outside in the shade, or, in cool weather, inside near the stove.

Use of Barrel

If it is not desired to use the barrel already containing the fermented liquid, or if its transformation therein is not practicable, a clean barrel which has contained vinegar, wine, or spirit may be used. It should be thoroughly scalded with steam or water beforehand, and then placed on its end and the top taken out and the open end covered with cheesecloth to keep out the vinegar-flies while the acetic fermentation is progressing; or, for continuous use, a barrel laid on its side with the bung-hole uppermost is more convenient.

This barrel should have two ¾in. or 1in. holes bored in the upper part of the ends, and these should be covered with fly-proof muslin, mosquito-net, or wire mesh which has previously been varnished. With the aid of the bung-hole, covered with similar material, a free circulation of air can thus be obtained. The hoops should be painted or varnished inside and outside to preserve them from the action of the acetic acid, which corrodes most metals, and a wooden tap placed 2in. or 3in. from the bottom of one of the ends.

The barrel must be firmly fixed, so that the vinegar plant will not be disturbed by vibration. It is then partly filled with alcoholic liquid, leaving about one-third or one-fourth of the barrel empty to allow a free circulation of air over the surface of the liquid.

Testing

To make a good vinegar containing 6 to 10 per cent. of acetic acid, the fruit juice, sugar, or honey solution should contain before fermentation from 12 to 20 per cent. of saccharine matter, which, when fermented, will produce from 6 to 10 per cent. of pure alcohol, and, when transformed by acetic fermentation, from 6 to 10 per cent. of acetic acid. In a liquod which has already fermented the desired strength can be regulated by diluting the water or adding sugar or honey and refermenting.

To test the saccharine contents of the original must or unfermented liquid a Baume hydrometer or a Brix or Balling saccharometer can be employed. Either of these can be purchased for 5s. to 6s. The degree Baume is equal to 2 per cent. of sugar in the liquid at 60 deg., and the Brix and Balling degrees are equal to 1 per cent.

If, on testing, the sugar contents are found to be insufficient, 4oz. of cane-sugar or 5oz. of honey should be added for each additional degree of alcohol or acetic acid it is desired to obtain. These figures are not scientifically exact, but they are convenient to work from and give results near enough for the purpose.

Right Ferment

To ensure the introduction of the right ferment and the exclusion of the Mycoderma vini—which forms a thicker film, of a whiter appearance than the Mycoderma aceti, and transforms the alcohol into carbonic-acid gas and water—a small culture of vinegar bacteria or Mycoderma aceti may be developed in a shallow basin or saucer in a warm corner from an alcoholic liquor, such as wine or beer, mixed with a little vinegar, and the film, when formed, transferred carefully to the surface of the liquid in the barrel.

The same result may be obtained by pouring 10 per cent. of vinegar from a previous brew into the contents of the barrel. The alcoholic fermentation must be complete before the vinegar ferment is introduced, or the yeast ferment will be stopped by the acetic acid and unfermented sugar will remain in the vinegar.

A strong alcoholic liquid is not so easily acidified as a weaker liquid. Therefore, when making strong vinegar it is advisable to start the barrel with a little fermented liquid of low strength (3 or 4 per cent.) and add the stronger liquid gradually.

Time Required

Under favourable conditions a good vinegar will result in about three months. If it contains more than 10 per cent. of acetic acid this will act as an antiseptic to unfavourable bacteria, but in vinegar of a lower strength when the alcohol falls below 1 per cent. the bacteria destroy the ethers and finally the acetic acid itself, which is oxidised to carbonic-acid gas and water or undergoes what is known as putrid fermentation. To obtain a perfect vinegar 1 to 1½ per cent. of alcohol should remain unconverted. This increases the flavour of the vinegar when maturing in the barrel.

The amateur who has no means of ascertaining when this point is reached may arrest further development when in his judgment a full vinegar flavour had been obtained. If not already clear and bright, the vinegar may then be filtered through a flannel bag or clarified with isinglass, and then heated up to 130 deg. F. to ensure good keeping qualities by killing all bacteria, ferments, or vinegar-eels. It may now be run into a clean barrel and stored for a year, which will greatly improve its flavour. The barrel should be kept tightly bunged and vinegar added from time to time to replace that which evaporates through the wood.

Bottling

If it is desired to bottle the vinegar at once it should be allowed to cool before doing so, or, better still, it may be run into bottles cold and pasteurised at 130 deg. F. in the bottles. A convenient method for withdrawing the vinegar from the cask when no tap has been inserted is to siphon it off through a small rubber tube attached to the lower end of a stick, so that its lower end will be well above the lees, which should not be disturbed. The stick is then let down into the barrel, and the vinegar siphoned off into the bottles.

In the continuous barrel process about one-third of the vinegar may be drawn from the barrel and the same quantity of fermented liquid added through a glass funnel with a long spout so as not to rupture or precipitate the Mycoderma aceti film. This operation can be repeated whenever the vinegar is ready to draw.

Clarifying

To clarify vinegar which is not clear and bright the substance giving the best results is isinglass, employed at the rate of 1oz. per 100 gallons of vinegar, broken up into small pieces, and each ounce soaked in a gallon of warm vinegar until it swells up and becomes soft. It should then be passed through a hair sieve and any lumps that are retained broken up.

The solution should be of a perfectly smooth consistency before being used. In this condition it can be added to the bulk of the vinegar, thoroughly mixed by stirring with a suitable piece of wood, and allowed to stand about