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(54) Framework, used particularly for constructing the sides for wheelchairs for disabled people and wheelchairs made with this system

(57) Framework, used particularly for constructing the sides for wheelchairs for disabled people and wheelchairs with this system, made up of two equal and opposite sides, with each side made up of a tubular element bent accordingly to shape and supported on its back part by a corresponding large wheel. The said element laterally supports a foldable seat and relative back, while on the front side, by means of an extension, it holds a corresponding swivelling wheel and the lateral extremity of a footrest. Each side is made up of off-round tubular elements, preferably elliptical, joined laterally with a jaw-clamp to an adjustable plate or similar means, used for mounting the corresponding large wheel.

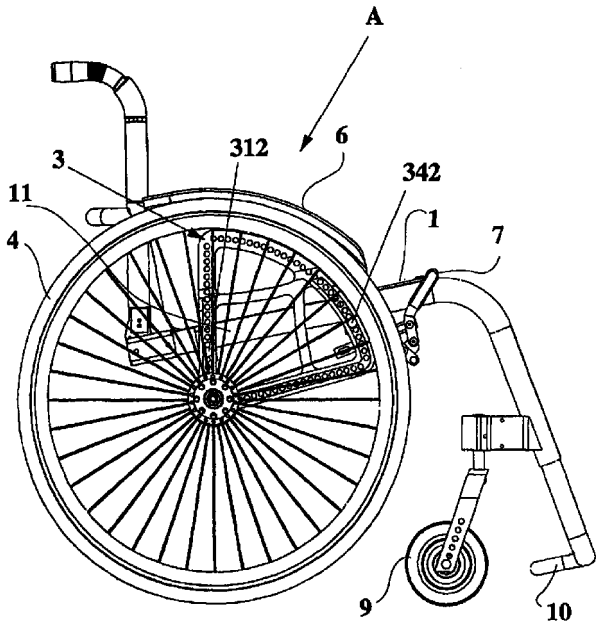

FIG. 1

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Description

[0001] The object of the invention contained herein is a framework, used particularly for constructing the sides for wheelchairs for disabled people and wheelchairs with this system.

[0002] The invention has particular, but not necessarily exclusive, application in the sector of wheelchairs for disabled people.

TECHNICAL FIELD

[0003] There are various types of wheelchairs available for disabled people. They are basically made up of a seat part and a back part joined to a rigid frame, with a footrest attached to the front. The frame, which is static, is made up of a series of uprights and cross-members for the most part in tubular metal with a round section, that have the function of attaching two large-diameter wheels with hand-rails to the sides, and two smaller wheels that rotate and swivel on to the front part of the wheelchair. Finally, there are attachments fastened to the back part, so that third parties may grip the said attachments in comfort to push and direct the wheelchair.

[0004] The logical evolution of the technology involved in the successive years, along with the particular requirements of disabled people that use the said wheelchairs, has led to the development and introduction on the market of new types of folding wheelchairs, although the rigid type of wheelchair, which has also been further developed, is still widely used.

[0005] From a structural point of view this type of wheelchair, as opposed to the static or rigid type, has a jointed cross-member that joins the two sides of the wheelchair which support the seat. The jointed cross-member, generally made out of tubular material, consists of joining and hinging two straight tubular elements in an intermediate position, with other straight, secondary elements orthogonal to the first elements, attached at the lower and upper ends. Regarding the secondary tubular elements, the ones at the lower end are used for attaching the sides of the wheelchair, while the other ends support the seat. The seat is made out of padded cloth or other flexible material, so that it can be folded around the central part.

STATE OF THE ART

[0006] A particular specialist sector of the market is the "active" type of wheelchairs. These are different from the traditional type in that they have a lighter structure, are smaller and, above all, can be regulated in various points so that the user can find the ideal position according to the activity to be carried out. This type of wheelchair, that is also used for sporting activities, must guarantee above all increased stability, because of the speeds reached and the sudden changes of direction carried out with the wheelchair. This stability is given by the camber or, as in horse-riding, wheels similar to those used in car racing which allow the user to increase or reduce the amount that the wheelchair is leaned over according to requirements.

