CANE SAMPLE SIGNALLING DEVICES

G. S. MOBERLY.

One of the minor problems connected with Cane Testing has always been the difficulty of knowing the exact time during which any given consignment of cane is actually passing through the crusher rollers. The earliest method was to slit the end of a piece of cane, insert a sheet of paper, and then stick this flag in the cane on the carrier, at the point where the new consignment started, and then to wait until it disappeared from sight into the mouth of the crusher. The general introduction of cane knives necessitated delaying the hoisting of the ensign until it was estimated that the head of the sample had passed the knives. The introduction of further sets of knives higher up the carrier, and the covering of the carrier to retain chips from high speed knives, rendered the old method unworkable, and recourse was had to estimation of the the time of travel of the carrier, with a possibly high degree of personal error.

During my visit to Queensland in 1935, I was very much struck by the methods generally adopted in that country to overcome this difficulty. While these devices vary from factory to factory, the general principle may briefly be described as follows. (Figure 1).

A wheel (an old flywheel or pulley) of about 2 ft. diameter is geared to a carrier sprocket shaft (either by a series of sprockets and bicycle chains or by a worm gear) so that the wheel makes a quarter turn during the travel of the carrier between a marked point before the knives, and the crusher rolls. (In Queensland where shredders are universally used, allowance must be made for the interval between the shredder and the first mill). Round the periphery of this wheel are drilled a series of holes into which steel or brass pegs fit loosely. When the head of a sample reaches the marked point, the Cane Tester inserts a peg into the hole nearest to the top point of the wheel. When the head of the sample is just reaching the first rollers, the wheel has carried the peg round a quarter turn, where it closes an electric circuit, which lights a coloured lamp near the juice sampling point. Further travel of the wheels brings the peg down to a point where it falls out into a container, ready to be used again.

Now if on the periphery of the wheel we have two parallel sets of holes, one set can be used to mark the beginning and the other to mark the end of the sample, and each peg can be made to light a different coloured light. This allows for much greater accuracy in sampling, because if, during the run of one sample, the crane driver drops in a grab-full of cane from another consignment, the cane tester can put a peg into the appropriate hole for the beginning and end of this cane, and can then remove his sample bucket during the time indicated by the coloured lights.

A further refinement which would prove very useful would be to place a second pair of switches slightly in advance of the other pair, so that a coloured light would be shown in the laboratory a minute or so before the corresponding light appeared at the sampling point, or the same circuit might ring a warning bell.

Once such a device is installed it would be easy to add still further refinements. For instance the drip rod, leading the juice into the bucket could be pivoted, so that a relay, connected with the circuit, could throw it away from the bucket. This would enable the Cane Tester to put the bucket into position, and then allow the sample to take itself.

The installation of such sampling devices has been definitely provided for by the new Agreement, paragraph 12 (b) of Schedule C of which reads:—

"The manufacturing company shall supply the following facilities for the sampling of cane:—

(b) Some automatic device for signalling the arrival of the beginning and end of the sampled portion of every consignment of cane at the crusher rolls."

In order to assist companies to fulfil the requirements of this paragraph, blue prints showing the general principles of the required device were circulated to all mill engineers last season. By the end of the season three such devices had been installed, two satisfactory and one unsatisfactory.

At Gledhow, the device installed by Mr. Fullam followed the above description very closely, except that the peg, after making its quarter turn, trips a switch which has to be reset by hand before it can operate again. The light extension to the laboratory has been added, but it operates simultaneously with the light at the sample point, instead of a minute or so earlier. This installation has worked very successfully. The gearing is by means of directly meshing pinions in a closed box, and is

