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SWITCHING OF CLEARING FIELDS ON SPARK CHAMBERS*

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ABSTRACT

A system for applying clearing-field voltage to the plates of a spark chamber without use of an extra wire or connection is described.

The clearing-field voltage is usually brought to a spark chamber by a separate wire, and the clearing-field supply is protected by a capacitor-resistor network (see Fig. 1). If the capacitor C_1 fails , the clearing-field supply is usually destroyed. The clearing or recovery time of the spark chamber may be limited by the time constant R_1C_1. The extra wire, with up to 200 volts on it and possible high-voltage surges, presents a safety hazard.

If the clearing field is applied as shown in Fig. 2, it is sent out on the same cable as the high-voltage pulse. When the clearing-field voltage is less than the extinguishing voltage of the neon bulb, typically 65 V for NE-51, the bulb will stay off and the clearing-field supply will see an open circuit. When the high-voltage pulse is applied, the bulb breaks down and the damping resistor is switched across the chamber. As soon as the pulse is over, the bulb deionizes and the clearing field is again applied to the chamber plates.

If the clearing-field value is greater than the breakdown voltage of a single neon bulb, several may be used in series. Neon bulbs can carry peak currents of hundreds of amps with no apparent damage, as long as the current pulse times are in the submicrosecond range. The bulb Ne_2 and the resistor R_2 protect the clearing-field supply from voltage surges.

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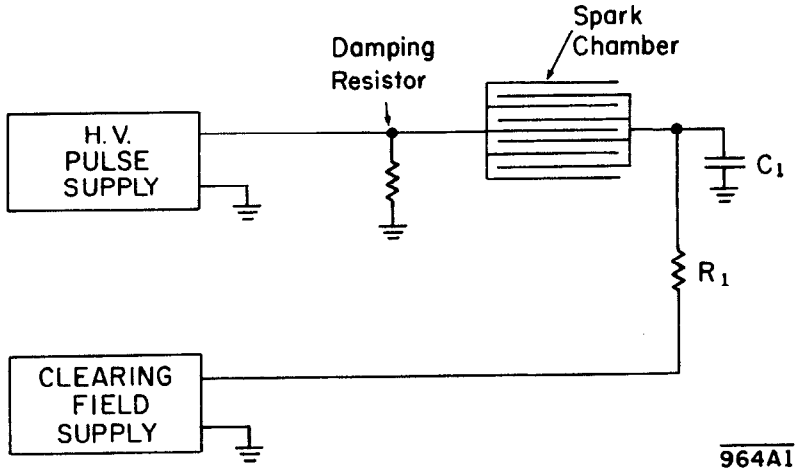

FIG. 1

Conventional clearing field circuit.

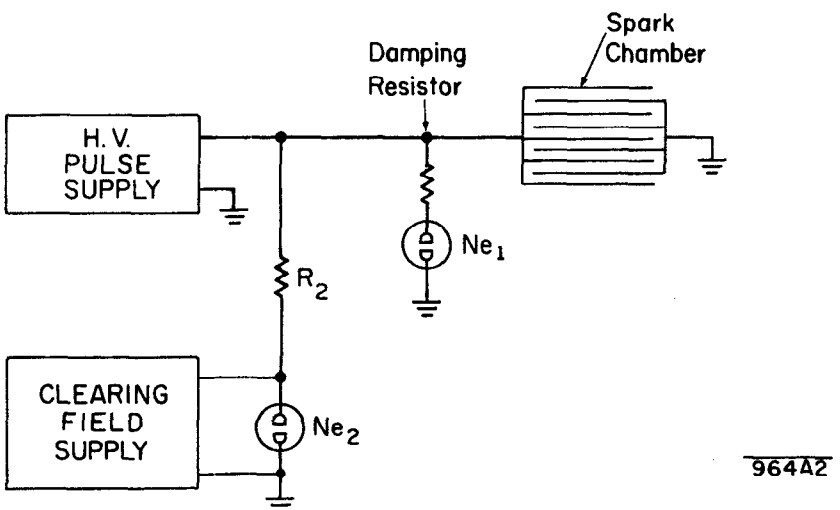

FIG.2

Switched clearing field circuit.