

tom of the bason ; 2. to protect the operator from any accident that may occur, for instance, if one of the bottles full of burning acid were to break. it must not be forgotten that burns caused by sulphuric acid are very serious. (1)

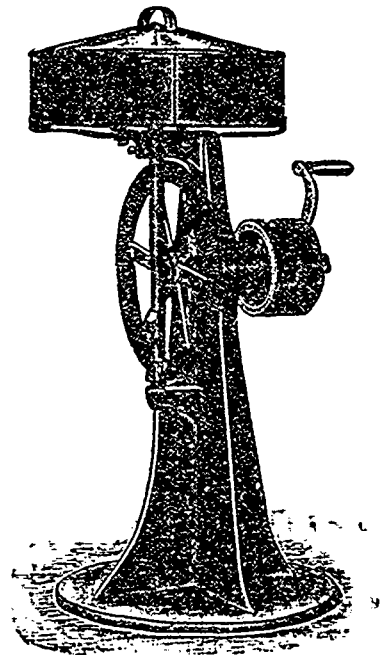
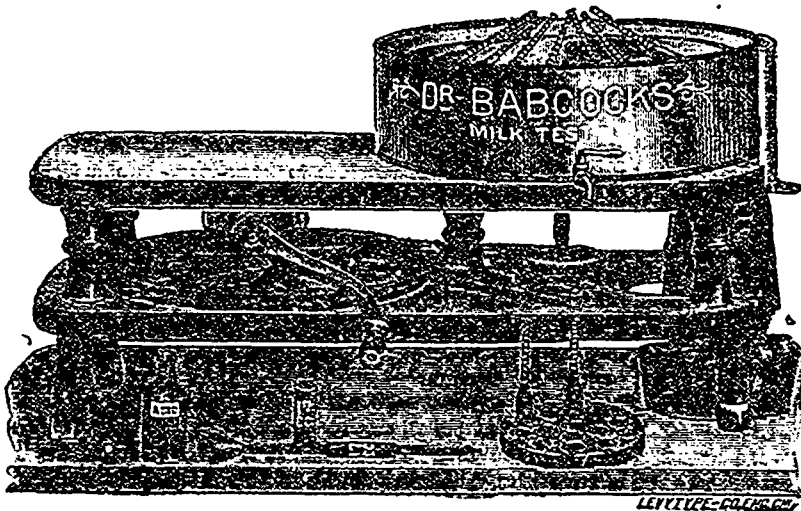
As the Babcock is not patented, many makers have varied the arrangement of its parts more or less advantageously. Thus, in one or two models, such as those made by D. H. Roe & Co, the cylindrical pouches that hold the bottles, instead of being fixed on the turbine-wheel, are soldered on movable stems united by joints (*articulations*), or, more simply, by a hook, to the central disc of the turbine, in such a manner that when the machine is at rest the bottles occupy a vertical position (and may dip into the hot water in the bason), but as soon as the machine is going at full speed, the bottles rise into a position almost horizontal. This arrangement is, in our opinion, an improvement, but it is not indispensable. Whichever system is adopted, the test of the milk is proceeded with as follows :

*First operation (turbine).*—As we saw just now, the graduated bottles containing the mixture of milk and acid were placed in the pouches of the turbine. The bottles bear a ticket on a copper ring, the numbers on which correspond with the different milks under test. If more than 10 or 12 tests are carried on at once, it is absolutely necessary that hot water be put into the bason at the beginning of the operation, in every case, the temperature of the bottles and of their contents, from the beginning of the operations up to the end of

*better at two different times, with a fresh rotation of the turbine between them.* The bottles, then, are taken out one by one, and hot water is poured into them *very carefully* until the layer of butter, which rises by degrees into the neck of the bottle, arrives within the limits of the graduated scale. I say *very carefully*, because the butter must not be allowed to rise too high, that is, above the graduation, since that would vitiate the experiment. Generally, it is so managed that the upper level of the butter reaches nearly the figure 7 or 8 of the scale. The hot water used can be withdrawn from the bason by the tap, or any hot water can be employed by the use of the pipette or the graduated glass, &c. After having thus filled all the bottles and replaced them in the turbine at once, the cover is put on again and a second *turbine* given.


*Second turbine.*—This is meant to completely gather the fatty matter into the graduated neck of the bottle and thus to enable us to estimate its quantity exactly. This second *turbine* (which, when two separate additions of hot water to the bottles are made, is followed by a third) only lasts one minute; and then the reading off of the results follows in haste.

*Reading off the results.*—We have now succeeded in isol-



the reading off of the results, must not be allowed to fall below 100° F., and it is advisable that the water in the bason be at a temperature of 200° F., before the bottles be placed in the machine.

The bottles being carefully placed in the very bottom of the cylindrical pouches, the cover is put on the bason and the machine set in motion so that it may quickly attain a speed of about 700 revolutions a minute, which speed should be kept up for about 6 or 7 minutes. The effect of this rotation is to completely separate the butter from the rest of the liquid, so that, after the stoppage of the machine, the butter is found floating by itself on the top in the form of an oily layer more or less thick. The machine having been stopped, the cover is lifted off, and the bottles are filled up with hot water; an operation that may be done at once, but

ating the fatty matter of the milk and have brought the whole of it into the contracted neck of the graduated bottle, where it appears in the form of a little cylinder of oil, in colour a yellow more or less pale; its lower extremity is almost level (*plane*) or flat, and, if the test has been well conducted, it forms a very distinct line of demarcation from the liquid below it. The upper extremity, owing to the effect of capillary attraction exercised by the glass-tube, instead of being flat, presents a hollowed surface of this form , and may be the occasion of erroneous calculations, unless care be taken to observe that the upper extremity is determined, not by the lowest point of the hollowed surface, but by the *sides*, which are higher, for the graduation of the scale has been constructed in accordance with that intention.

We must also remember that the figures 1, 2, 3, 4, &c., on the scale of the bottle represent 1, 2, 3, 4, &c., per cent., and that the intervening lines represent 0.20 per cent. So that, to read off the percentage of the fatty matter it will be sufficient

(1) Wherefore, when I make superphosphate, I always empty the carboys of acid by means of a siphon, so that there may be no splashes.

A. R. J. F.