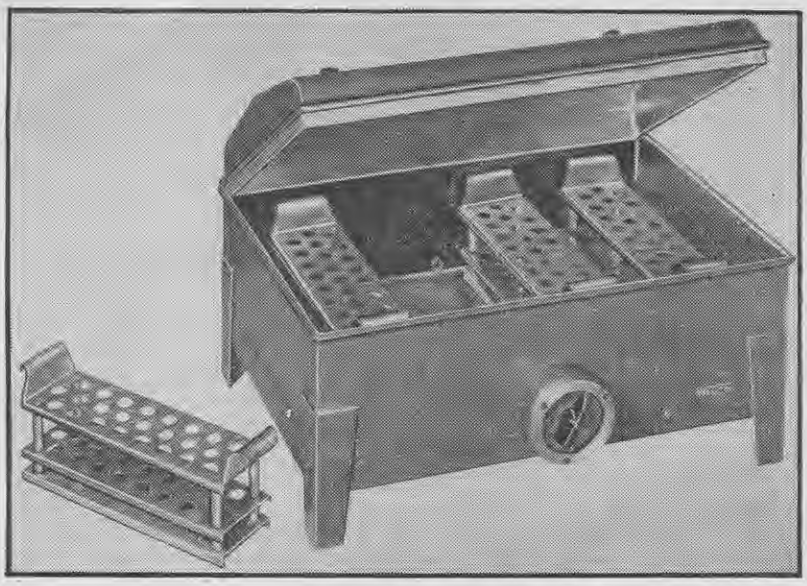

A thermostatically-controlled electrically-heated methylene blue bath with removable racks for holding test tubes.

with instructions for preparing the solution. The stock solution must be stored in a dark cupboard.

To prepare the test a few millilitres of stock solution is poured into a sterile test tube and the stock solution returned to the cupboard. One millilitre of stock solution from the test tube is added to 9ml. of distilled water, and 1ml. of this solution is added to 10ml. of milk, giving a final concentration of 1 part of dye in 300,000. Excess dye should not be returned to the stock solution.

The glass test tube into which the 10ml. of milk and 1ml. of dye solution are placed is 6in. long and $\frac{5}{8}$in. in diameter, with provision on the surface of the tube for marking the number of the sample. The tube also carries a small mark indicating the 10ml. capacity, which is convenient for measuring the milk directly into the tubes. For plugging the tubes rubber corks are normally used. The other equipment required for the test includes a supply of 1ml. and 10ml. pipettes and graduated cylinders and a constant-temperature bath, preferably provided with thermostatic control to ensure the maintenance of a steady temperature of 98 degrees F. during the test. These baths can be heated by electricity or by gas or spirit lamps, but in general practice baths heated by electricity are found to be most convenient. Inside the bath are racks to hold tubes. The bath is covered with a lid, as it is desirable that the test be carried out in the dark; some old-model baths had glass fronts, but because of the effect of light on the samples it was found necessary to paint the glass black.

It is essential that glassware and corks to be used for a methylene blue test be sterile. The glassware can be sterilised either by being heated in a dry-heat oven at 340 degrees F. for 2 hours or by being placed in boiling water and the water kept boiling for 10 to 15 minutes. The rubber corks used for closing the tubes when they contain the milk and dye are sterilised in boiling water.

After the samples to be tested are ready the procedure is as follows: Test tubes, racks, a basket of corks, tongs for handling the corks from the basket, pipettes, and methylene blue solution are all placed in a convenient position. Each sample is mixed, and either 10ml. of milk is pipetted into each test tube or milk is poured into the tube up to the 10ml. mark. Then 1ml. of the prepared methylene blue solution is pipetted into each test tube or run into it from a special burette, and the tubes are corked and inverted to mix the dye thoroughly through the milk. Each tube is numbered when the sample is added and then placed in position in the rack, which is numbered correspondingly; that ensures the maintenance of the identity of the sample from the producer. The rack of test samples is placed in the water bath and the water level maintained about the level of the sample of milk in the test tubes. The water temperature is controlled at 98 degrees F. within a tolerance of 1 degree, as this is the temperature considered most suitable for the reproduction of the bacteria usually found in milk. The test tubes are inverted every half-hour until the colour of the contents changes to white. The period between the start of the test and the time when the colour finally changes to white is expressed as the result of the test—for example, if a test started at 9 a.m. and the sample was reduced to white at 3.30 p.m., the result of the test would be $6\frac{1}{2}$ hours.

A good-quality milk, from healthy cows and well cooled and handled under clean conditions, will contain comparatively-few bacteria and may not bring about a change of colour in 10 hours; milk of the same age but produced, cooled, and handled under unclean conditions will contain large numbers of bacteria and may change the colour to white in 30 minutes.

Milk that has been poorly cooled invariably causes a change of colour in a shorter time than if the same milk had been properly cooled at the time of production.

By regular testing and recording of results any variation in keeping quality is quickly noted. This information is passed on by the treatment station to the producer concerned and to the local Stock Inspector of the Livestock Division, Department of Agriculture, who assists the producer in locating and clearing up his trouble.

Producers' Responsibilities

The result of the methylene blue test is influenced by the number of bacteria present in the milk, which varies with cleanliness, temperature, and time. Therefore, to produce milk with good keeping quality every person handling milk must declare war on all bacteria to prevent their gaining admission to the supply. No amount of testing can absolve the producer from his responsibility in maintaining a high quality in the milk produced. If clean milk is to be produced, a definite routine must be observed:—

First, all cows milked must be healthy and clean. The cows should be properly prepared for milking by the clipping of all surplus hairs from the udder and thorough washing of the udder with clean water. The taking of a few streams of milk from each teat into a receptacle enables the attendant to examine the milk and in healthy cows removes a great source of bacteria by cleaning out the teat duct. Milk produced in such conditions will have a low bacterial count.

Second, all equipment with which milk comes in contact must be thoroughly clean, and that can be achieved only with a plentiful supply of hot water and the correct technique of cleaning the plant. This is explained in bulletins which can be procured free from the nearest office of the Department of Agriculture, and Stock Inspectors of the Department will readily give advice and assistance.

Third, milk must not be exposed to the atmosphere. Particles of dust floating in the air may fall into cans or on coolers, thus admitting unknown numbers and types of bacteria. Yards and surroundings should be kept clean and bails and yards thoroughly wet before the cows come in.

Fourth, milk should be reduced quickly to 60 degrees F. or cooler to preserve the natural flavour and improve the keeping quality. This requires a good supply of cold water. Bacterial growth is reduced considerably by cooling to 60 degrees, though bacteria cannot be killed by cooling, but merely remain dormant until the temperature rises. The low temperature should be maintained by keeping the cans in a cool, shady position. It is also in the producers' interest to insist that all milk-collection lorries be fitted with good covers so that their milk is delivered to the depot in good condition; the test sample is taken at the depot, and poor carrying conditions have a great influence on test records.