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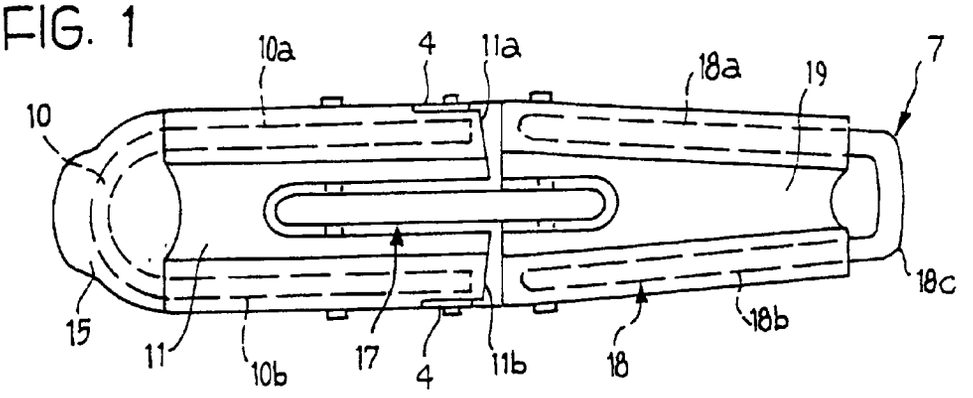
(54) A method for manufacturing a lever fastening device and a device produced by the method.

(57) A method is described for the manufacture of a fastening device of the type comprising a lever (5) articulated to a base (3) and a tie (6) associated with the lever, in which at least one of the lever (5), the base (3), and the tie (6) is produced by co-moulding of a first portion (8) with a second portion (9), the first portion (8) being at least partially incorporated in the second portion (9) and being made of a material having a modulus of elasticity and/or a colour different from the modulus of elasticity and/or the colour with which the second portion (9) is made.

FIG. 1



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Description

The present invention relates to a method of manufacturing a lever fastening device and to a device produced by the method, according to the preambles to Claims 1 and 9, respectively.

Lever fastening devices including the characteristics indicated are used widely in the technical field of sports footwear and particularly in the field of skating boots, ski boots and snow-board boots. In this field, a need has arisen to improve the functional capacity of the various elements which make up the fastening, both in terms of resistance to the various stresses which arise in each of the elements in use, giving priority to their lightness for a given functional capacity and, at the same time, seeking to achieve a certain overall aesthetic effect of the fastening device, which is very important in this field.

The prior art has provided lever fastening devices in which components such as the operating lever or the tie associated with the lever are formed in several parts produced separately for subsequent assembly by mechanical fixing or coupling means or by gluing.

However, these techniques involve a certain structural complexity and cost, in addition to the fact that, by their very nature, the components of the aforementioned fastening devices thus formed normally have a certain structural discontinuity between the elements coupled to one another.

The problem upon which the present invention is based is that of providing a method of manufacturing a fastening device which is designed in a manner such to prevent the problems complained of with reference to the prior art mentioned.

This problem is solved, according to the invention, by a method and a device produced by the method in accordance with the following claims.

The characteristics and advantages of the invention will become clearer from the following detailed description of an embodiment of the method according to the invention given below with reference to the appended drawings, provided by way of non-limiting example, in which:

Figures 1 and 2 are a plan view and a side elevational view, respectively, of a fastening device formed in accordance with the method of the present invention,

Figure 3 is a perspective view of a detail of the device of the previous drawings,

Figure 4 is a perspective view of a second embodiment of the fastening device with elements separated, during a stage of its manufacture by the method of the invention,

Figure 5 is a perspective view of the fastening device of Figure 4,

Figures 6 and 7 are a plan view and a side elevational view, respectively, of a further embodiment of the fastening device formed in accordance with the method of the present invention.

With reference to Figures 1 and 2, a lever fastening device formed in accordance with the method of the present invention for sports footwear such as, for example, the footwear which is generally used during skating, or for ski boots or snow-board boots, is generally indicated 1. This device 1 is intended to be fixed to a flap 2 of the footwear, not shown, and is complementary with a rack device, also not shown, which can be fixed to the other flap of the footwear.

