REPORT OF SUB-COMMITTEE ON DETERMINATION OF FIBRE IN CANE

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This Committee, before proceeding to detail its recommendations on the subject of fibre testing, states its opinion that the time has now arrived when experiments should be conducted on a factory scale, and recommends that during the coming season the actual determination of fibre in all cane should be carried out at each mill in turn, in order to test the practicability of the various schemes suggested, and to gain experience in carrying out the work. With this end in view, the Committee suggest certain lines along which the experiment might be conducted.

General Method.

Last year this Committee presented a report which outlined a possible method of determining fibre, solely from the moisture content of the L.P.M. bagasse. Further consideration has been given to this method, but it has been felt that too many doubtful factors and presumed constants were involved, and it is now recommended that fibre be determined by direct analysis of the sample, i.e. by lixiviation and drying.

Material to be Sampled.

Two possibilities present themselves—either a direct sample of the cane itself, or a sample of the last bagasse prior to maceration (L.P.M. bagasse). Each method presents certain advantages and disadvantages. A sample of cane would give the percentage of fibre direct without further calculation, or the use of factors and constants. On the other hand, cane is difficult to sample, and the sample obtained would probably not contain the true proportion of adhering water and trash. A sample of L.P.M. bagasse would be easier to take and would more nearly reflect the composition of the cane as crushed. On the other hand, the fibre content would have to be converted to fibre % cane by means of certain factors and constants. It was recommended that both methods be tried in the course of the factory experiments.

Sampling.

Cane.—The following method for sampling and subsampling cane has been suggested.

Sixteen sticks should be taken at random from different points along the carrier (from at least 75% of the consignment). These sticks are taken to the laboratory and each one is cut up into four lengths. These lengths are placed in four piles—all the tops in one pile, all the butts in another, and so on. Four lengths are taken from each pile. These 16 lengths are then chopped up into sections one inch long. (This can be done with a suitable machine.) These small sections are then well mixed in a basket or bucket, and a double handful extracted and passed through the shredder. A Hyatt reducer or a Gallois cutter is recommended for this purpose. One hundred grams of the shredded cane is taken for testing.

L.P.M. Bagasse.—This sample should be taken by hand at regular intervals along the whole breadth of the carrier between the point where the bagasse leaves the mill and the point where maceration is applied. It should be placed in an air-tight container and sent immediately to the laboratory and a portion passed through the shredder.

Fibre Determination.

Lixiviation.—Three types of lixiviator have been suggested and details of these are appended to this report. The time necessary for complete extraction should be determined experimentally and should vary from one to four hours according to the apparatus used.

One hundred grams of the shredded sample should be weighed out on a scale weighing to the nearest decigram. The sample should be placed in a linen bag 50% larger than the bulk of the sample. A preliminary pressing in some convenient type of press would be advantageous. This press could also be used for expressing the greater part of the water previous to drying the extracted samples.

Drying.—A suitable hot-air oven should be used. The temperature and time necessary for drying to constant weight may be determined experimentally.

Estimation of Fibre % Cane from Fibre % L.P.M. Bagasse.

In a paper which is being presented separately to this Congress by Mr. Bechard, the latter has deduced the following formula :—

$$f = \frac{M\,C}{100 - M}$$

where f = Fibre % cane and M = Fibre % P.L.M. bagasse.

The value of C is given by :—

$$C = 100 - f - KY$$

where K is the total Juice factor in unity and Y extraction on total Juice % Cane. (For further details of this calculation, see Mr. Bechard's paper.)

Method of Applying above Results.

When the Fibre % Cane has been determined by one of the methods outlined above, it remains to devise a suitable method of applying the same for the determination of Sucrose % Cane, and fibre bonus and penalties. The following scheme is submitted :—

The Sucrose Journal headings should be altered to read as follows :—

Name.
First Truck No.
First Crusher Juice { Brix. Sucrose. Purity.
Fibre % Cane.
Java Ratio.
Approximate Sucrose % Cane.
Tons Cane.
Tons "Crusher Sucrose."
Tons Fibre.
Bonus and Penalty columns (as before).