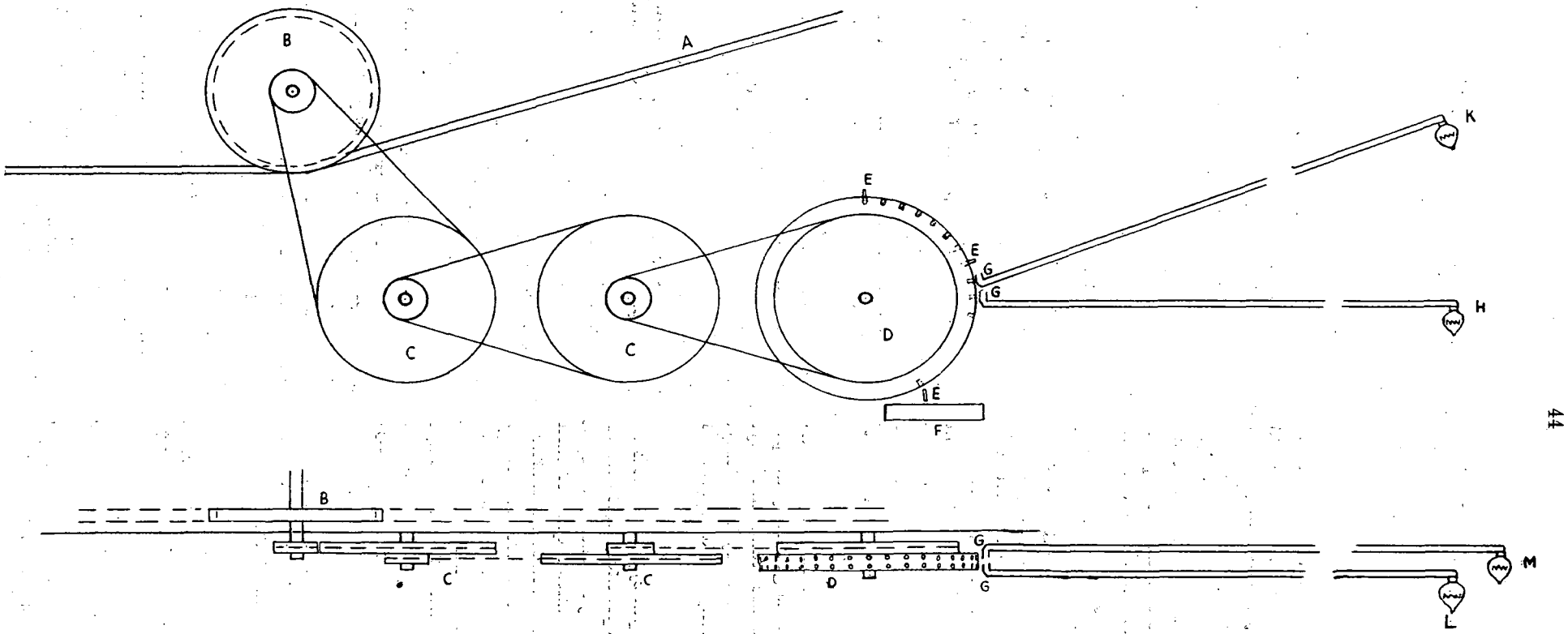

Figure 1.

QUEENSLAND SAMPLING DEVICE.

A—Carrier Chain. B—Carrier Sprocket. CC—Reduction Gear. GG—Switches Closed by Pegs. H—Light at Sampling Point. D—Wheel with Peg Holes. EEE—Pegs. F—Peg Box. K—Light in Laboratory. L—"Start Light. M—"Stop" Light.

taken off a carrier idler, there being no apparent slippage in this idler. If such slippage is feared it can be overcome by connecting two idlers together with a bicycle chain and sprockets.

At Felixton Mr. L. Cox has produced an interesting variation of the principle (Figure 2).

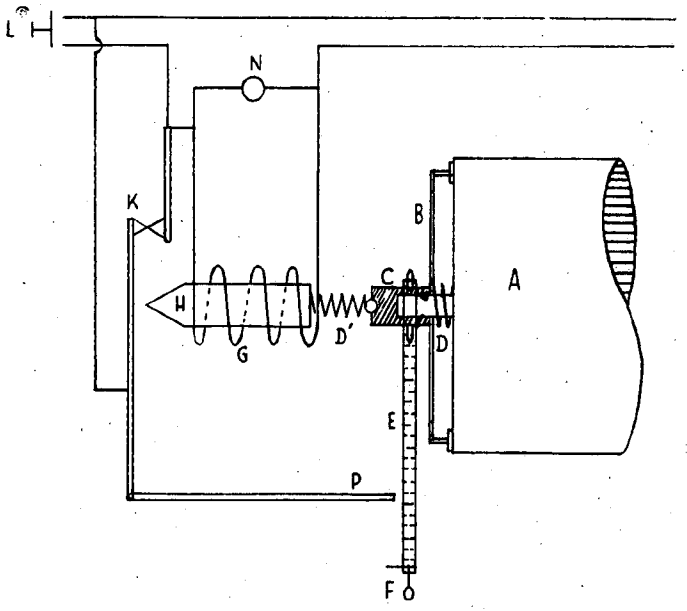

Figure 2.

Felixton Signalling Device.

By L. Cox.

DD' Springs.
A End of carrier driving shaft.
B Clutch plate.
C Boss conveying sprocket.
E Chain.
F Weight and hook on chain.
G Solenoid windings.
H Armature.
K Contact points.
L Press-button at loading point.
M Electric mains.
N Signal light at sampling point.
P Lever arm actuated by hook F.

