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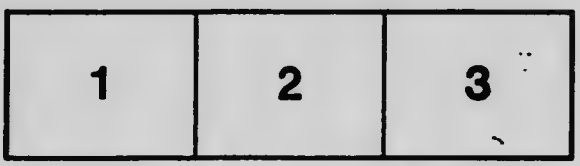
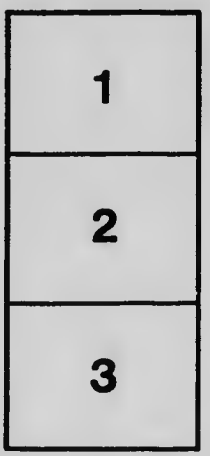
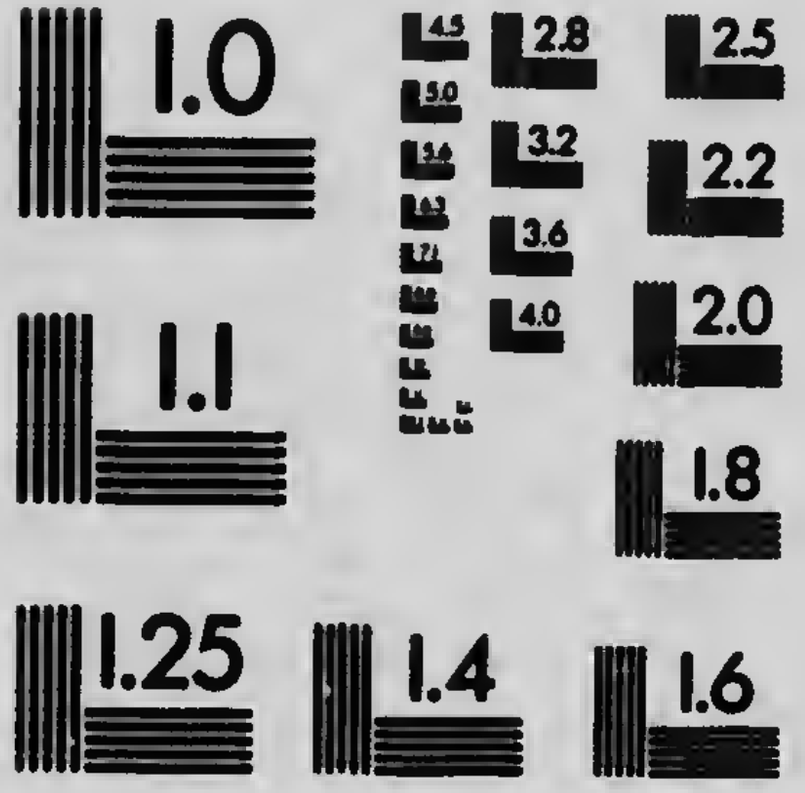




MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



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Ontario Department of Agriculture.

DAIRY BRANCH

MITCHELL-WALKER TEST BOTTLE

A NEW FORM OF BABCOCK TEST BOTTLE.

By J. W. Mitchell, B. A., Supt. Eastern Dairy School, and W. O. Walker, M.A. Lecturer on Organic Chemistry, School of Mining, and Dairy Chemistry, Eastern Dairy School.

Whether used for butter or cheese making, or for sundry other purposes that might be mentioned, milk is valuable not simply in proportion to its weight, but rather in proportion to the one or more solids which it contains and which we wish to utilize. For butter-making it is valuable in proportion to the amount of butter-fat which it contains, and for cheese-making practically in proportion to its fat and casein content.

The need of a thoroughly practical test for determining the per cent. of fat in milk was a want that was long felt before it was actually realized, and it led many to study the subject with a view to satisfying this want. The farmer needed it to aid him in the building up of his dairy herd, it was needed in creameries in order that an equitable division of the proceeds might be made, and it was realized that such a test would be most valuable for testing the by-products with a view to preventing undue losses through these channels; and we would add that such a test should be in general use in cheese factories, in connection with the division of the proceeds, instead of the "pooling" system or the system of dividing the proceeds merely in accordance with the weight of milk, which latter method is all but universal at the present time.

On this continent and in different countries outside of it the Babcock test has, for good and substantial reasons, supplanted all of its rivals for the determining of fat in milk and its products and by-products. It is simple, speedy, and accurate; and as but a single, cheap

reagent is used the cost of a test is small. It is already used in nearly all of our creameries for the purpose of estimating the value of milk and cream for butter-making purposes and dividing the proceeds amongst the several patrons accordingly; and, as has already been intimated, it should, with the requisite modifications, be generally adopted for a like purpose in our cheese factories.

The extra time and labor it entails is undoubtedly one of the chief factors that have militated against the general introduction of the test into cheese factories, although this reason is not usually brought very prominently to the fore by advocates of the "pooling" system. We venture to say, however, that few if any dairymen of prominence will say that the "pooling" system is a just one.

It is but fair, then, to conclude that any improvement that can be made in the test, in the way of lessening the time and labor involved in conducting it, will be much appreciated by all factorymen now using it and will greatly help to popularize the test and hasten its more general introduction.