Tons "Crusher Sucrose" means tons Cane x Sucrose % Crusher Juice.

Its use is explained later.

The approximate Sucrose% Cane is only required for the daily advice notes and does not appear in the subsequent calculations. The Java Ratio is found for each consignment from the Fibre % Cane, as explained later.

The ledger headings should be altered to read as follows :—

Date.
First Truck No.
Journal Folio.

Daily :

Cane—tons.
Crusher Sucrose—tons.
Approximate Fibre—tons.
Purity.
Tons Purity.
Sucrose Bonus—tons.
Sucrose Penalty—tons.

Weekly Total :

Cane—tons.
Crusher Sucrose—tons.
Approximate Fibre—tons.
Adjusted Sucrose—tons (entered from weekly summary).
Balance of Bonus and Pentaly Sucrose Fibre—tons (entered from weekly summary).
Corrected Sucrose—tons (entered from weekly summary).

A weekly summary would be prepared with the following headings :—

Name.
Tons Cane (from ledger).
Tons approximated Fibre (from ledger).
Tons Adjusted Fibre.
Adjusted Fibre % Cane.
Tons Crusher Sucrose.
Java Ratio.
Tons Adjusted Sucrose.
Sucrose Bonus—tons (from ledger).
Sucrose Penalty—tons (from ledger).
Fibre Bonus Sucrose % Cane.
Fibre Bonus tons Sucrose.
Fibre Penalty Sucrose % Cane.
Fibre Penalty tons Sucrose.
Balance of Bonus and Penalty (Sucrose and Fibre).
Tons corrected Sucrose.
Corrected Sucrose % Cane.

The Java Ratio is determined from the Fibre % Cane as follows :—

$$\text{Sucrose \% total Juice} = \frac{\text{Sucrose \% Cane.}}{100 - \text{Fibre.}}$$

$$\text{Cane Juice factor} = \frac{\text{Sucrose \% total Juice.}}{\text{Sucrose \% Crusher Juice.}}$$

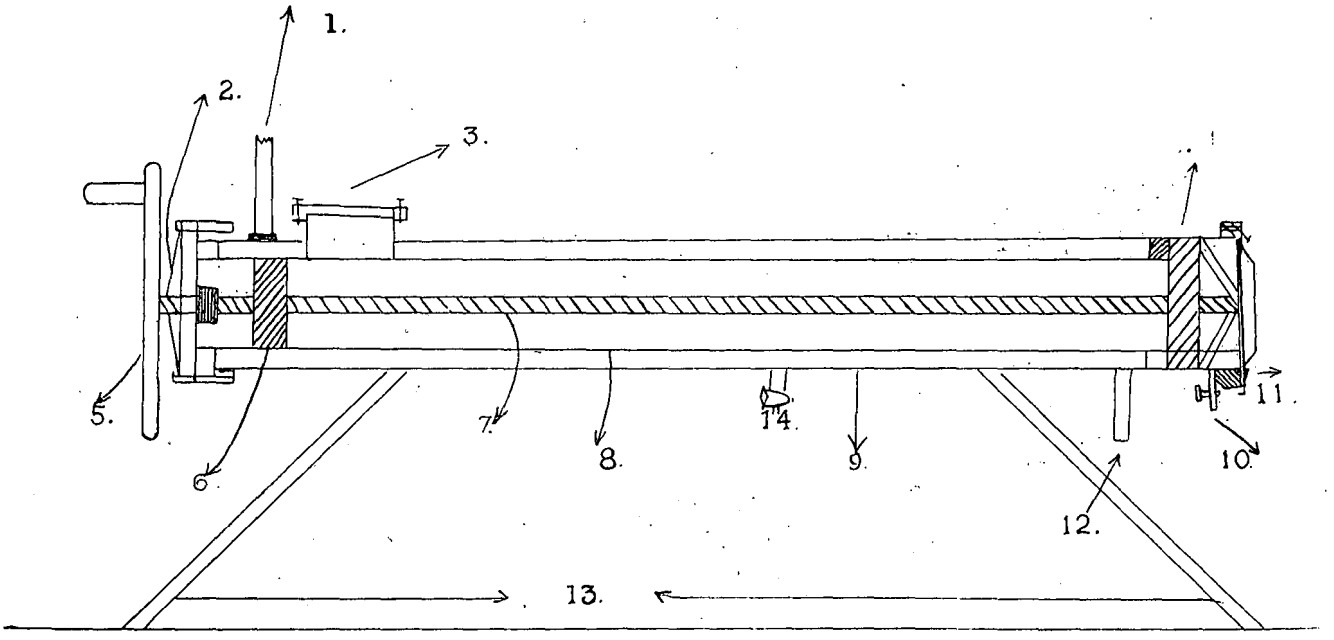
$$\text{Java Ratio} = \text{Cane Juice factor x } (100 - F).$$

