Letters to the Editor.

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A Method of Recording Coincidences between Geiger Counters.

RECENTLY the recording of coincidences between Geiger counters has become of considerable interest, and several experimental arrangements have been described for this purpose.[1] A common property of these arrangements is that the resolving power is of nearly the same magnitude as the duration of an impulse from the counter (about 2×10^{-3} sec.). Impulses occurring within a time interval shorter than

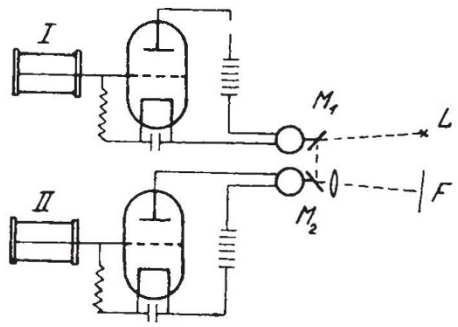

FIG. 1

this are recorded as true coincidences. The method to be described here gives a resolving power about ten times higher; at the same time, it suffers from the disadvantage that the coincidences must be recorded photographically and not by mechanical summation, as is the case with the arrangements mentioned above.

Two Geiger counters *I* and *II* (Fig. 1) are connected to the grid of amplifying valves with grid leaks of 5×10^8 to 5×10^9 ohms. The anode current of the valves is sent through moving iron oscillographs of a type similar to that described by Wynn-Williams and Ward.[2] Light from an arc lamp *L* is reflected successively from the plane mirrors M_1 and M_2 of the oscillographs and concentrated by a lens on a slowly moving film *F*. The deflections of M_1 and M_2 are crossed, so that one mirror gives a horizontal deflection, the other a vertical one.

In Fig. 2, *x* represents the direction of the movement of the light spot on the film, and *I* and *II* indicate deflections given by the two mirrors independently. With a natural frequency of 1000 of the oscillograph, the time taken by the light spot to reach full deflection is nearly equal to the duration of the impulse from the counter; the movement of the light spot back to zero deflection is determined by the discharge of the grid capacity over the grid leak, and can be varied at will within certain limits. If a coincidence occurs, the two mirrors commence their movements simultaneously, and the deflection obtained on the film makes an angle of 45° with the direction of *x* (Fig. 2, *a*). If the impulses from the counters occur with a time difference, the deflection appears as a broken line, as

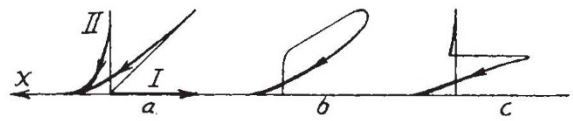

FIG. 2.

indicated in Fig. 2, *b* and *c*, where the time difference is shorter or longer respectively than the duration of the impulse. The position of the kink gives an estimate of the time difference between the impulses. On actual photographs, the smallest time difference which can be detected with certainty is about a tenth of the time taken to reach a full deflection, or about 2×10^{-4} sec. This quantity represents the resolving power of the arrangement. The same value for the resolving power was obtained by counting the number of coincidences when the counters were excited by γ-rays, the coincidences being regarded as accidental. When the same particle (α- or β-particles) was sent through both counters, all coincidences were true (apart from natural effect), so that the time lag in the action of the counter, if it exists, must be identical for the counters used to within 2×10^{-4} sec.

J. C. JACOBSEN.

Institut for teoretisk Fysik,
Copenhagen, June 20.

[1] W. Bothe, *Zeit. f. Phys.*, **59**, 1; 1930. Bruno Rossi, NATURE, **125**, 636; 1930. Hummel, *Naturwiss.*, **18**, 567; 1931.
[2] *Proc. Roy. Soc.*, **131**, 391; 1931.

An Investigation of Infra-Red Radiation from an Engine.

A PRELIMINARY investigation of infra-red radiation from a small single cylinder Otto cycle engine delivering power has just been completed.

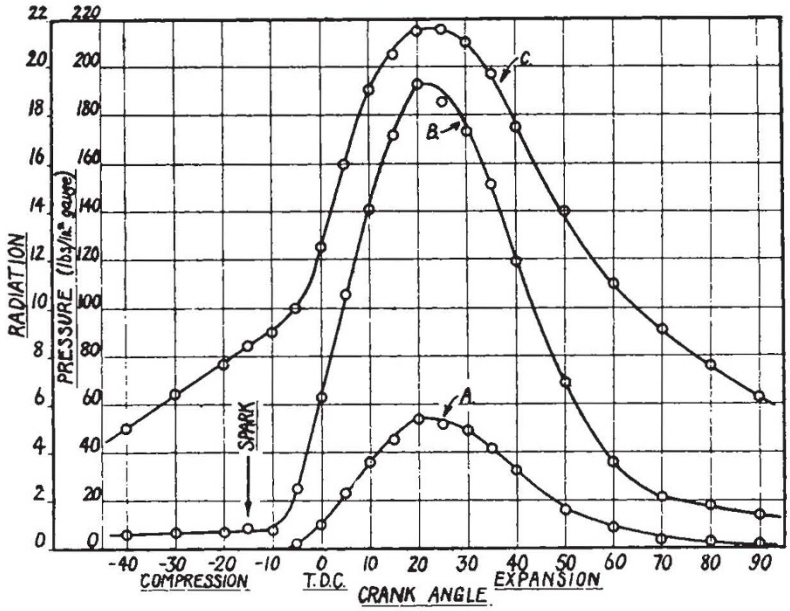

FIG. 1.

The radiation passes through a fluorite window, slightly greater than three millimetres in diameter, and three millimetres thick. Thirty-one positions sym-