

A Polariscopes Printer

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About 3 years ago D. J. Roach, assistant general manager, and S. J. Osborn, general chemist, both of the Great Western Sugar Company, suggested that a polariscopes that would print the sugar reading directly on the analysis ticket would avoid errors in reading the vernier scale and in transferring the reading to the analysis ticket.

The vernier scale is similar to scales used on most scientific instruments. It involves the reading of numbers and the counting of lines or divisions. Most scales read in one-tenth of a whole number. Experienced operators can read exactly to one-tenth and estimate to five-hundredths or less. Inexperienced operators sometimes have difficulty reading to one-tenth of a division.

The operation of reading a polariscopes consists of placing a prepared sample in the instrument, then looking into the lower, or field, eyepiece where a circular field of light divided into halves by a vertical line is seen. These two halves are different in shade or color. By turning the reading screw which is located below the eyepiece, the operator moves a quartz wedge across the optical system. When this wedge is brought into the proper position, the two halves of the colored field have the same intensity and shade. At this point the vernier scale reads the percentage sugar in the sample under observation. The vernier scale is then read through the upper eyepiece or telescope. It takes longer and requires more experience to read this scale than it does to match the colors in the field. Most errors of analysis are made in reading this vernier scale and copying the reading on the analysis ticket.

Having these ideas in mind we made an experimental instrument which was used in the Beet Laboratory during the complete season and proved satisfactory. The original instrument was very similar to the present one except that it had a hand printing device.

The present instrument consists of a printing wheel carrying an etched brass scale reading in one-tenth sugar degrees. It covers a range from 7 to 25 percent sugar. The printing wheel is mounted in bearings directly under the reading screw. This reading screw operates the quartz compensating wedge to match the colors of the field and moves the vernier scale to the proper sugar reading. The printing wheel is attached rigidly to the reading screw so that any movement of the vernier scale results in a proportional rotation of the printing wheel. Most of the polariscopes now in use pass through :52

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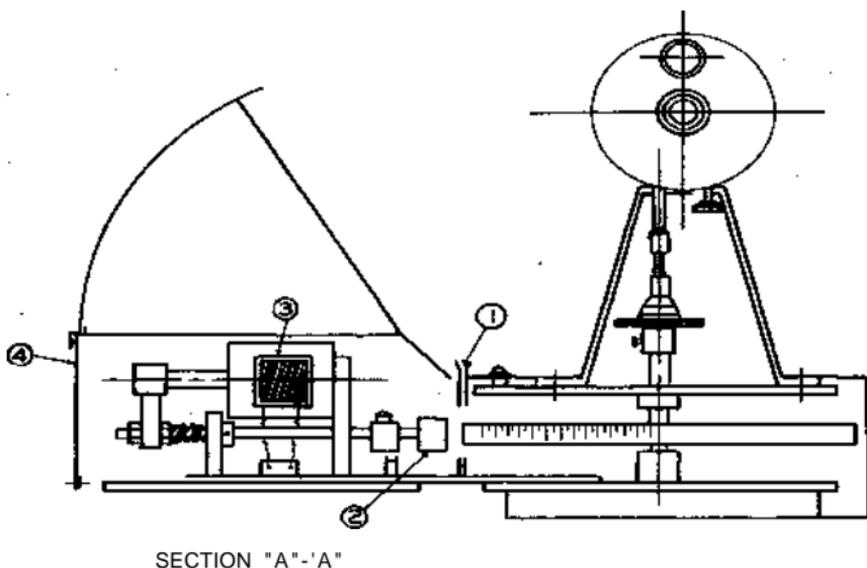


Figure 1.—1, card holder; 2, printing hammer; 3, solenoid ; 4, cover.

to 56 sugar degrees for one complete revolution of the reading screw. In fitting a printing scale to an individual polariscope a standard scale is used, all scales having 1/16-inch divisions for each one-tenth sugar degree. The scale is adapted to the individual vernier scale by varying the diameter of the printing wheel. For example a scale is to be fitted to an instrument having 52 sugar degrees for one complete revolution of the reading screw. Since our printing divisions are 10/16 of an inch for each sugar degree, a complete revolution of the wheel would be 520/16, or the circumference of the printing wheel with scale would be 32.5 inches corresponding to a diameter of 10.345 inches. It is possible to fit the standard scale to any vernier scale as long as the vernier scale is uniform. There is a fine adjustment on the coupling fastening the reading screw to the printing wheel by which the vernier scale can be set exactly with the printing scale. The rack which moves the vernier scale is double and when properly adjusted has no back-lash; therefore the printing scale operates in exact relationship with the vernier scale.

The printing device is powered by an electric solenoid operating on 110 volts AC. This is shown in the accompanying drawing. A typewriter ribbon is moved between the printing scale and the card holder. A printing hammer strikes the card, driving it against the

printing scale and a fixed index point. The printed card can easily be read to five-hundredths of a sugar degree.

One of these instruments has been in use in our Beet Laboratory for two seasons. Two more were used last season. They have given satisfaction and have received favorable comment from the Growers' Association and the cashier's department. We expect to equip several more of our beet laboratories with them this year.

The printer has the following advantages over the regular polariscope.

(1) It is relatively simple to teach a new operator to match the colors of the polariscope field, but it takes much more time to teach one to read the vernier scale without error.

(2) It is necessary only to place the analysis ticket in the printer slot, match the colors of the field, and press a button. The sugar reading is printed directly on the analysis ticket. This eliminates the reading of the vernier scale. This saves time and eyestrain for the operator. It relieves the operator of writing the reading on the ticket and thus eliminates errors in transposing figures.

(3) The cashier carries the figures to the nearest one-tenth. Formerly it was necessary for the polariscope reader to decide whether the reading should be the next tenth higher or the next tenth lower. The divisions on the ticket being 1/16" apart makes this very easy to decide, and the cashier's office makes the decision.

(4) It leaves a permanent record on the analysis ticket for the inspection of anyone interested.

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