Tons of adjusted fibre are made to correspond with the total fibre found by the mills by multiplying the tons of approximate fibre by a correcting factor.

The individual tons of adjusted sucrose are found by multiplying the tons of crusher sucrose by the individual Java Ratio.

By the above method the work will be minimised, as most of the calculations will be made on the weekly figures instead of on the daily figures.

If experiments are carried out this year on a factory scale on the lines indicated above, enough information and experience should be gained to put the whole scheme into operation in 1930, the year stipulated by the Fahey Agreement.

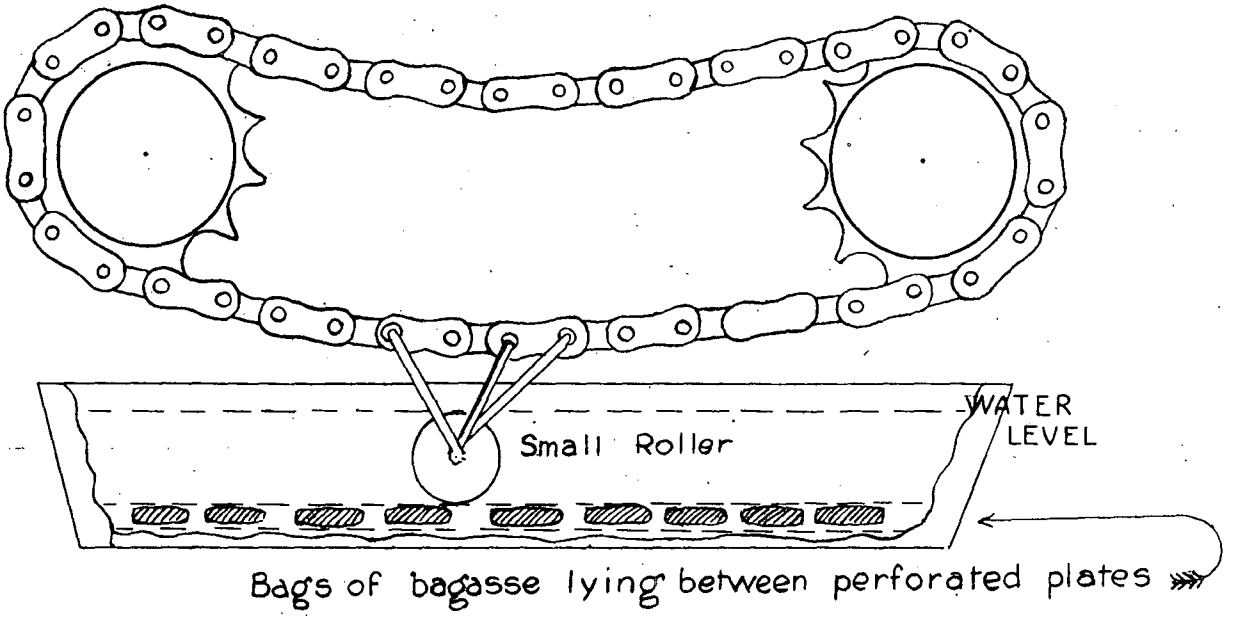


1. Water outlet.
2. Gland.
3. Opening for inserting samples.
4. Fixed perforated disc.
5. Hand-wheel.
6. Movable piston.
7. Screw.
8. Perforated 3in. pipe.
9. 4in. pipe.
10. Test cock.
11. Hinge.
12. Water inlet.
13. Stands.
14. Drain cock.