The fastening device 1 comprises a plate-shaped base 3 with two perforated lugs 4 extending in the same direction, between which a lever 5 is articulated. The base 3 is fixed to the flap 2 by means of rivets or other equivalent fixing means.

A tie, generally indicated 6, is articulated by one end to the lever 5 and carries, at its opposite, free end, engagement means 7 for engaging the tie in an adjustable position along the rack.

The embodiment of the method of the invention described by way of example provides for the lever 5 to be produced by a technique in which a first portion 8 is co-moulded with at least one second portion 9 of the lever, with the first portion at least partially incorporated in the second portion. More specifically, with reference to Figures 1 and 2, the first portion 8 comprises a U-shaped frame 10 with opposed arms 10a, 10b which are incorporated in the second portion 9 which in turn includes a body 11 having a generally forked shape with two symmetrically opposed prongs 11a, 11b extending to cover the respective arms 10a, 10b. The portions 8, 9 are preferably made of plastics material by injection co-moulding of one on the other. Moreover, the first and second portions are made of materials having different moduli of elasticity, in particular, with the material of the first portion having a modulus of elasticity E_1 greater than the modulus of elasticity E_2 of the second portion. By virtue of these resilience characteristics, the stiffness of the lever, particularly the flexural and torsional stiffness, is provided by the frame 10 which thus constitutes a particularly rigid and light framework of the lever. At the same time, by virtue of its relative resilience due to the modulus of elasticity E_2, the body 11 of the second portion, which extends to cover and connect the arms of the frame 10, performs a protective function as well as linking the frame and conferring on the lever an increased capacity to absorb the knocks to which the lever is subjected in use. The greater resilience of the body 11 also confers on the lever improved gripping characteristics for the user during the fastening/unfastening of the device 1.

At the free ends of the arms 10a, 10b, there are holes 12 for housing a pin 13 for the articulation of the lever 5 to the base 3.

The method of the invention provides, as an alternative, for the first portion 8 to be made of metal, for

example, aluminium alloy (or steel) so as to have a high modulus of elasticity for a low specific weight. In accordance with a preferred embodiment, the frame 10 is formed by blanking from a metal sheet or plate and subsequent bending to form the arms 10a, 10b.

The portions 8 and 9 may also be co-moulded to form the lever 5 with the use of materials of different colours so as to achieve a certain aesthetic impact by virtue of the fact that the frame 10 is partially incorporated in the body 11 and hence at least partially visible.

A further step of the method of the invention provides for the co-moulding of a third portion 14 with the first and second portions 8, 9. The third portion comprises an appendage 15 extending to cover the portion of the frame which connects the arms 10a, 10b at the opposite end to the region of the articulation of the lever to the base. The appendage 15 is preferably made of a plastics material having a modulus of elasticity E_3 lower than the moduli of elasticity of the materials of which the frame 10 and the body 11 are made. By virtue of this resilience which is achieved, for example, by a particularly soft and yielding material, the gripping capacity, and hence the ease of handling, of the lever by the user is increased in the appendage 15. In this case also, the selection of forming the appendage 15 in a colour different from the colours which distinguish the body 11 of the lever and the inner frame 10 can confer particular aesthetic merit on the device as a whole.

It will be appreciated that it is possible, with the method according to the invention, advantageously to produce the lever 5 with the three portions 8, 9 and 14 co-moulded to form a unitary and substantially indivisible structure.

Although the method according to the invention is particularly suitable for the production of levers of fastening devices, it can equally advantageously be used in the manufacture of other components of the device 1, for example, the tie 6 associated with the lever.

Figures 1 and 2 show the tie 6 formed in two adjacent portions articulated to one another. The first portion comprises a link 17 articulated at one of its ends between the prongs 11a, 11b of the lever 5 and articulated at its opposite end to the second portion of the tie. The second portion comprises an open loop 18 with opposed sides 18a, 18b connected at one end by a transverse portion 18c.

The sides 18a, 18b preferably converge towards the transverse portion 18c with a substantially trapezoidal configuration of the loop 18.

