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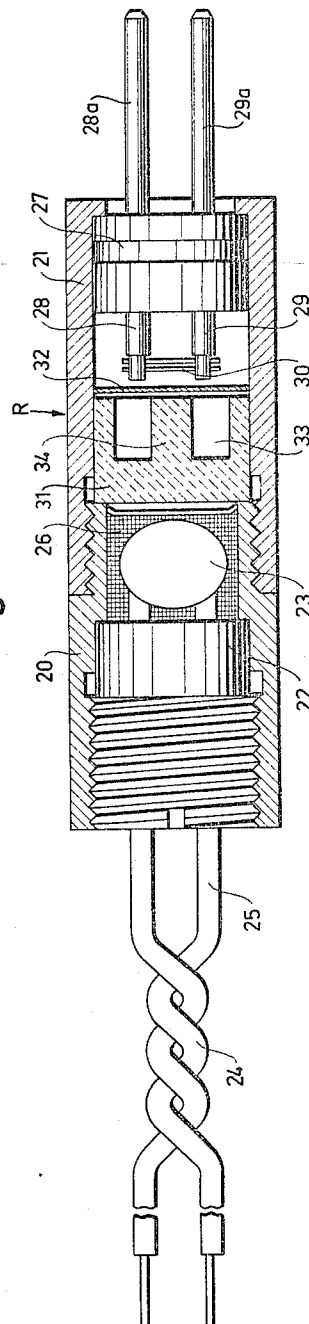
K. V. MATTSSON ETAL
SINGLE USE CIRCUIT BREAKER

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Fig.1



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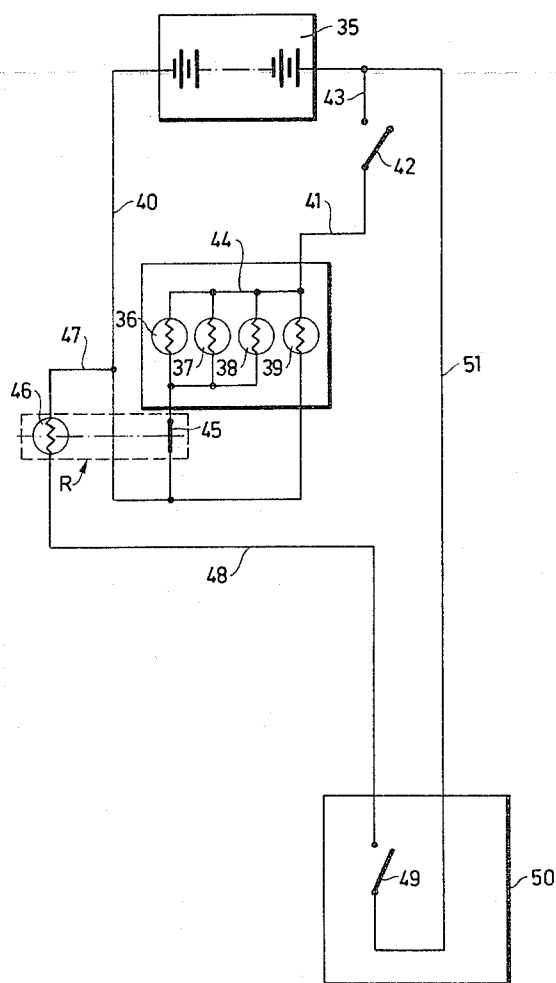
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Fig. 2



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SINGLE USE CIRCUIT BREAKER

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2 Claims. (Cl. 200—61.08)

The present invention relates to an electric circuit breaker and, more particularly, to a circuit breaker which is to be used only once.

Circuit breakers of this type may be used on missiles and particularly in rocket type missiles for breaking a circuit therein at a predetermined time, or in response to a control signal. More specifically, the circuit breaker may be advantageously used on missiles carrying several electrically ignitable tracers. With missiles of this type it is often desired to ignite all the tracers on the missiles, or only selected ones. For such use, the circuit breaker is connected with the energizing circuits for the ignition devices of the tracers so that the circuit breaker when operated interrupts the energizing circuits for the non-selected tracers so that the same remain inactive. Actuation of the tracer circuits may be conventionally controlled by a timing device or a selector transmitting a control signal to the circuit breaker.

It is a broad object of the invention to provide a novel and improved circuit breaker of the general kind above referred to.

A more specific object of the invention is to provide a novel and improved circuit breaker of the general kind above-referred to which is simple, rugged and inexpensive in construction in that the circuit breaker does not include any delicate parts which are likely to be damaged by the heavy jars and rapid acceleration to which a missile is unavoidably subjected when launched.

Other and further objects of the invention will be pointed out hereinafter and set forth in the appended claims constituting part of the application.

In the accompanying drawing a preferred embodiment of the invention is shown by way of illustration and not by way of limitation.

In the drawing:

FIG. 1 is a longitudinal cross section of a circuit breaker according to the invention, and

FIG. 2 is a circuit diagram of a tracer assembly including the circuit breaker.

Referring first to FIG. 1 in detail, the exemplified circuit breaker comprises a sleeve formed of two parts 20 and 21 suitably secured together, for instance by a screw connection. Sleeve part 20 includes a holder 22 for an electric igniting device 23 of conventional design. The device is connected to conductor wires 24 and 25 which should be visualized as leading to a suitable source of current. A pyrotechnical charge 26 of suitable and conventional composition is fitted into sleeve part 20 in co-acting relationship with igniter 23 so that the charge will be ignited when the igniter is activated.

