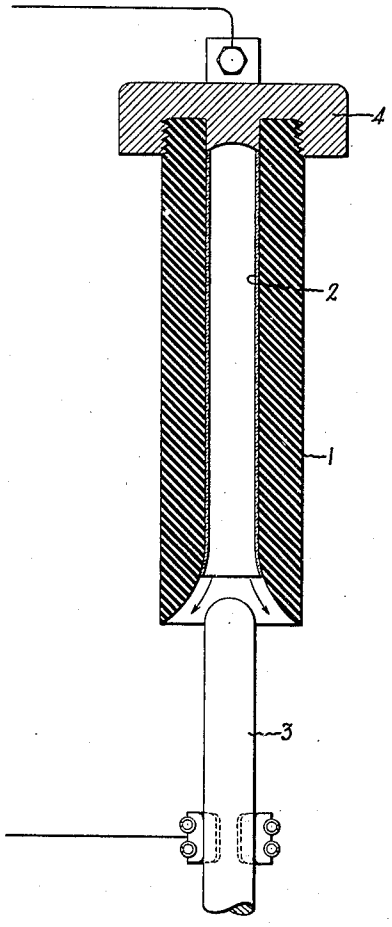
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ELECTRIC CIRCUIT INTERRUPTER

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ELECTRIC CIRCUIT INTERRUPTER

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This invention relates to electric circuit interrupters of the air-break expulsion type wherein a gas formed by decomposition of a material by the arc upon opening of the circuit is utilized to interrupt the arc.

In a well-known form of circuit interrupter of the aforesaid type, the arc is drawn in a confining insulating structure, such as a tube composed of material which under the influence of the arc heat emits gases or vapors tending to extinguish the arc. The interrupting capacity of a circuit breaker of this type wherein the gas for interrupting the arc is released by the arc heat from solid materials forming the walls of the confining insulating structure, depends primarily on the rapidity with which appreciable amounts of arc-extinguishing gas can be released under the influence of the arc, particularly in the case of low current interruptions. The interrupting capacity also depends on the characteristics of the gas so formed.

In the latter case, it is known that carbonic acid has many advantages as an arc extinguishing medium. In practice, however, the use of carbonic acid has been limited because of the comparatively complicated and expensive switching installations heretofore considered necessary.

With reference to the rapidity of generation of the arc extinguishing gas in appreciable quantities under the influence of the arc, fiber has proved satisfactory. However, due to the hygroscopic characteristics of the fiber, this material has not stood up well in operation. Another known material for releasing gas by action of the arc is boric acid which contains chemically combined water. In the circuit opening process the water is released under influence of the arc and is evaporated to form an arc extinguishing vapor. In this case, however, the evaporation is not free of residue so that the original properties of the wall surfaces adjacent the arc are not obtained after repeated circuit interruptions.

It has also been proposed to make the arc-extinguishing tube of fibrous material impregnated with a urea artificial resin. In this case, wherein mainly nitrogen acts as the arc extinguishing gas, the fibrous materials or carriers must be so selected that they readily disintegrate to form gas under influence of the arc without leaving undesirable residue as soot. Accordingly, the cost of the arc extinguishing material in this case is an important factor.

In accordance with the present invention the advantages inherent in the use of carbonic acid as an arc extinguishing medium and in a material capable of releasing gas at a high rate for interrupting the arc are obtained without disadvantageous results by the use of oxalic acid as the gas emitting material. The oxalic acid may either contain water or be free of water and may be used either with or without materials giving off oxygen, such as organic peroxide or per-salts.

Under the influence of the arc, the oxalic acid disintegrates to carbonic acid and water at a high rate. The carbonic acid which is suitably utilized to interrupt the arc in a manner hereinafter described is released immediately and in large quantities, while the solvent water present evaporates without being essential to or materially influencing the arc interruption. Since oxalic acid readily disintegrates upon the addition of oxygen and by the addition of materials giving off oxygen, the production of the arc extinguishing gas may be considerably increased thereby.

For the purpose of making the arc-interrupting structure in practical form, the oxalic acid is deformed and subjected to high pressure with or without the addition of a binding agent in powder form. As examples of binding agents, inorganic agents, such as plaster of Paris, clay, etc. and organic agents such as highly oxidized oils, such as, for example, linseed oil and wood oil, or prepolymerized artificial resin, as, for instance, a urea artificial resin may be used.

Referring more particularly to the drawing which illustrates a simple form of circuit interrupter to which the present invention is applicable, the single figure thereof is an elevational view partly in section of a circuit interrupter of the air-brake expulsion type.

In a structural embodiment of the invention it is preferable, particularly when the gas-emitting material for confining the arc is in tubular shape, to provide a strong reinforcing tube therefor because of the stresses incident to circuit interruption.

As illustrated, a mechanically strong reinforcing tube 1 composed of a suitable fibrous material, for example, is provided with an inner lining at 2 composed of the oxalic acid gas-emitting material above described. The arc which is formed upon opening of the circuit is drawn through the tubular structure by the movable rod contact 3 which coacts with the fixed contact 4 at the upper closed end of the tube. The tube has a sleeve fit with respect to the rod contact so that the arc is either in close proximity to or

in contact with the tube walls. When the contact 3 clears the open end of the tube as illustrated, a blast of carbon dioxide gas is released through the arc for interrupting the circuit.

It should be understood that my invention is not limited to specific details of construction and arrangement thereof herein illustrated, and that changes and modifications may occur to one skilled in the art without departing from the spirit of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An electric circuit interrupter comprising means for opening the circuit so as to form an arc, and an insulating structure disposed adjacent and in confining relation to said arc, the walls of said structure in proximity to said arc being composed of oxalic acid.

2. An electric circuit interrupter comprising means for opening the circuit so as to form an arc, and an insulating tubular structure within which said arc is drawn, said tubular structure being in confining relation to said arc and consisting of a reinforcing material having an inner lining composed chiefly of oxalic acid.

3. An electric circuit interrupter comprising means for opening the circuit so as to form an arc, and an insulating structure disposed adjacent and in confining relation to said arc, the walls of said structure in proximity to said arc being composed of oxalic acid and a per-salt.

4. An electric circuit interrupter comprising means for opening the circuit so as to form an arc, and an insulating structure disposed adjacent and in confining relation to said arc, the walls of said structure in proximity to said arc being composed of oxalic acid, and a binding agent consisting of a highly oxidized oil.

5. An electric circuit interrupter comprising means for opening the circuit so as to form an arc, and an insulating structure disposed adjacent and in confining relation to said arc, the walls of said structure in proximity to said arc being composed of oxalic acid, and a binding agent consisting of a prepolymerized artificial resin.

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