The sides 18a, 18b of the loop are partially incorporated in a body 19 from which the transverse portion 18c projects and thus constitutes the engagement means 7 of the device 1. The method according to the invention provides for the second portion of the tie 6 to be formed by co-moulding of the loop 18 with the connecting body 19, with the selection of materials with resilience characteristics similar to those described above with reference to the lever 5 of the device 1. In particular, the loop 18 is made of a material having a higher modulus of elasticity than the modulus of elasticity of the body 19 so that resistance to stresses, particularly tension, in the tie is increased in a localized manner. Alternatively, the loop may be made of metal, for example, steel wire, with the sides 18a, 18b bent at the corresponding free ends to form respective eyes 20a, 20b for receiving a pin 21 for the articulation of the adjacent portions of the tie. It is also envisaged that the loop 18 be produced in accordance with the description for the frame 10 by blanking from a metal sheet or plate and subsequent bending of the sides 18a, 18b at the free ends of which the holes are formed for the articulation of the loop.

Similarly, the link 17 may be produced by co-moulding of a core 22 with a covering element 23 extending to cover the core. Holes 24, preferably with rectangular cross-sections, are provided in the core for the articulation of the link 17 to the lever and to the second tie portion, respectively.

In this case also, the core 22 is made of a material having a higher modulus of elasticity than the covering element 23 and, as an alternative to plastics material, is made of metal, particularly aluminium alloy or steel, so as to optimize its resistance to tensile stresses for a low overall specific weight of the link. The covering element 23, made of plastics material and having a lower modulus of elasticity than the core, is intended to provide a protective covering for the core as well as an ability to absorb knocks.

Moreover, in a similar manner as for the lever 5, the method provides for the co-moulded portions of the first and second portions of the tie 6 to be made of materials of different colours in order to confer a particular aesthetic impact on the fastening device 1.

Figures 4 and 5 show a second embodiment of a fastening device, generally indicated 30, which is produced in accordance with the method of the invention and in which details similar to those of the previous embodiment are identified by the same reference numerals.

Figure 4 shows exclusively the frame 10 of the lever and the core 22, as well as the loop 18 of the tie 6, that is, the first portions 8 of these components which are intended to be incorporated at least partially during the injection co-moulding process in the corresponding second portions 9, the latter being visible in Figure 5, which shows the device 30 produced by the method of the invention. This device differs from that of the previous embodiment basically in that both of the bodies 11 and 19 extending to cover the frame 10 and the loop 18, respectively, are located and extend so as to cover each respective arm of the frame and each respective side of the loop without the provision of any transverse connections of the type described for the device 1.

Figures 6 and 7 show a third embodiment of a fastening device, generally indicated 40, produced according to the method of the invention. In this embodiment, the lever 5 comprises a first portion 8 partially incorpo-

rated in the second portion 9 which in turn extends to cover the peripheral edge 41 of the first portion. Similarly, in the tie 6, it is envisaged that the body 19 be produced by co-moulding and with a shape such as to cover the peripheral edge 42 of the first portion, with a geometrical configuration substantially identical and symmetrically opposed with respect to that of the lever 5. The selection of the materials and of their resilience characteristics, as well as the use of different colours is exactly the same as described for the previous embodiments.

Claims

1. A method of manufacturing a lever fastening device, particularly for sports footwear, of the type comprising a lever (5) articulated to a base (3) and a tie (6) associated with the lever, characterized in that at least one of the lever (5), the base (3), and the tie (6) is produced by co-moulding of a first portion (8) with a second portion (9), the first portion being at least partially incorporated in the second portion and being made of a material having a modulus of elasticity and/or a colour different from the modulus of elasticity and/or the colour with which the second portion is made.

2. A method according to Claim 1, in which the first and second portions (8, 9) are co-moulded with one another to form a unitary and substantially indivisible structure.

3. A method according to Claim 1 or Claim 2, in which the modulus of elasticity of the material of the first portion (8) is greater than the modulus of elasticity of the material of the second portion (9).

4. A method according to any one of the preceding claims, in which the second portion (9) is made of plastics material.

5. A method according to Claim 4, in which the first portion (8) is also made of plastics material.

6. A method according to one or more of Claims 1 to 5, in which the first portion (8) is made of metal.

7. A method according to one or more of the preceding claims, which provides for the co-moulding of a third portion (14) with the first (8) and/or the second portion (9), the third portion being made of a material having a modulus of elasticity and/or a colour different from the modulus of elasticity and/or the colour of the first and second portions.

8. A method according to Claim 7, in which the third portion (14) has a lower modulus of elasticity than the first and second portions.