Sleeve part 21 houses two terminal contacts 28 and 29 in the form of metal pins which are secured in the sleeve part by suitable means such as an insulation plug 27. The two pins lead to conductor wires 28a and 29a which should be visualized as being connected to a control circuit. The two pins 28 and 29 are bridged by a frangible conductive bridge 30 formed for instance by thin metal wires.

A plunger 31 of insulation material is slidably fitted in sleeve part 21 between the charge 26 and the bridged end of pins 28 and 29. A frangible disk 32 of insulation material is preferably interposed between the pins and the

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adjacent face of the plunger for a purpose which will become more fully apparent from the subsequent description. The end face of the plunger facing the pins includes an annular recess 33 to define a central lug 34.

As it is evident, the plunger will be retained in its position in any position of the circuit breaker and also when the circuit breaker is subjected to jars. However, when the charge 26 is ignited by activating igniter 23, the thereby generated pressure force will drive the plunger towards the right as seen in the figure. As a result, disk 32 will be fractured and the central lug 34 will break bridge 30. Recess 33 will accommodate pins 28 and 29 when the face of lug 34 moves past the location of bridge 30.

Turning now to FIG. 2, this figure shows a circuit system for selectively igniting one or four tracers in a rocket type missile or similar weapon.

The rocket type missile, which should be visualized as being conventional and is not shown, comprises a battery 35 which is activated by suitable and conventional means (not shown) when the missile is launched. The battery serves to supply current for the entire mechanism of the missile but only those circuit components of the mechanism which are essential for the understanding of the invention are included in the circuit diagram. More specifically, the tracer assembly is shown and, in particular, the electric igniters 36, 37, 38 and 39 for the tracers. Igniter 39 is connected across the terminals of the battery through lines 40, 41 and 43. An initially open switch 42 is connected between lines 41 and 43. Igniters 36, 37, and 38 are connected to line 41 through a line 44 and also to line 40 through a circuit breaker R of the kind shown in FIG. 1. The bridge 30 of FIG. 1 is symbolized in FIG. 2 by a switch 45 and the igniter 26 of FIG. 1 is symbolized by the symbol 46 in FIG. 2. Igniter 46 is connected to one terminal of the battery through lines 47 and 40 and to the other terminal through lines 48 and 51. Lines 48 and 51 are connected by a selector switch 49. The selector switch may be visualized as being part of a stationary control device 50 which is suitably connected with the missile.

If the selector switch is in its open position, as shown in FIG. 2, no current can flow through igniter 46 when battery 35 is activated when the missile is launched and accordingly switch 45 remains closed when the missile is launched. In this connection it should be understood that the connection between the missile and the stationary control device 50 through lines 48 and 51 is automatically broken in a conventional fashion after the missile is launched.

When now switch 42 is closed after a predetermined flight time of the missile by any suitable mechanical, electric or electronic means of conventional design, or also after a predetermined time, the igniters 36 through 39 for all four tracers are connected to the battery and accordingly all four tracers will be ignited.

If selector switch 49 is closed prior to the launching of the missile an energizing circuit will be established through igniter 46 the moment battery 35 is activated as previously described whereby the circuit breaker opens switch 45. As a result the connection to igniters 36, 37 and 38 is interrupted at switch 45 so that closing of switch 42 as previously described establishes an energizing circuit for igniter 39 only and accordingly the tracer associated with igniter 39 is the only one which will be ignited.

While the invention has been described in detail with respect to a certain now preferred example and embodiment of the invention, it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended therefore to cover all such changes and modifications in the appended claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A circuit breaker comprising a tubular housing, two terminal contacts connectable to a control circuit and fixedly mounted in said housing, a frangible conductor bridging said terminal contacts, an actuating member movable in said housing from an inactive position separated from said terminal contacts into a circuit breaking position, said actuating member including a plunger slidable in said housing along a path intersecting the position occupied by said bridging conductor and having in its end face facing said terminal contacts an annular recess defining a central lug, said lug being engageable with said bridging conductor so as to fracture the same and said recess receiving the terminal contacts when and while the lug is moving towards its circuit breaking position, a pyrotechnical charge disposed in said housing adjacent to the end face of the plunger opposite the recessed face thereof, and an activating means for igniting said charge, the pressure generated upon ignition of the charge in said housing causing movement of the actuating member into its circuit breaking position.

2. A circuit breaker comprising a tubular housing, two terminal contacts connectable to a control circuit and fixed-

ly mounted in said housing, a frangible conductor bridging said terminal contacts, an actuating member lengthwise movable in said housing from an inactive position separated from said terminal contacts into a circuit breaking position in which the actuating member causes fracturing of said bridging conductor, a pyrotechnical charge disposed in said housing on the side of the actuating member remote from said terminal contacts, a frangible partition wall in the housing interposed between said terminal contacts and said actuating member to prevent accidental displacement of the latter into its circuit breaking position, and an activating means for igniting said charge, the pressure generated upon ignition of the charge in said housing causing movement of the actuating member into its circuit breaking position.

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