oak barrel were to add to it the tannins, the furfural, the solids, and the color, the use of oak barrels would be an extremely expensive process to impart to whiskey certain chemical compounds. These compounds could undoubtedly be added mechanically much cheaper and easier. But the function of the barrel is much more important than merely imparting to the whiskey these compounds. It is used to store the whiskey and to aid in certain chemical reactions the end result of which produces a matured pleasant tasting beverage. This would seem to be the primary use of the barrels and accordingly the barrels are primarily manufacturing aids and are considered subject to tax.

Perhaps we can draw an analogy to the iron balls used in the grinding of cement. During the grinding process a portion of the iron in the balls wears off and becomes a component of the cement. Iron is a necessary ingredient in the production of high quality cement. The iron balls thus contribute in two ways to the manufacture of cement (1) by grinding it to a powder and (2) by imparting to it at least a portion of the required iron content. Nevertheless, the iron balls are manufacturing aids and are considered subject to tax.

In 1948 A--- D--- Company sued the State Board of Equalization in Sacramento County to recover some \$X,000.00 tax on its purchases of charred oak barrels used to contain and mature its whiskey. The primary contention there made was that the barrels were sold with the matured whiskey and consequently were nonreturnable containers and exempt from tax. The court discussed the use of the charred oak barrels in the processing of the whiskey and indicated that the barrels were used for a purpose other than retention, demonstration or display and that such use was sufficient for the imposition of tax. The court did not pass on the question of whether the barrels by reason of the absorption by the whiskey of a portion of their content became a component part of the finished product and thus exempt from tax.

Taxpayer presented a letter from the State of Maryland which indicated that the Maryland Controller had ruled that distillers could purchase new cooperage to be used for the aging and curing of bonded whiskey tax free. The basis of this ruling is not apparent from the letter.

It is recommended that the petition for redetermination be denied.

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