9. A fastening device, particularly for sports footwear, produced in accordance with the method of one or more of Claims 1 to 8, comprising a lever (5) articulated to a base (3) and a tie (6) associated with the lever (5), characterized in that at least one of the lever (5), the base (3) and the tie (6) comprise a first and a second portion (8, 9) co-moulded with one another, the first portion being at least partially incorporated in the second portion and being made of a material having a modulus of elasticity and/or a colour different from the modulus of elasticity and/or the colour with which the second portion is made.

10. A device according to Claim 9, in which the first portion (8) of the lever (5) comprises a U-shaped frame (10) with opposed arms (10a, b) at least partially incorporated in a body constituting the second portion (9).

11. A fastening device according to Claim 10, in which the third portion (14) of the lever comprises an appendage (15) extending to cover the frame (10) at least partially at the opposite end to the free ends of the arms (10a, b) so as to constitute an operating appendage for the lever (5).

12. A fastening device according to one or more of Claims 9 to 11, in which the tie (6) comprises two adjacent portions articulated to one another, the first portion comprising a link (17) articulated by one of its ends to the lever (5) and extending to cover a core (22) at least partially incorporated therein, the second portion comprising an open loop (18) with opposed sides (18a, b) at least partially incorporated in a body (19) constituting the second portion.