[0007] From a structural point of view, the wheelchairs in question are made up of two sides and a hinged cross-member for joining the seat and the back part, with each one made up of a pair of more or less horizontal, parallel tubular elements. The upper one, which comes out inclined from the front part, along with the symmetrical side, makes up a fixing point for the footrest. The lower tubular element is attached to the upper one by means of straight, perpendicular elements. At least two of these elements are positioned close to the swivel points for the large wheels to form the quadrilateral for the system for the swivel and regulation points for the large wheels. This latter area usually has a transversal plate that can be adjusted vertically in height, and can be joined to the ends along the perpendicular elements which have holes, to determine the height of the seat from the ground. This means that the centre of gravity of the wheelchair and the camber of the wheels may be varied.

[0008] The purpose of the upper horizontal element of each side is mainly to act as a fixing point for the seat and other parts, such as the arm rests and the brakes, while the lower element forms a vertical jointing means at the front for a corresponding swivelling wheel.

[0009] Recent developments (see other proposals by European companies) propose a wheelchair that has been further lightened by using a single tubular element for each side. This tubular element, that is bent to shape with a very open angle to apply the footrest at the end, forms the support for the seat. Going more into detail, there is a part that of the element, basically a rectangular plate that hangs downwards and to which a fastener is attached that, on the opposite side, joins one of the two corresponding large wheels. The said fastener is adjustable along the vertical axis only, more or less copying in a simplified manner the adjustment system for less active wheelchairs, of the type made with more complex sides.

DRAWBACKS

[0010] The solutions described, and others that have not been illustrated, have in common the fact that they all use tubular elements with various diameters and wall thickness for the construction of the sides, of which all have a round section.

[0011] This leads to various drawbacks that may be summed up as follows.

[0012] First of all, the exasperated research in order to construct wheelchairs that are as light as possible is very important, in that it is not possible to use tubes below a certain size or diameter otherwise the rigidity and resistance of the structure would be compromised,

and which is already considered barely sufficient with some of the models that are currently produced.

[0013] Secondly, the use of a round section tubular framework means that removable fixing methods as an alternative to nuts and bolts are not practical, in that the use of a clamping system, for example, even if it is very tight, does not guarantee the stability required, and may even deform the tube. With the solutions currently used, in fact, tried and tested techniques are used to fix the seat to the sides, for example by using clips fixed rigidly to the structural elements that hold the padded seat or that stretch the cloth of the seat, and that are fastened to the sides by using screws or bolts.

[0014] This means that, when using screws or bolts to fasten the seat to the sides, there must be a series of corresponding holes to allow a larger or smaller movement backwards and forwards of the seat, thus acting upon the centre of gravity of the wheelchair. The amount of adjustment available is limited and is according to the number of holes available, and it is only possible to adjust the position with some of the latest models of wheelchairs.

[0015] There are also problems involved in the production of this type of wheelchair, since they require a large number of components and work cycles before final assembly, considerably increasing the production costs.

[0016] The aim of the invention described herein is to overcome the aforementioned drawbacks.

SUMMARY OF THE INVENTION

[0017] This and other aims are achieved through the use of this invention according to the characteristics in the attached claims, solving the problems described by means of a framework, used particularly for constructing the sides for wheelchairs for disabled people and wheelchairs with this system. It is made up of two equal and opposite sides, with each side made up of a tubular element bent accordingly to shape and supported on its back part by a corresponding large wheel. The said element laterally supports a foldable seat and relative back, while on the front side, by means of an extension, it holds a corresponding swivelling wheel and the lateral extremity of a footrest. Each side is made up of off-round tubular elements, preferably elliptical, joined laterally with a jaw-clamp to an adjustable plate or similar means, used for mounting the corresponding large wheel.

ADVANTAGES

[0018] In this way, through the creative contribution of the system which leads to an immediate technical progress, various advantages are achieved.

[0019] The most noteworthy aspect of this system is that, with the same weight of materials, the framework made up of elliptical tubes is more rigid and resistant. Consequently, the thickness of the framework may be reduced leading to a further weight reduction of the frame work.

[0020] It is thanks to this particular elliptical section for the tube that it has become possible to use special supports such as jaw-clamps, to guarantee a sure and firm fastening of the various components, and particularly the support elements for the seat, thus avoiding them slipping on the tube itself.

[0021] This system leads to an unrivalled range of adjustment for the sides and the seat with respect to the mounting of the large wheels, since it is not tied to any particular reference point. This means that it is possible to optimise even more the position of the seat for the benefit of the final user who, by simply loosening and tightening four screws, may adjust the inclination, the height and the depth of the seat.

[0022] A further aspect regards the quick assembly of the sides, an aspect that means that this type of wheelchair is particularly interesting from a production point of view, since it can be manufactured and assembled quickly at a lower cost than with the manufacture of traditional wheelchairs.