There were some features of the test, as heretofore applied, which we looked upon as demanding more time and care than was desirable, and these objectionable features we felt might be eliminated by some modification in the apparatus and conducting of the test.

During the present year we have done considerable experimental work with a view of shortening the length of time required for conducting the test. Our main point of attack has been upon that part of the test which involves the stopping of the centrifugal machine during the test, adding hot water to the individual bottles and again whirling the bottles before the readings are taken.

We started our work on the principle of the use of a small centrifuge to be placed on the spindle of the ordinary centrifuge for the purpose of receiving and conveying the water to the bottles while the machine was in motion. This necessitated a modification of the test bottle for the purpose of receiving the water from the small centrifuge. After much experimental work we have succeeded in devising a centrifuge and bottle that give every satisfaction.

The Water Centrifuge.

The small centrifuge that is placed on the spindle of the machine, for the purpose of adding water to the bottles while in motion, is what we mean by the term *water centrifuge*, there being, in addition, the large centrifuge for whirling the bottles. The first forms of centrifuge designed by us were made on the principle of a hollow cylinder perforated for the exit of the water. It had a horizontal plate with wings on its upper side, the purpose of these being to set the water in motion and prevent its falling to the bottom of the centrifuge to too great an extent, as it was necessary to direct it in two main streams, upper and

lower, to fill two rows of bottles in the machine. We have discarded the wings entirely so that now the centrifuge is perfectly simple in construction, consisting simply of a hollow cylinder with the upper and lower parts of the wall perforated. In order to guard against any particles of dirt, that might be in the water used, entering the centrifuge and stopping up the perforations we converted the above-mentioned horizontal plate into a strainer consisting of a solid bottom with sides of wire gauze that can be easily removed and cleaned when necessary. The whole centrifuge slips on to the spindle of the ordinary machine and the water is simply poured in at the top through the cone-shaped cover of the machine.

By reference to the accompanying cut the construction of the centrifuge will be readily understood.

The Bottle.

The bowl and graduated neck of the bottle are similar to those of the ordinary test bottle. In addition our bottle possesses a second neck of a funnel or inverted cone shape for receiving the water from the water centrifuge on the spindle. The upper end of this neck is bevelled for the two-fold purpose of catching the water from the centrifuge and preventing the fat in the graduated neck from overflowing. The lower end of the neck is reduced in size and prolonged into a curved tube for the purpose of preventing any fat from rising into it during the test. Furthermore, the direction in which it curves, namely, toward the outer wall of the bottle, causes the acid to flow down the side of the bottle to the bottom, thus avoiding its mixing with and charring the sample.

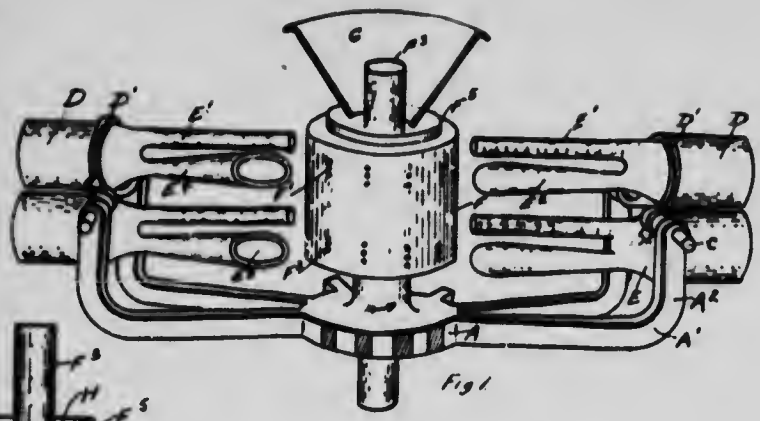


Fig 1

Fig 3.

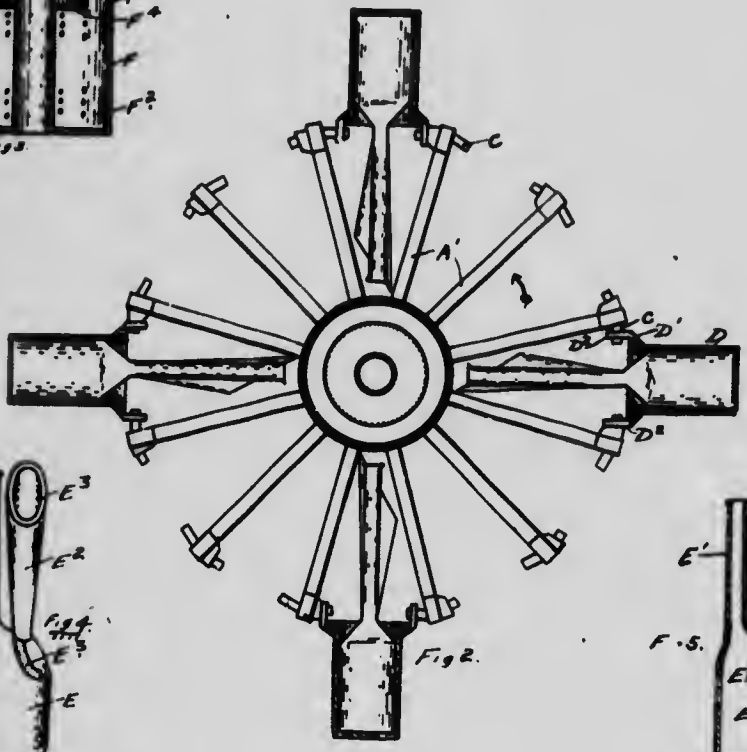
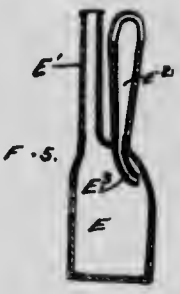