FIG. 1

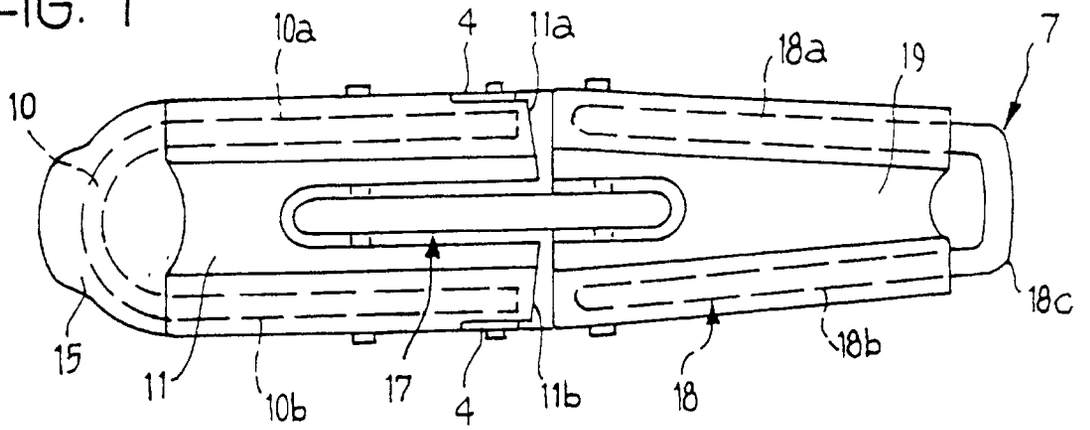

FIG. 2

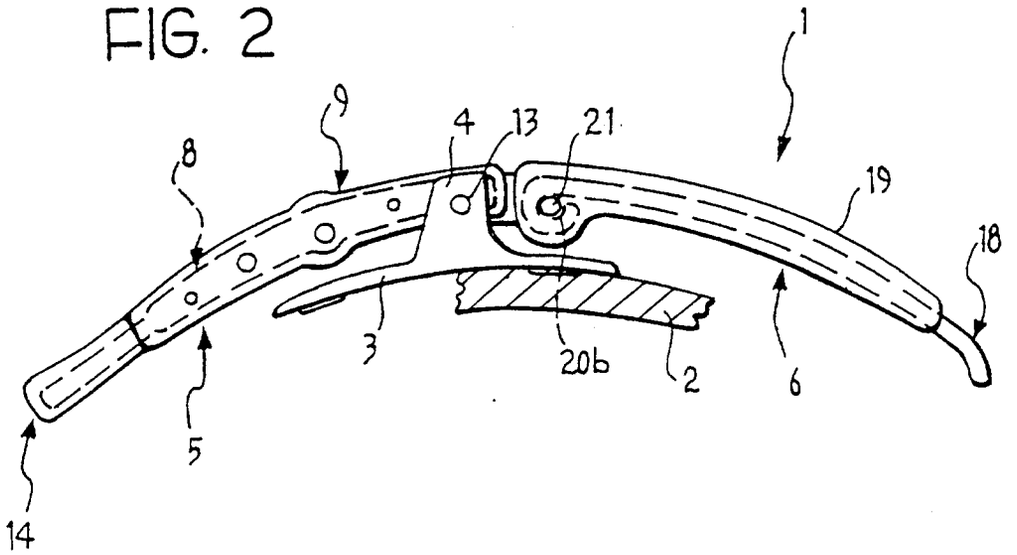

FIG. 3

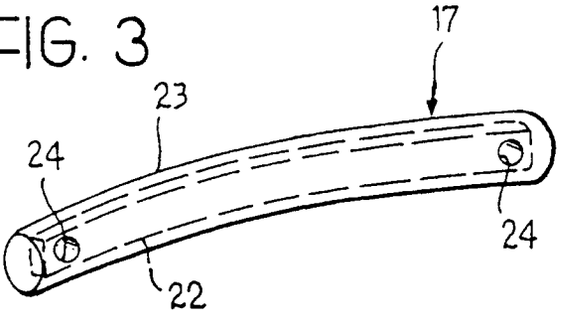

