

A SIMPLE APPARATUS FOR THE DETERMINATION OF MOISTURE IN MADE TEA.

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The reasons for determining the moisture content of made tea have already been discussed, and are recapitulated below:

- (1) The determination of moisture in the fired tea serves as a check on the firing operations.
- (2) It also shows whether the bulked tea contains too much or too little moisture, and thus shows whether final firing is necessary or not.

The determination of moisture in plant materials is not an easy process, but if a standard method is adopted then trustworthy results can be obtained, and the technique can be easily acquired.

The principle of the most common method is to dry a known weight of material at a constant temperature until it attains a constant weight. The loss in weight represents the moisture in the material, and the percentage in the original material is obtained by calculation. Absolute constancy of weight is, however, most difficult of attainment since loss of moisture is not the only result of heating plant material, and in practice it is usual to determine the drying period necessary to obtain a dry product. This period has been determined for 10 grammes of tea, and is found to be 3-4 hours at the temperature of boiling water. If this weight of tea is therefore dried in an oven kept at the temperature of boiling water for 3-4 hours the loss in weight can be taken as representing the moisture in the original sample of tea.

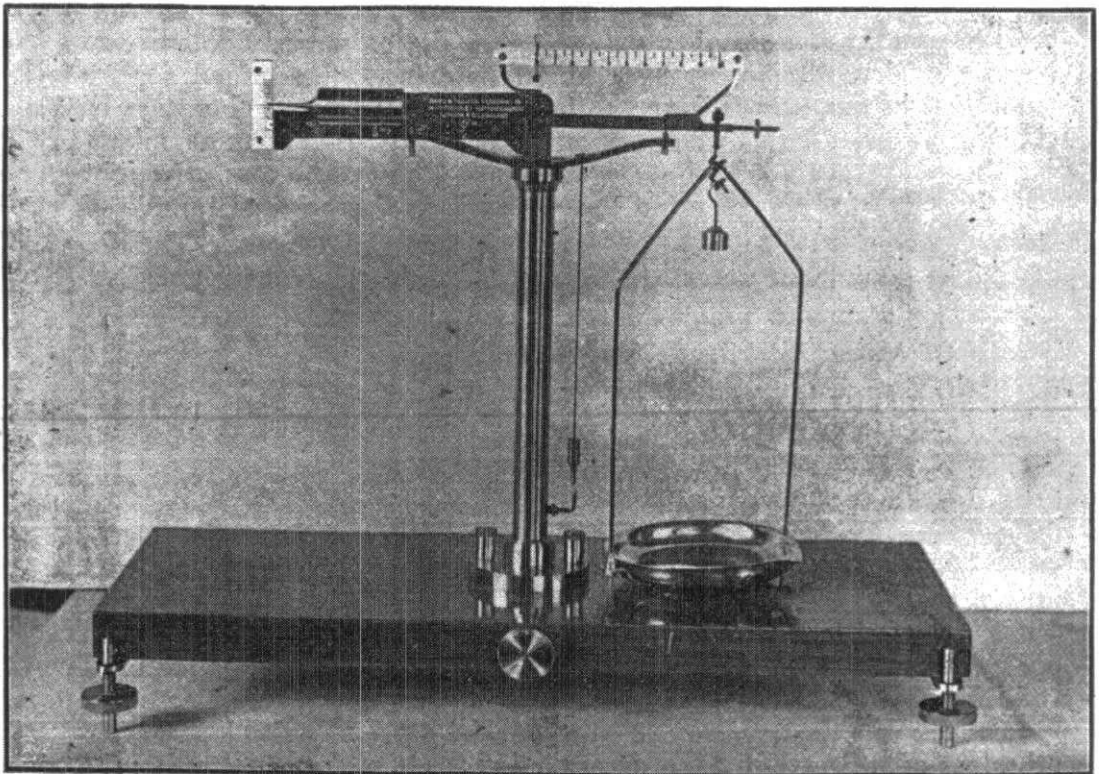
The equipment necessary for the determination consists of:

- (1) Balance to weigh the tea.
- (2) Water oven for drying the tea.
- (3) Primus stove for heating the oven.
- (4) Sample tins with well-fitting lids to hold the tea in the oven, and to store the sample while cooling.
- (5) Instructions for the use of set.