A clutch plate B can be engaged by friction against the end of the carrier driving shaft. Ordinarily it is kept out of engagement by a spring D. In the centre of the clutch plate is a boss C which fits over a steel stud screwed into the end of the carrier driving shaft. This boss carries a sprocket, over which hangs a chain E. At the lower end of this chain is a weight with a projecting hook F. G is a solenoid, and H an armature, which under ordinary conditions, with no current flowing, is pushed over to the left by the spring D' keeping the contacts K open. The spring D keeps the clutch plate out of engagement with the driving shaft.

When a cane sample commences to ascend the carrier, the cane tester presses the button L. A current flows through G, causing H to move to the right. This closes the points K and allows the current to continue flowing when the button L is released. At the same time the clutch plate is forced against the driving shaft, and thus starts to rotate, carrying the sprocket with it, and turning the chain. A signal light is illuminated at the sample point and continues to shine while the head of the sample is ascending the carrier.

When the head of the sample reaches the crusher the hook F has been carried right round with the chain, and engages the lever arm P, the movement of which breaks the contact at K, which cuts off the current in the solenoid, extinguishes the signal light, and allows the spring D to force the armature over to the left, where it holds the points at K apart. At the same time the spring D releases the clutch plate and the weight at F pulls the chain back to its normal position.

The weakness of this otherwise satisfactory device is that once it has been put into operation by the switch, it cannot be again operated until after one complete travel of the carrier. This renders it useless for a very small sample, or in the case of a break in a sample occuring shortly after the start.

At another factory where it was found difficult, owing to the proximity of a railway to the carrier on both sides, to instal any device geared to the carrier, an installation was made, which depended for its successful operation solely on the assumption that the time of travel of the carrier was uniform. As this assumption is very far from being true, the device cannot be considered as satisfactory.

Another device observed at the Calamba Central in the Philippine Islands (Figure 3) consists of a 2 in. bar, about 6 ft. long with a screw thread, situated under the carrier, near the sampling point, and geared to the carrier so that it rotates axially. A pointer can be hung on this bar, the inner surface of the semi-circular piece which hooks over the bar being threaded on its inner surface to engage with the threads on the rotating bar. At the commencement of the sample the pointer is hung on to the bar and proceeds to travel along it. When it reaches the other end it is time to take the sample. With a long carrier, two or more pointers may be travelling simultaneously.

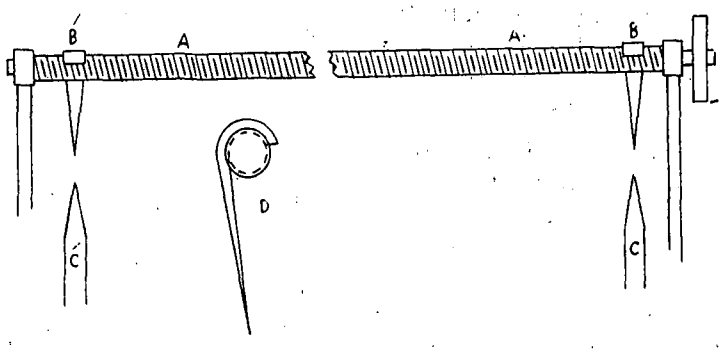

Figure 3.

CALAMBA SIGNALLING DEVICE
(Slightly modified).

AA Screwed shaft geared to carrier.
B Pointer at "start" position.
B' Pointer at "stop" position.
C "Start" point indicator.
C' "Stop" pointer indicator.
D Enlarged cros-section of pointed hanging on bar.

A great advantage in all such signalling devices is that they are neither costly, nor difficult to instal. A few pieces of junk, such as are to be found lying in a factory scrap heap,some electrical fittings, a little ingenuity on the part of the engineer, and a few hours of a mechanic's time, being the only ingredients required. For this reason no factory should have any difficulty in fulfilling the requirements of the Agreement in this respect, by the start of the next crushing season.

Mr. CAMDEN SMITH: The device should work quite well, only, of course, no provision is made for any slippage in the carrier in wet weather. That will have to be looked out for.

Mr. MOBERLY: I think Mr. Camden Smith is quite right—that no device of this sort, so far as I can see, can take care of that difficulty. I think, as he says, you will have to look out for it and make any allowance for it when it does occur.

There is one point I overlooked, just as a guide to some people—that the meaning of the Agreement is taken by the Central Board that protection of that sort applies to all mills where cane is brought and sampled: it does not merely apply to such mills as the Central Board Cane Testing Service operates at.

The PRESIDENT: I would like you to join me in a vote of thanks to Mr. Moberly for his paper. (Applause).