2, 3, &c., signifying 1, 2, 3, %, and the intermediate divisions representing the 0.20 %.

Measuring the sample.—To measure a sample of milk, we must first be sure that the milk is thoroughly homogeneous, and to ensure this, it should be poured several times from one vessel into another, to incorporate the cream completely with the milk. Now, plunge into the milk the point of the pipette (fig. 2), which is a glass tube with an enlargement in the middle, and with a mark towards the top showing how high it has to be filled; this pipette will hold 17 6 cubic centimetres of milk (1).

While you are plunging the lower part of the pipette into the milk suck with the mouth at its upper end so as to draw

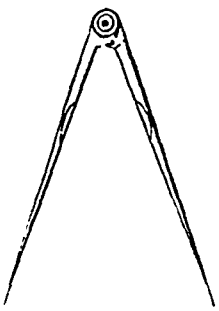

Fig. 4.

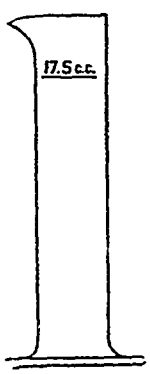

Fig. 3.

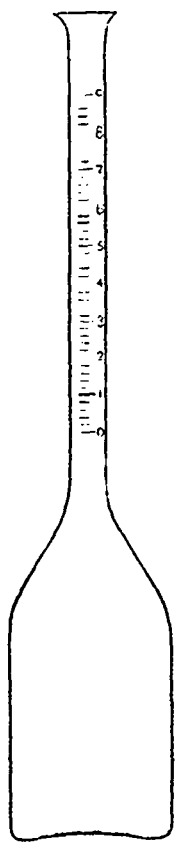

Fig. 1.

Fig. 2.

up the milk above the mark; place a finger of the left hand under the lower end of the pipette, draw it out of the milk, with the fore-finger close the upper end, and, keeping that end more or less shut with the fore-finger, allow the level of the milk to descend to the mark: you can thus be sure to have the exact volume of milk desired. Now, take one of the graduated bottles in the left hand, holding it gently sloping, introduce the point of the pipette into the neck of the bottle leaning it against the interior side of the neck, and withdraw the fore-finger of the right hand from the upper opening of the pipette: the milk will then flow into the flask. This being done, wait a few seconds to allow the last drops of milk to gather together towards the bottom of the pipette, blow into it a little, to drive the last drops into the flask, and the sample of milk is ready. The same process is gone through with the different lots of milk to be tested, and, when all the bottles have received their samples, the re-agent, which, as we have said, is sulphuric acid, is to be added.

The use of sulphuric acid.—The acid employed is the ordinary commercial sulphuric acid density or specific gravity of about 1.82 (which can be verified by the aræometer or acid-weigher, made on the same principle as the milk-weigher. Were the acid too weak, it would not dissolve the casein, and the butter could not disengage itself; if the acid were too strong, carbonaceous matter would be formed, and the butter itself would be attacked. Generally speaking, the acid met with in commerce possesses the requisite strength.

To use it, fill a glass measure, represented in fig. 3, up to the mark: this holds 17.6 cubic centimetres. The acid need not be measured with such nicety as the milk sample; according to our own researches, a little more or less acid does not exert much influence on the results. With the left hand, you will take one of the graduated bottles already charged with milk, then, holding it a little sloping, take with the right hand the glass filled with acid, and, leaning its spout on the mouth of the bottle, pour carefully into it all the acid in the bottle: and the same with the other samples. This having been done, take the bottles one after the other by the bottom of the neck and mix the acid and milk well together by shaking them round and round (horizontally), but taking care not to shake them up and down (perpendicularly), until the mixture, which will get very hot, assumes a chocolate-brown hue and the whole of the curd is dissolved. Not one single grain of the curd must be visible in any part of the flask. Care must be taken not to shake the bottles until the sulphuric acid has been poured into every one of them, in order to profit by the heat developed in them: the bottles should then be placed as soon as possible in the centrifugal machine.

The Babcock centrifugal tester.—The machine (see cut p. 76) can be put in motion either by hand-power or by a belt attached to a steam-engine, as is sometimes the case in large dairies. The principal part is a disc or wheel able to revolve horizontally at a great rate (700 or 800 revolutions a minute), along the spokes (*radii*) of this wheel are soldered cylindrical sheaths or pouches intended to receive and retain in their places graduated bottles, whose number varies according to the size of the apparatus from 4 bottles in the smallest to 60 in the largest size; those most frequently employed are made to hold from 10 to 20 bottles. The wheel in which the bottles are placed receives its motion through a belt or gear-work moved by a hand-crank. In the Babcock machine bought by the Department of Agriculture and Colonisation, made by Messrs. Fargo & Co, Lake Mills, Wisconsin, the requisite speed is obtained by turning the crank 75 times a minute. The turbine-wheel does not work in the open air; it is enclosed in a round tin bason, or preferably one made of copper, which is fix to the frame of the machine. This bason, which is provided with a large moveable cover (and also with a small tap at a point in its circumference near the bottom), serves for two purposes: 1. hot water may be poured into it to keep up the temperature at a degree which will ensure the success of the test of the milk; if the water is too cool, it can be warmed up by placing a lamp under the bot-

(1) The quantity of milk that flows into the flask is, in reality, only 17 5 cubic centimetres: but the pipette holds 0.1 of a cubic centimetre more, for it has been found that 0. 1 c. c. of milk adheres to the interior surface of the pipette $\frac{1}{176}$.

A cubic centimetre is about the $\frac{1}{1000}$ of the old Canadian quart.