Laboratory and Shop Notes

Magnetic Field Measurement in Beta-Ray Spectroscopy

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IN order to determine the momentum of particles in the magnetic beta-ray spectrometer, an absolute determination of the magnetic induction must be made. This is usually accomplished by tripping a flip coil in the field and applying the induced electric charge to a ballistic galvanometer. The galvanometer must be calibrated by having in its circuit a known mutual inductance through which the current is changed a known amount. It is apparent that a great many uncertainties must necessarily enter into such determinations. The evaluation of the integrated area of the flip coil is alone a difficult task.

In order to simplify this measurement an apparatus similar to that first used by Lorentz in the determination of the absolute ohm has been devised. A solid silver disk about 10 cm in diameter is mounted as shown in Fig. 1 so as to spin about a central axis and cut normally across the field. A small synchronous motor running at 1800 r.p.m. drives a completely non-magnetic reducing gear so that the disk spins at 3 r.p.sec. A fine silver wire makes contact in a slight depression at the center of the top of the disk and two parallel silver wires press lightly on the outer rim forming the other electrical contact. The brushes are arranged so that the radius inducing the e.m.f. that is measured is along a chord of the circle which is the path of the particles in the spectrometer chamber.

The output of the disk generator is observed by a Leeds and Northrup Type K potentiometer used with a high sensitivity galvanometer. In this way even running at this slow speed a change in magnetic induction of 0.15 gauss can be observed. Uncertainties exist only in determining the

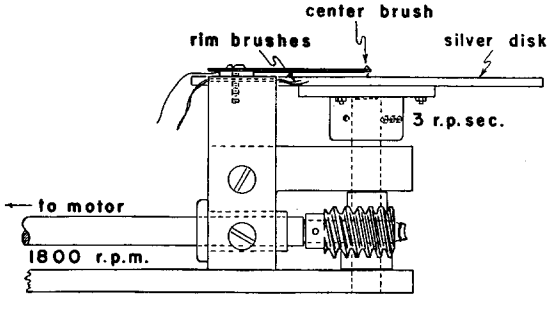

FIG. 1. Schematic drawing of the spinning disk generator.

radius of the disk and in the constancy of the speed of the synchronous motor. The silver to silver contacts offer no thermal e.m.f. difficulties and are free from chattering.

Even if not used continuously it is worthwhile in calibrating the flip coil or any similar device.

A Plate-Cutting Slab

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MANY people have difficulty in cutting and breaking photographic plates to a predetermined width in complete darkness, when using a steel wheel scoring tool. To avoid the loss of expensive plates from breaks which do not follow the scored line, a useful plate-cutting slab has been made in this laboratory.

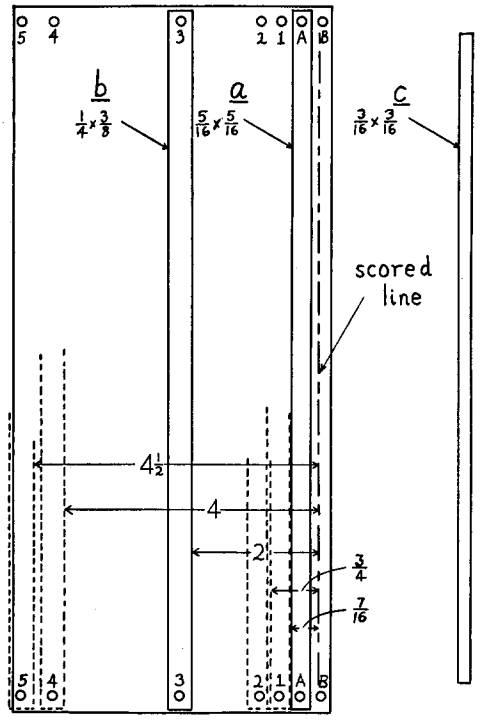

FIG. 1.

The slab is designed to handle plates up to 4″×10″, and to cut widths of $\frac{7}{16}$″, $\frac{3}{4}$″, 2″, 4″, and $4\frac{1}{2}$″, which are needed for the various plate holders on several spectrographs in daily use here. The slab consists of a smooth flat piece of $\frac{1}{4}$″ cold rolled steel 5″×11″, which bears seven steel pins $\frac{1}{8}$″ in diameter pressed into the top face at each end along a line $\frac{1}{4}$″ from the edge, as shown in Fig. 1. These pins locate the position of three steel bars, *a*, *b*, and *c*, first for cutting, and then for breaking the plate.

