An Absorption Cell, Mercury Sealed

Use is made of a mercury seal to replace the cement and rubber gaskets generally employed to make cells sufficiently tight to hold liquids which are to be examined for their infra-red spectra. Fig. 1 exhibits a cell cut in half, the cross section showing the salt plates *PP* forming the cell windows with the thickness of the liquid layer regulated by the thickness of the metal shim, *S*. Each plate on its inner surface is channeled entirely around, near its edges, with a deep groove as shown. This is done with a milling machine. When the cell is assembled, these two channels are opposite and form a single channel of double depth which, when filled with mercury, completely seals the inner volume of the cell from the outside. Care should be taken to make the salt faces and the metal shims accurately flat. When the plates are pressed together with a very moderate pressure, this mercury seal is good enough to retain liquids even when the cell is used in evacuated spectrographs. The shims are of aluminum or platinum, the parts inside and outside the mercury being separate or held together by narrow cross strips.

The steel plates *BB* which hold the cell together are given any convenient shape, circular in this case. The pressure exerted by the bolts must be very gentle, a thin rubber gasket between metal and salt easing any unequality of pressure. When assembled the channel is filled with mercury through the steel tube, *V*, whose lower end is opposite a hole drilled through the upper salt plate into the channel. A finely threaded screw closes the top of this tube when it is completely full of mercury. The liquid to be examined is run through a second hole drilled through the upper salt plate near the one for the mercury. This hole is to be above the liquid level when the cell is vertical. When the liquid is too viscous to run through the narrow opening, a second opening shown at the upper left is drilled and suction applied. Both holes may be closed, without contaminating the liquid, by a soft rubber pad held in place by a thin metal strip screwed to the upper steel plate (not shown in figure).

This cell is independent of cements or gaskets which is important when organic liquids are used. It is quickly taken apart for cleaning. Care has to be taken that in polishing the plates they do not lose their flatness. If a plate cracks it is usually due to this loss of flatness. Plates of NaCl and KBr have been used; the latter permits spectral range to 22μ or better.

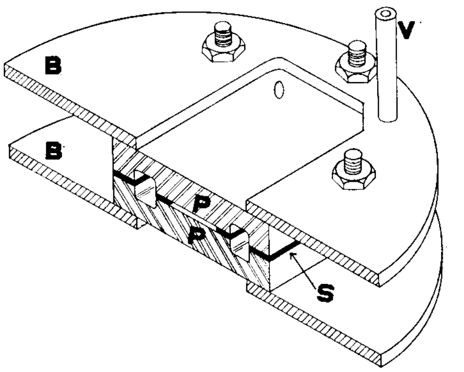

FIG. 1.

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A Recording Device for a Shook and Scrivener Colorimeter

A method for automatically recording the momentary position of balance of a photoelectric colorimeter of the Shook and Scrivener type[1] is of advantage when using the apparatus to measure rates of reaction where changes in light-absorbing capacity of liquids through color changes or otherwise are involved. The following adaptation of a recorder has been used with success for this purpose.

An arm projecting from the traveling carriage inside the box carries two metal points, which are about 1 inch apart, and travels about 5 mm over a waxed paper strip[2] which lies on a grounded metal strip. Through one point an automatic timer sends a spark from an ignition coil at regular time intervals, marking the strip with the position of the traveling carriage at that time. Whenever the carriage is moving at such a rate and is in such a position that the galvanometer shows balance, a key connecting the timed current source to a second ignition coil connected to the second metal point is closed and a double perforation is made at that moment, showing a balance reading.

A reproduction of a typical strip is shown in Fig. 1, in which the exact position of the metal points is shown as a minute hole at the center of each wax dot. The hole can be clearly seen in the original to use in calculation, but due to halftone reproduction is difficult to see in Fig. 1.

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[1] Shook and Scrivener, Rev. Sci. Inst. **3**, 553 (1932).
[2] Of the type commonly used in the "Atwood machine."

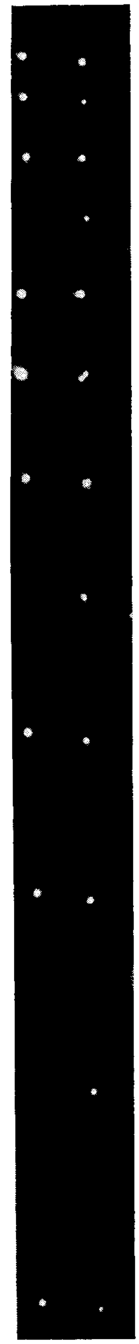

FIG. 1.