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(54) Rotating fireworks.

(57) A rotating firework characterised in that it comprises a support, which may be centrally-pivoted, having a pyrotechnic composition applied thereto in a generally circular arrangement with a discontinuity is disclosed.

The production thereof, preferably by stencilling or screen printing, is also disclosed.

The accompanying illustrative drawing depicts a preferably stencilled or screen printed wheel viewed from the front when in firing position. A discontinuous strip of pyrotechnic composition (1) has been applied to a support board (2) which is provided with a centre pivot boss (3). This is a simple one-direction wheel. Ignition at A by ignition means (not shown) would result in anticlockwise rotation, while ignition at B would give clockwise movement.

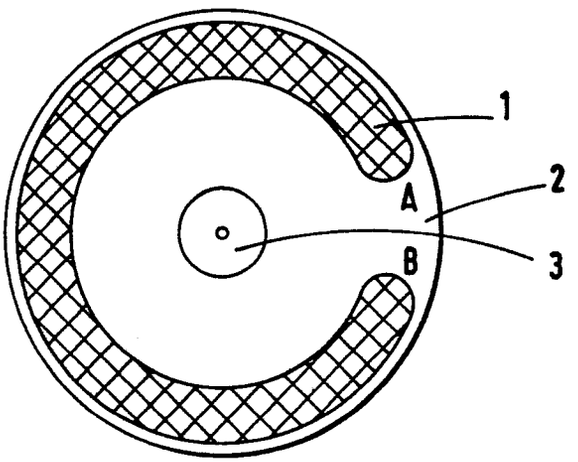

Fig.1

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ROTATING FIREWORKS

This invention relates to rotating fireworks, more particularly it relates to stencilled or screen printed wheels.

Existing rotating fireworks generally employ pyrotechnic compositions contained in tubes. They may comprise two or more straight tubes attached at or near the periphery of a centrally-pivoted support, which may or may not be laminar, commonly a board, which are generally arranged to burn consecutively. Larger types frequently use spoked wheels usually of wood or plastics, smaller types also commonly use a plastic moulding. Alternatively, in the firework commonly known as a Catherine Wheel, the pyrotechnic composition may be provided in a thin-walled tube which is wound round a central boss. Another known type of rotating firework comprises a single tube with a pivot at one end and a hole in the side of the tube near the other end, through which a jet of flame emerges. Such may also be provided in a double version having a pivot in the centre and a jet near each end.

U.K. Patent No. 2,049,651 relates to a process for applying a pyrotechnic or explosive composition to a surface which comprises: (i) screen printing the composition in the form of a liquid, slurry or paste on to the surface; and (ii) allowing the layer of the composition thus obtained to dry and/or harden. Reference may be made thereto for further details.

It has now surprisingly been found that such a technique may be used in the production of a novel rotating firework. Stencilling may also be advantageously used. More particularly, a pyrotechnic composition applied discontinuously on the surface of a centrally-pivoted generally laminar support, such as a board, may be arranged to produce sufficient thrust on ignition to spin the support. Such is novel, unexpected and advantageous. It is particularly surprising as a relatively small amount of composition is used and the thrust is not directed by a tube. The main advantages arise in ease and hence cost of production.

The present invention provides a rotating firework characterised in that it comprises a support, which may be centrally-pivoted, having a pyrotechnic composition applied thereto in a generally circular arrangement with a discontinuity.

The applied composition tends to burn with a flame at a relatively small angle to the plane of the support surface. Thus, a strip of applied pyrotechnic composition describing the arc of a circle will produce thrust at a tangent to the circumference of the circle and will tend to rotate the support about the pivot. The above-mentioned discontinuity is necessary to provide an ignition point. By a change of direction of the applied strip of pyrotechnic material, the firework may be made to spin first one way and then the other.

Although the above-described screen printing technique may be regarded as a preferred means of production, along with stencilling, the present invention is not restricted thereto. Rotating fireworks in accordance with the present invention embody a unique concept and may be produced by a number of non-traditional methods. According to the present invention, rotating fireworks may be produced by various means involving applying a strip of pyrotechnic composition in an appropriate conformation to a generally laminar support, which may be pivoted. For example, a strip of an adhesive material may be applied as desired to a laminar board and pyrotechnic composition dusted on to the adhesive. Alternatively, a pyrotechnic composition may be applied directly to a board, for example, by painting and then dried.

Accordingly, the present invention also provides a process for the production of such a rotating firework characterised in that it comprises applying a generally circular arrangement with a discontiuity of a pyrotechnic composition to a support, which may be centrally-pivoted.

After application, for example by stencilling or screen printing, the pyrotechnic composition is allowed to dry or harden. A layer of priming composition may be applied to one end of the strip to facilitate ignition. Alternatively, a fuse, for example touchpaper, may be applied to the strip at the desired point of ignition.

The strip of dried pyrotechnic composition is preferably covered with one or more layers of inert material, for example varnish, paint or epoxy resin, to inhibit ignition of the surface of the applied pyrotechnic except at the intended point of ignition. Such inhibition also helps to ensure that, once ignited, the firework will continue to rotate until all of the pyrotechnic composition is consumed.