The bars are shown in the diagram in position for cutting. Bar *a* rests on top of the plate, and bar *b* is in contact with the slab and serves as a stop, to fix exactly the plate width to be scored. The line which will be scored on the plate with our steel wheel cutters is $\frac{1}{8}$″ from the right-hand edge of bar *a* when it is in position *A*, and is $\frac{3}{16}$″ from the edge of the slab. The width to be cut is the distance from this line to the right-hand edge of bar *b*, and may be any one of the five values shown.

After the plate is scored, bar *a* and the plate are removed, and bar *c* is placed on the right-hand side of bar *b*. Then

the plate is replaced, using the edge of c as a stop. This brings the scored mark exactly over the edge of the slab. When bar a is replaced in position B, its right-hand edge is also over the edge of the slab, and the plate is clamped between it and the slab in a sort of vise. Thus when the over-hanging part of the plate is depressed, the greatest strain occurs exactly at the scored mark, and the plate breaks cleanly along this line.

The slab is easy to use in total darkness, as the three bars are of different sizes and easily distinguished by touch, and as the orientation of the slab and the correct pins to use may also be found by touch. After learning the simple technique, three different operators have made nearly a hundred cuts using the slab, without a single case of faulty breakage.

The authors are indebted to Mr. Howard Sandvik for actual construction of the slab and bars.

On an Optical Slit

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I WISH to call attention to a description of an optical slit by J. E. Sears[1] which is substantially the same as one described in this section.[2]

[1] J. E. Sears, J. Sci. Inst. **10**, 376 (1933).
[2] John Strong, Rev. Sci. Inst. **12**, 213 (1941).

New Instruments

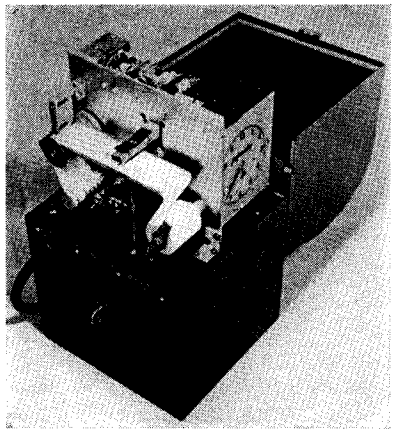
Section Editor: Wm. F. Roeser,
National Bureau of Standards, Washington, D. C.

These descriptions are based on information supplied by the manufacturer and in some cases from independent sources. THE REVIEW *assumes no responsibility for their correctness.*

Mechanical Traffic Counter

The Streeter-Amet RC Traficounter used in highway planning and traffic control systems counts vehicles in motion past a given point at the roadside or curb. The counter registers when pneumatic impulses started by wheels crossing a tube laid transversely on the road surface close an electric circuit as the pressure waves strike a diaphragm membrane. A hit and skip action in a star and geneva linkage cause one count for each pair of impulses. For sharp determination of traffic fluctuations the instrument records the count on a tape at fifteen-minute intervals, and for convenience in subsequent statistical work with the record automatically clears to zero each hour on the hour.

For portability, the machine is designed for six-volt direct current power supplied by storage cells in the housing base. For safety, lockouts prevent damage from short circuits caused by sustained closure of the diaphragm contacts or other causes, and jamming of the counter unit



during the resetting function. A bleeder valve dissipates excessive pressures caused by heavy vehicles.

The critical functions of a traffic counter are the correct registering of cars moving at extremely low speeds, and cars moving closely abreast in parallel lanes or in any circumstances where incidences on the road tube by the wheels of different vehicles closely follow one another. Practically the sensitiveness of the counting unit proper is limited by the necessity for ruggedness. With an apt combination of low inertia mechanical parts and specially wound relay coils, the counter handles impulses for sustained periods at the rate of 1600 per minute.

Simultaneous incidences on the road tube result in undercounting. When the road tube extends across more than two parallel lanes, accuracy therefore depends upon the density of traffic. In extreme cases, such as a location at the entrance side of an intersection on a heavily loaded highway, undercounts up to five percent may occur. On the same highway and on the exit side of the same intersection, the undercount may be two percent or less.—STREETER-AMET COMPANY, *4101 Ravenswood Avenue, Chicago, Illinois.*

Seam Welder Controls

A new full-electronic timer and control designed for use with seam welders, as well as spot welders is announced by Weltronic Corporation. When used with spot welding machines, the Model 40 timer provides both single shot and pulsation type welding controls.

Of the synchronous type, and incorporating phase-shift type heat control, the Weltronic 40 always starts and stops current flow at the zero point of the current wave, while current duration is adjustable to the exact number of cycles desired.

The cabinet housing the control is of the standard Weltronic 4-panel type. The top panel is blank in the standard control, being provided for the mounting, if desired, of sequencing controls, etc., which are sometimes used to replace limit switches, etc., in seam welding.

The second panel is provided with three dials. The left-hand dial adjusts current duration to the exact number of