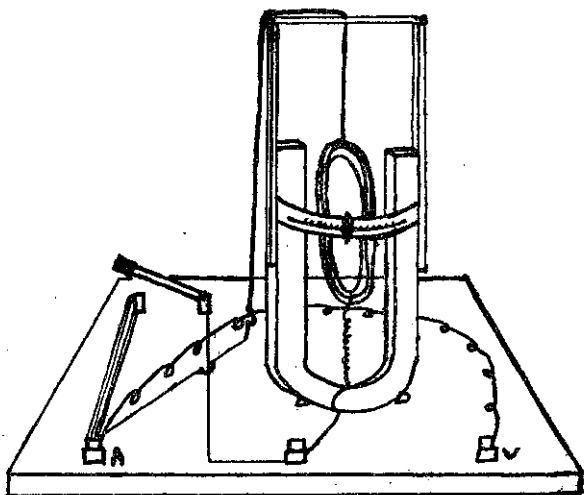


A HOME-MADE GALVANOMETER.

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As a teacher of physics in a small High School during the past few months I have realized what difficulty arises from a lack of adequate equipment. Especially may this be true in regard to electrical instruments which, if worth much for tolerably accurate results, are almost always of high price. The school where I taught had no galvanometer in its physics laboratory equipment and the need for one was very great, although a Weston volt-ammeter sufficed for several occasions when considerable current was used. The following paragraphs tell how I built a rough-and-ready instrument with some supplies at hand.



As the accompanying sketch shows, a large horseshoe magnet is securely mounted, arch down, on a piece of board and a coil of some thirty turns of large copper wire is suspended by means of a light wooden scaffold between the poles of the magnet. Attached to the coil and perpendicular to its plane is a piece of wire which is bent up over a paper scale, the latter a semi-circle and fastened at each end by thumb-tacks to the inside edge of the scaffold. The upper suspension is composed of a piece of No. 30 bare copper wire and the lower is a small coil of No. 40 silk-wound copper wire. The latter is connected to a binding post in the center of the board and the former joins a piece of large wire which terminates at the left-hand binding post (A).

Between this terminal and the central one is placed a knife switch and a few lengths of steel wire to form a shunt. A coil of very fine copper wire leads from terminal A to terminal V.

The strength of the magnet is such and the coil sufficiently large so that when an outside circuit is connected to the two left-hand terminals the instrument acts as a galvanometer. If the knife switch be closed, the resulting shunt allows the instrument to act as an ammeter. With the switch open and the circuit completed thru V instead of A a voltage reading is possible. Lack of uniformity in the field, air currents and the like prevent the instrument in any case from being very accurate, but as a galvanometer indications of current are noticeable when it is employed with, say, a slide-wire bridge, on which the moving contact may be within a couple of cms. of the correct null point. The instrument was calibrated for amperes and volts with standard meters, the ampere range being 0-8.5, the volt range 0-6. These values appear on the scale. The resistance of the galvanometer connection is 0.03 ohm, that of the ammeter side 0.24 ohm and that of the voltmeter part 19.30 ohms (too small for any hope of accuracy).

The properties of the upper suspension largely determine the sensitiveness of the instrument. Ordinary "bell" wire suffices for the coil. The results obtainable as a galvanometer are satisfactory enough for the grade of work attempted. I shall be glad if these hints may prove useful to any High School teacher, and if the complete instrument fail in many respects from an electrical standpoint, it will show quite clearly the mechanical construction of a suspended-coil current measuring instrument.

PRODUCTION OF ASPHALT INCREASES.

The quantity of native asphalt and native bitumens sold in the United States in 1920 was 198,497 short tons, valued at \$1,213,908, according to the United States Geological Survey, Department of the Interior. This was an increase of 125 per cent in quantity and of about 78 per cent in value over 1919. Gilsonite was reported from Uinta Country, Utah, wurtzilite (or elaterite) from Duchesne County, Utah, and grahamite from Pushmataha County, Okla.

The sales of manufactured asphalt obtained from domestic petroleum amounted to 700,496 short tons, valued at \$11,985,457, or \$17.11 a ton. Compared with 1919 these figures indicate an increase of 14 per cent in quantity and 37 per cent in value.

The sales of asphalt manufactured in the United States from Mexican petroleum in 1920 amounted to 1,045,779 short tons, valued at \$14,272,862 or \$13.65 a ton. This was an increase of 55 per cent in quantity and of 85 per cent in value over 1919.