FIG. 4

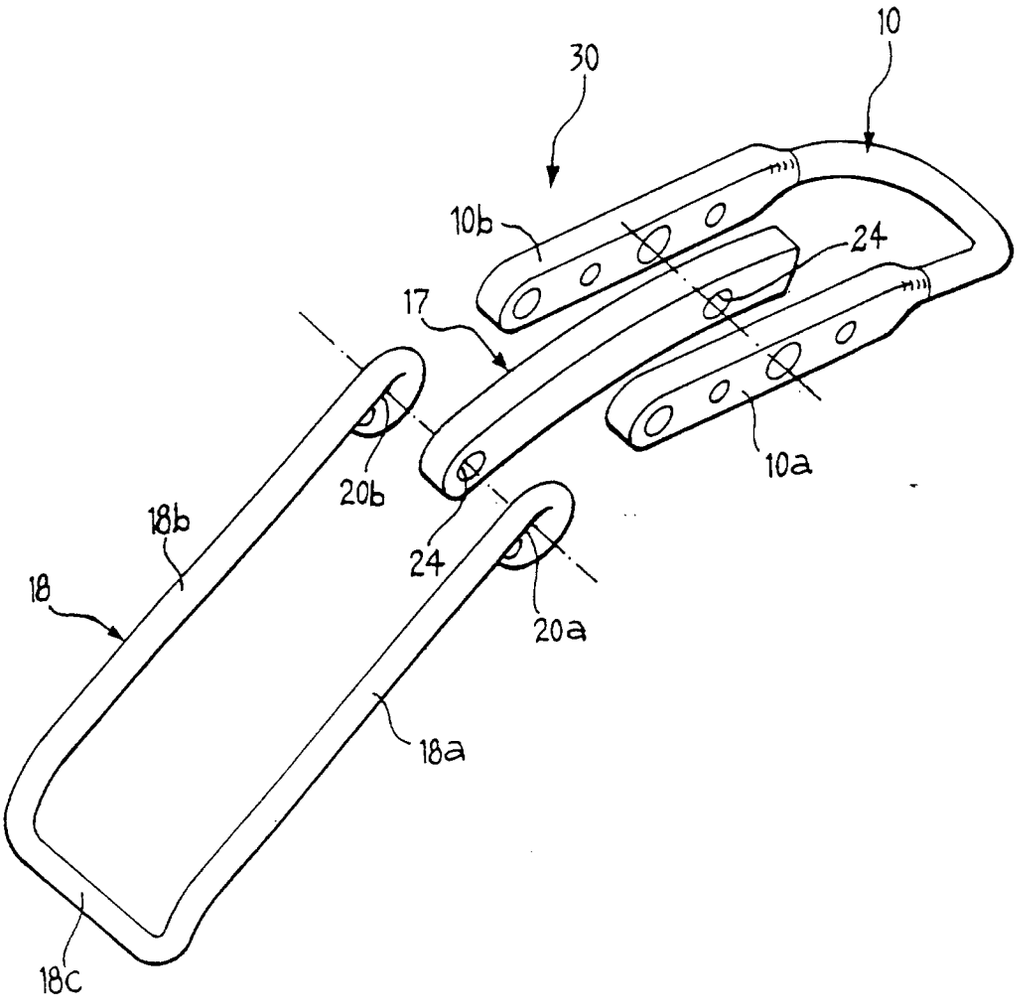

FIG. 5

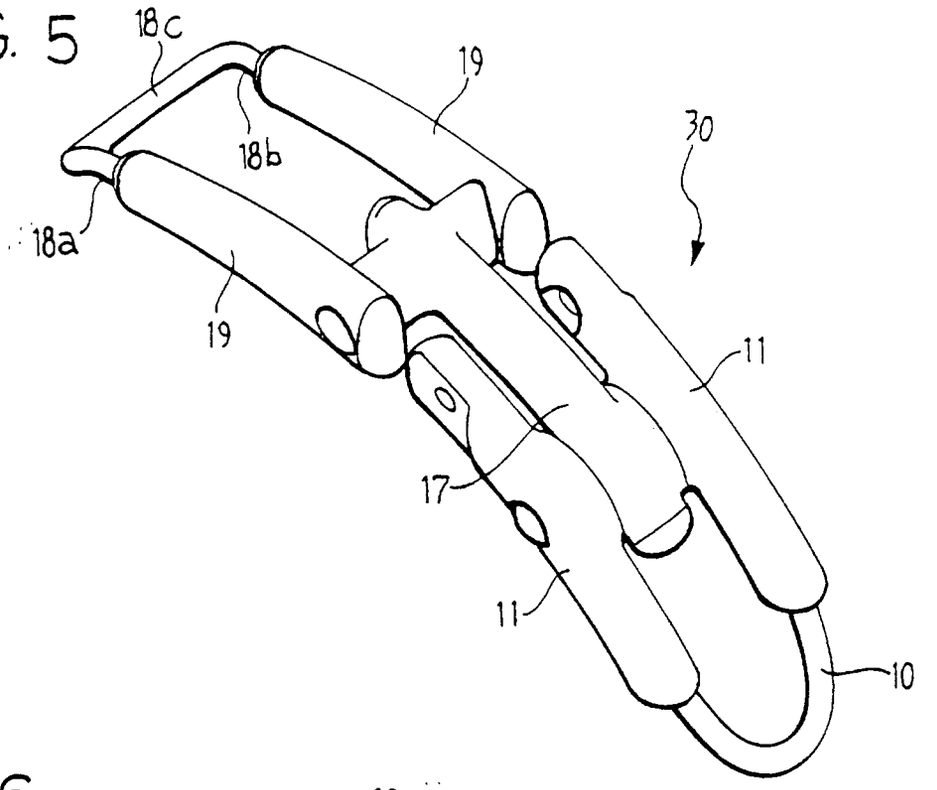

FIG. 6

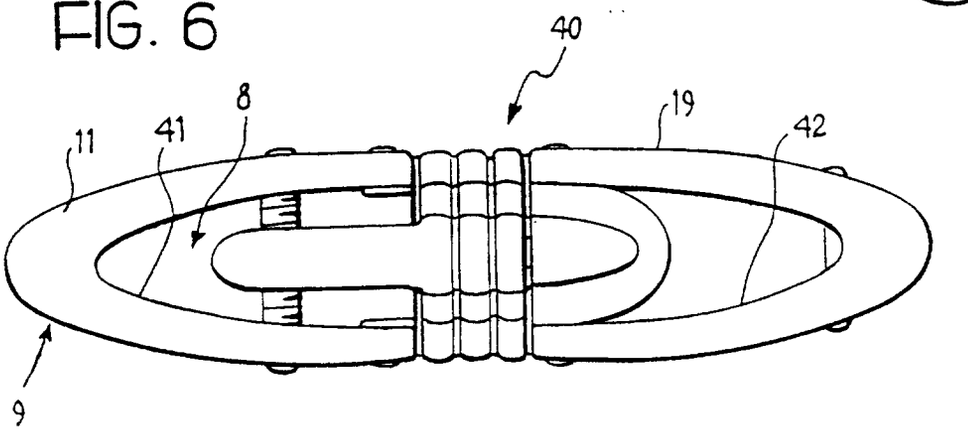

FIG. 7