Typically, the composition includes a curable resin, which also acts as fuel for the pyrotechnic composition, such as resorcinol-, phenol-or urea-formaldehyde resin; a hardener, such as paraformaldehyde; an oxidant, such as potassium perchlorate, potassium nitrate, strontium nitrate, barium nitrate or sodium nitrate; a flame colourant or coolant, such as strontium oxalate, strontium carbonate, barium oxalate, barium carbonate, calcium oxalate or calcium carbonate; a metal powder which may act as an additional component of fuel to add to the effect of the display, such as Ti, Fe, Mg, Al, or Mg/Al alloy; and a thinner to reduce viscosity of the

mix and allow flow.

For purposes of illustration, a pyrotechnic composition which is suitable for the present purposes comprises (in parts, by weight):

Resorcinol formaldehyde resin 20 parts
Paraformaldehyde 1.5 parts
Strontium oxalate 5 parts
Potassium perchlorate 50 parts
Titanium, iron or magnesium/aluminium alloy 4-10 parts
Methylated spirit 6 approx.

Such may be stencilled or screen printed on a support as desired using the process disclosed in GB 2,049,651 in the latter case. The accompanying drawings illustrate some of the possible arrangements. Figure 1 depicts a preferably stencilled or screen printed wheel viewed from the front when in firing position. A discontinuous strip of pyrotechnic composition (1) has been applied to a support board (2) which is provided with a centre pivot boss (3). This is a simple one-direction wheel. Ignition at A by ignition means (not shown) would result in anticlockwise rotation, while ignition at B would give clockwise movement. Figure 2 illustrates a "reversing wheel" in a similar manner. Ignition at X would result in initially anticlockwise and later clockwise rotation as the composition was consumed.

Claims

1. A rotating firework characterised in that it comprises a support, which may be centrally-pivoted, having a pyrotechnic composition applied thereto in a generally circular arrangement with a discontinuity.

2. A firework as claimed in claim 1 wherein the generally circular arrangement reverses at least once.

3. A firework as claimed in claim 1 or claim 2 wherein the support is generally laminar.

4. A firework as claimed in claim 3 wherein the support is a board.

5. A process for the production of a rotating firework as claimed in claim 1 characterised in that it comprises applying a generally circular arrangement with a discontinuity of a pyrotechnic composition to a support, which may be centrally-pivoted.

6. A process as claimed in claim 5 wherein the pyrotechnic composition is applied by stencilling or screen printing.

7. A process as claimed in claim 5 or claim 6 wherein the pyrotechnic composition is applied in the form of a liquid, slurry or paste on to a surface of the support and the discontinuous layer of applied composition is allowed to dry and/or harden.

8. A process as claimed in any of claims 5 to 7 wherein the applied pyrotechnic composition is at least partially covered by a layer of an inert material.

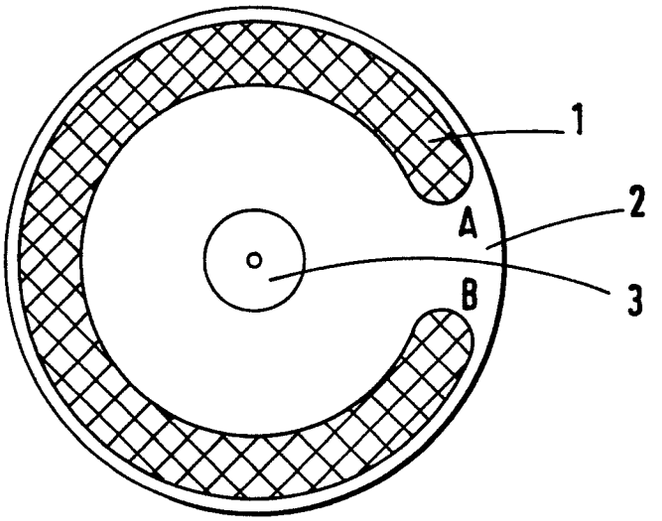

Fig.1

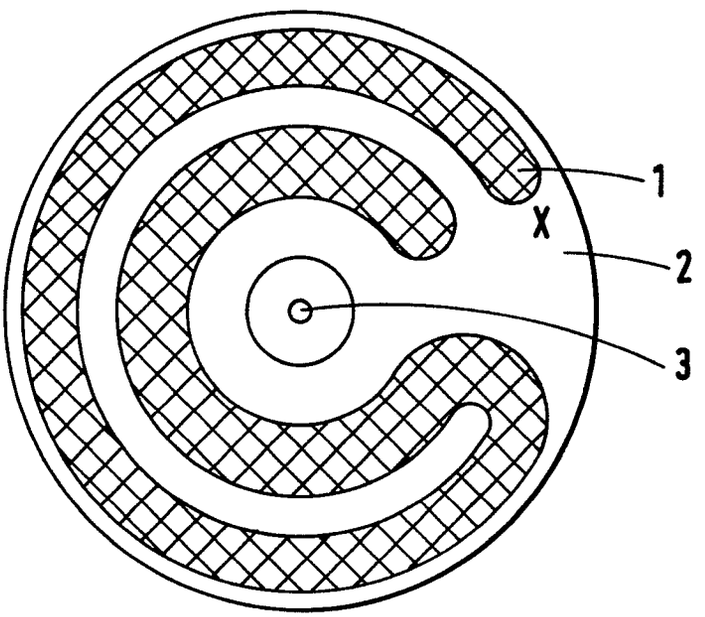

Fig.2