BAGASSE "LIXIVIATION APPARATUS" FOR DIRECT FIBRE DETERMINATION.

Type of Lixiviation Apparatus Suggested by Mr. Bijoux.

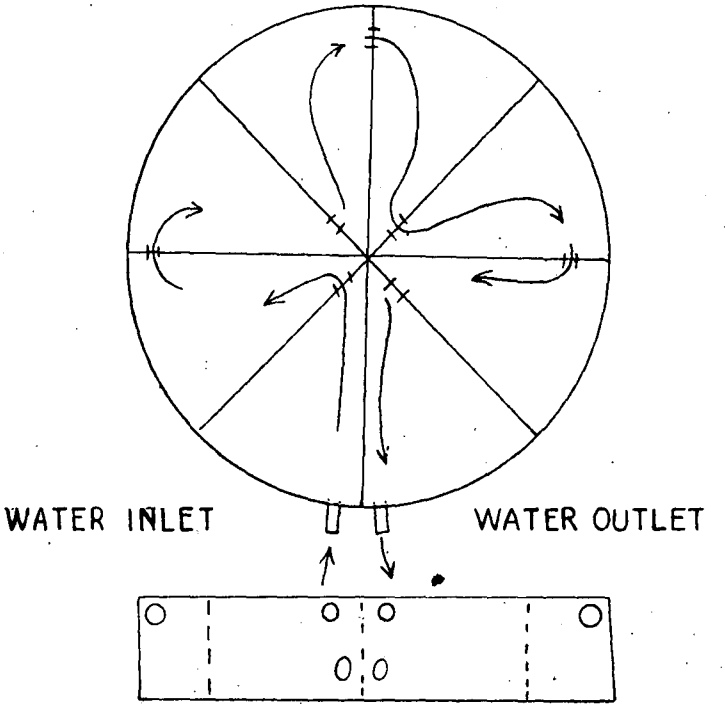
3in. perforated pipe inside a 4in. pipe. Inside the former a piston works along a screw operated by a hand-wheel. Water circulates through the whole apparatus. Samples in specially shaped linen bags are inserted through an opening on top and hung on the screw. At intervals the samples are compressed by means of the screw and piston. Exhausted samples are removed at the other end. A test-cock is provided to test water for traces of sugar.



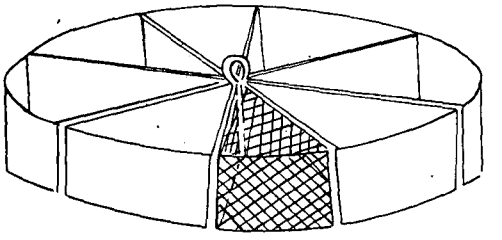
BAGASSE LIXIVIATION APPARATUS FOR DIRECT FIBRE DETERMINATION.

Type Suggested by Mr. Bechard.

A small roller attached to a sprocket-driven chain compresses the samples, which lie in linen bags between perforated plates at the bottom of a trough through which water circulates. The upper perforated plate can be removed for the insertion and withdrawal of samples.



PLAN AND ELEVATION OF EXTRACTION VESSEL.



BASKET

BAGASSE LIXIVIATOR FOR DIRRECT FIBRE DETERMINATION.

Type Suggested by Mr. Moberly.

A circular vessel is divided into eight (or other number) sectors, through which water circulates as shown. A basket of corase wire mesh, consisting of a similar number of sectors, is so constructed that it can fit over the partitions of the extract on vessel. The first sample, in a linen bag, is placed in the basket, which is inserted into the vessel so that the sample lies opposite the water outlet. When the next sample is ready it is placed in the adjoining sector, and the basket moved round one sector, and so on, until eventually the first sample is in the sector, and so on, until eventually the first sample is in the sector opposite the water inlet. When the next sample is ready the first is removed for pressing and drying, and the rotation is continued. A tamp (not shown) consisting of a similar number of sector plates attached to a vertical rod, can be used for pressing the samples from time to time during the extraction.