Fig 2.



Description of the Cut.

Fig. 1 is a perspective view of our improved apparatus partially broken away and in section.

Fig. 2 is a sectional plan showing portion of the cups and bottles, the bottles being shown in full.

Fig. 3 is a detail of the water centrifuge.

Fig. 4 is a perspective detail of the bottle.

Fig. 5 is a longitudinal section through the bottle and necks thereof.

In the drawings like letters of reference indicate corresponding parts in each figure.

A is a spider which is journalled on a shaft B, and comprises arms A^1 bent at the outer end and A^2 substantially at right angles to the main portion of the arm. C are trunnions secured in the end of the arm and D are a pair of cylindrical cups which are provided with a connecting rim D^1 having the centrally opposed lugs D^2, which are journalled on the trunnions C.

E are the bottles which are placed in the cups D. Each bottle is provided with a graduated neck E^1 and a substantially funnel or cone-shaped neck E^2 having a bevelled outer end E^3. The position in which the cups and bottles are shown in the drawing is that which they assume when the machine is in motion. When the machine is stationary the cups and bottles stand upright.

F is the water centrifuge, which comprises a cylinder having upper and lower sets of perforations F^1 and F^2 in its periphery, each set of perforations being substantially of the same width as the outer end of the funnel-shaped neck E^2 of the bottle E. As will be readily seen there are two layers of bottles, which assume the horizontal position when the machine is in motion and consequently the upper and lower necks E^2 are directly opposite the upper and lower sets of perforation F^1 and F^2 respectively.

F^3 is the centre tube of the cylinder, which is secured on the shaft

F^4 is a deflecting plate horizontally disposed beneath the top of the centrifuge F and opposite the flanged opening F^5, into which a funnel G is fitted in order to feed the water into the centrifuge.

H is a strainer of wire gauze or netting extending from the flange F^5 to the deflecting plate F^4, such wire gauze being designed to prevent dust or foreign matter passing into the centrifuge and stopping the jets F^1 or F^2. Both the centrifuge and the spider carrying the bottles are secured to the shaft and rotate in unison. As the machine revolves, the water in the centrifuge is forced by the centrifugal action outward in the form of a spray and is caught by the cone-shaped necks of the bottles circularly arranged as will be readily understood.

The inner ends of the funnel or cone-shaped necks of each bottle are extended in somewhat the form of a curve E^3 at its entrance into the bottle for the purpose previously mentioned.

Advantages of the Bottle and Centrifuge.

1. The milk and acid can be readily added to the bottle through the wide mouth of the funnel-shaped neck.

2. The acid flows down the side of the bowl without charring the sample.

3. *The water can be added to the bottles while the machine is in motion, thus saving much time.*

4. Two rows of bottles can be used.

5. The bottles may be emptied very rapidly—twenty-four in less than one minute.

6. Water can be added to the bottles very quickly for cleaning them after the test, either while at rest or in motion.

7. No special form of machine is required. We have been using the bottles and centrifuge with well-known makes of machines.

8. The funnel-shaped neck on the skim-milk bottle eliminates the danger of spurting out of the acid when shaking the contents, on account of the lower opening being above the surface of the liquids, thus allowing the gases to escape freely.

9. The foregoing may be summed up by saying that there is a saving of time from beginning to end of the test.

Directions for Using the Bottle and Centrifuge.

1. Add the milk and acid through the funnel-shaped neck. Shake the contents as usual.

2. Place the small water centrifuge on the spindle with the perforations just behind the arms of the large centrifuge and at the right height to fill the bottles.

3. Place the bottles in the pockets of the machine with the funnel-shaped necks on the inside or toward the spindle.

4. Have the cover of the machine fitting closely.

5. After whirling the bottles from four to five minutes pour the water through the cover of the machine at a rate corresponding to that of a stream from a half inch pipe. Use from two to three quarts of water or enough to ensure the filling of the bottles.

6. Continue whirling the bottles from one to two minutes after all the water is added.

7. See that the speed is maintained during the addition of the water.

8. When emptying the bottles have the graduated neck underneath.

9. The general principles and precautions that govern the conduction of a test with the ordinary bottle are assumed to be understood by the operator and expected to be applied when using the new bottle.

For particulars regarding price, etc., write to W. O. Walker, Eastern Dairy School, Kingston, Ontario.