There are several sets on the market for carrying out the operation of determining the moisture in tea, but the writer considered these too complicated and unsuitable for general use in factories. The main objection was the necessity to use fractional weights of parts of a gramme. It was considered that these weights required great care in use, and were liable to be mislaid and lost. The other drawback was the necessity to calculate the percentage moisture after the loss of weight had been determined.

In the meantime efforts were made to devise a balance which had no small weights to manipulate, and which indicated the moisture content directly. Such a balance was found to be used for the determination of moisture in butter in England and, when modified in certain ways, it was considered suitable for the determination of moisture in tea. A description of the proposed alterations and modifications was sent to the makers who carried out all the suggestions, and despatched the modified balance to the Institute for trial. When this balance was tested out at the T. R. I. Laboratories it was found to be suitable, provided a few minor alterations were carried out. A cable has been received from home that all these alterations have been attended to, and that delivery to estates could be arranged in four weeks.

The balance, a photograph of which is given below, has only one pan. This pan and the small hanging weight above it are balanced by the heavy weight on the end of the left hand beam when the small rider carried on the scale above the right hand beam is on the zero mark. When weighing the tea for the determination of moisture the hanging weight is removed and tea is poured into the pan until equilibrium is again obtained. This weight of tea will be equal to



Balance for determining Moisture in Tea.

that of the small hanging weight removed, i.e., 10 grammes. The tea on the pan is then poured into an open shallow sample tin and dried for 4 hours in an oven kept at the temperature of boiling water. At the end of this period the tin containing the tea is taken from the oven, the lid put on and the sample allowed to cool. The cooled tea is then poured back into the pan of the balance and the rider on the scale above the right hand beam moved to the right until equilibrium is again obtained. The figure on the beam under the rider when the beams are in equilibrium gives the percentage moisture in the tea directly. If a balance is obtained with the dried tea when this rider shows less than 5 the tea is too dry, but when more than 6 the tea contains too much moisture and needs final firing.

The rider beam is divided into 10 main divisions reading from 0-10% moisture. These main divisions are again sub-divided once so that readings to $\frac{1}{2}$ % are quite simple. The exact position of the rider between these divisions can also be easily gauged so that readings to 0.1 per cent can be taken. It is not necessary, however, to worry whether the tea contains 7.1 or 7.2% moisture, but it is important to see that tea for packing balances when the rider is between 5 and 6 after drying. In the final modification of the balance the area 5-6 is marked on the beam in a different colour and it is suggested that when weighing the dried tea the rider should be fixed on the 5.5 mark. If the tea is lighter than this move the rider to 6.0, if heavier move to the 5.0 mark, and it will be seen immediately whether the tea is too dry or whether it contains too much moisture. An exact estimate of the moisture can then be made. If the tea is too dry the firing operation should be investigated, but if it contains too much moisture then the tea should be final fired.

The exact details of manipulation are not given in this article since full details have been given to the makers, and instructions will be sent along with the set.

The tea is dried in a water jacketed oven, which can be set on a primus stove so as to boil the water in the walls of the oven and thus keep the tea inside the oven at the temperature of boiling water. This oven must be kept supplied with water and care taken that the water in the oven just boils while the tea is drying. A cheap electric oven is being sought for those estates that have electric power available, but in the meantime the heating unit consists of a primus stove which is part of the set.

Sample tins for drying the tea have not been included in the set since these will be available on most estates, but if required they should be specially ordered.

This whole set can be obtained from Messrs. Baird & Tatlock (London) Ltd., 14-17 Cross Street, Hatton Gardens, London, E.C. 1, for £6.8.9 complete.

The apparatus for the determination of moisture in tea should be part of the equipment of every factory, and when properly used will be found to be invaluable. In conclusion, I should like to suggest that a balance case should be made on the estate to house this precision instrument so as to protect it from dust.

If a small tin of silica gel, obtainable from the makers, price 3/-, is kept with the balance in this case no trouble should be experienced with the instrument.
