[0017] As an alternative, there can be provided two or more layers of the described fabric, having the same or different structures.

[0018] According to another aspect of the present invention, there is provided a fibre including a conductive yarn around which is wrapped at least one insulating yarn. Preferably, there are provided two or more insulating yarns helically wound around the conductive yarn.

[0019] According to another aspect of the present invention, there is provided a fibre including an insulating yarn around which is wrapped at least one conductive yarn, the insulating yarn including portions extending beyond the conductive yarn or yarns. Preferably, there are provided two or more conductive yarns helically wound around the insulating yarn. The projecting portions could be strands of fibre, protrusions and the like.

[0020] It is possible with the present invention to provide an electrically conductive textile having the features described in British patent application 2,339,495 with only a single layer of fabric.

[0021] The preferred embodiments of fabric can be significantly cheaper to produce than the structure described in British patent application 2,339,495.

[0022] Various embodiments of the present invention are described below, by way of example only, with reference to the accompanying drawings, in which:

[0023] **FIG. 1** is a perspective view of a grid arrangement of elongate conductors;

[0024] **FIG. 2** depicts the effects of applied pressure on a crossover between two conductors;

[0025] **FIG. 3** is a perspective view of an embodiment of fabric with floating conductors;

[0026] **FIG. 4** shows the operation of the fabric of **FIG. 3**;

[0027] **FIG. 5** shows various views of an embodiment of yarn;

[0028] **FIG. 6** shows various views of another embodiment of yarn;

[0029] **FIGS. 7***a* to **7***c* show various embodiments of conductive and insulating yarns;

[0030] **FIG. 8** shows another embodiment of composite yarn;

[0031] **FIG. 9** shows variations of the embodiment of yarn with floating conductors;

[0032] **FIG. 10** is a schematic diagram of an embodiment of woven bus bars;

[0033] **FIG. 11** shows an example of technical specification of weave structure; and

[0034] **FIG. 12** shows an example of individually addressable multiplexed switches within a woven fabric construction.

[0035] Referring to the Figures, in the embodiment of **FIG. 1**, the piece of fabric preferably comprises at least two sets of elongate electrical conductors. Typically, the conductors in each set are arranged in parallel relative to one another and one set of conductors is arranged perpendicular relative to the other set to form an arbitrarily spaced grid, as shown in **FIG. 1**. The elongated electrical conductors are typically mono-filament or multi-filament conductive fibres, while the remainder of the piece of fabric is composed of insulating fibres.

[0036] Where any two conductors cross over one another, the construction of the fabric and/or the conductive fibres maintains their physical separation, as shown in the cross-sectional view of two conductors in **FIG. 2**(*a*). When pressure is applied normal to the plane of the fabric, the conductive fibres are caused to deflect and make electrical contact, as in **FIG. 2**(*b*). Thus, each crossover point constitutes a momentary contact electrical switch, which will maintain contact while the applied pressure exceeds a threshold. The threshold pressure can be predetermined and controlled at manufacture.

[0037] The switches also exhibit an analogue switching region, as the area of contact shared by the two conductors varies according to the applied pressure, until a maximum contact area is achieved, as shown in **FIG. 2**(*c*). The manufacturing variables of the piece of fabric can be controlled such that, in use, the switches operate predominantly within this analogue region, demarcated by the dashed lines in **FIG. 2**(*d*). If this area of contact is measured through some electrical property, for instance resistance, the crossovers can constitute pressure sensors.

[0038] Although the piece of fabric can be of knitted or felted construction, it is envisaged that the primary application of this technology will be to woven fabric structures. In this latter case, the two sets of conductive fibres can constitute warp and weft yarns, respectively, with insulating yarns composing the remainder of the piece of fabric and acting to space apart the individual conductive yarns of each set. A typical example of a woven piece of fabric, incorporating two crossover points, is shown in **FIG. 3**.

[0039] Separation Techniques

[0040] A number of techniques can be used for maintaining a degree of physical separation between two conductive fibres at a crossover point. These techniques include the use of weave structures with floated yarns and composite conductive/insulating yarns. The different techniques may be used together, allowing, for example, a piece of fabric that incorporates both conductive cored composite yarn and a weave structure with floats.

[0041] Separation Technique—Weaving with Floats over One or More Yarns

[0042] The first described separation technique is the use of a weave structure with floats, a term applied to a portion of weft yarn that passes over or under more than one warp yarn or vice-versa. To achieve separation of the two conductive yarns at a crossover, typically, the weft conductive yarn is floated over the warp conductive yarn and one or more insulating warp yarns to either side, as is shown in **FIG. 3**. As a result, the two conductive yarns share little or no physical contact area, as shown in the cross-sectional view, longitudinal to the weft, of **FIG. 4**(*a*).

[0043] If the conductive warp yarn is of smaller diameter than the surrounding insulating warp yarns, their physical separation can be effected, as shown in **FIG. 4**(*b*). When pressure is applied normal to the plane of the fabric, the