[0023] These and other advantages will be illustrated in the following detailed description and attached drawings of a preferential application of the invention, which is to be considered simply an example, and not a limitation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

Fig. 1 is a side view of the assembly of an "active" wheelchair.

Fig. 2 is a front view of the assembly of the active wheelchair as shown in fig. 1.

Fig. 3 is a side view of an adjustment plate, on a wheelchair of the type illustrated in the previous figures.

Figs. 4 and 5 are three-dimensional views of the front and back of the plate illustrated in the previous figure.

Fig. 6 is a sectional view of the plate illustrated in fig. 3.

Fig. 7 is a three-dimensional view of an inter-changeable sleeve for attaching at least one of the two large wheels.

Figs. 8 and 9 are further views of an inter-changeable sleeve as illustrated in fig. 7.

Fig. 10 is a side view of one of the sides of the

wheelchair illustrated in fig. 1, made up of an oval section tube.

Figs. 11 and 12 are two front views of the side illustrated in fig. 10.

Figs. 13 and 14 are a bottom view and a three-dimensional view of the side illustrated in fig. 1.

Figs. 15 to 18 are views of one of the mobile elements that make up the jaw-clamp, in particular the outside one, used to fasten the side and relative seat to the corresponding adjustment plate for mounting the large wheel.

Figs. 19 to 22 are views of the second of the two mobile elements that, together with the element illustrated in fig. 15, make up the jaw-clamp, in particular the inside one.

DESCRIPTION OF A TYPICAL APPLICATION OF THE INVENTION

[0025] By referring to the illustrations, a wheelchair for disabled people (A), of the type known as "active", is made up mainly of two equal and opposite elliptical or oval section tubular elements (1), one that forms the right hand side and one that forms the left hand side, along the rear part (11) of which the foldable seat (2) and back (21) are supported.

[0026] Referring to the rear part (11) of each of the said oval section tubular elements (1), there are two connection means that are fastened to a corresponding adjustment plate (3), to the lower part of which a large wheel (4) is fastened. The said connection means are, in this case, two jaw-clamps, each one made up of two mobile elements, in this case non-symmetrical (12) and (13), external and internal respectively. Each one of the said mobile elements is made up of a monolithic body preferably in plastic, with a part (121, 131) that has a similar shape on the inner side to the oval section tube (1). On the opposite side, each element (12), (13) has a hole (122, 132) through which a screw is inserted to connect it with the adjustment plate (3). By tightening and loosening the said screw that joins the two mobile elements (12, 13) of each jaw-clamp, it is clamped to the side which is made out of oval section tube (1), guaranteeing that it is fixed in a stable manner to the said adjustment plate (3).

[0027] Going into detail, the said adjustment plate (3) is metallic and monolithic and has an angular shape, the top of which coincides with the fixing point of a respective large wheel (4). In this particular case, around the perimeter of the said plate (3) there is a first bar (31) that forms the vertical adjustment rod for the side (1) and of the seat (2), and a second bar (32) at approximately 75° from the first one, so that the two lower ends converge in the same position (33). This position (33) has a fixing hole, by means of at least one sleeve (5) for a large wheel (4).

[0028] Both of the peripheral bars (31) and (32) of each plate (3) are straight and are manufactured with a series of evenly pitched through holes in them (311) (312). There is a third bar (34) that is curved and with a similar series of holes (341) positioned longitudinally, which in this case permit the adjustment of the side (1) inclination and, therefore, of the seat (2).

[0029] As a result, by means of the corresponding jaw-clamps previously described, there are two points for fixing each side (1) to the plate (3), and in particular the rear part (11), respectively a first one (312) for vertical adjustment (31) and a second one (342) corresponding to any of the positions (341) along the portion of arc (34) that acts on the inclination of the side (1). Regarding the holed bar (32), its purpose is for fixing a wheel guard (6) that also doubles as an armrest, and other accessories such as, in this case, a brake (7).

[0030] In an optimised solution, the adjustment plate (3) is lightened by reducing the full areas of material. In this way, there will be two central reinforcement portions (8), with each one stretching along the internal perimeter from its respective lateral bar (31) (32) to the connecting portion of the arc (34).

Claims

1. Framework, used particularly for wheelchairs for disabled people and wheelchairs with this system made up of two equal and opposite sides, with each side made up of a tubular element (1) bent accordingly to shape and supported on its back part by a corresponding large wheel (4), with the said element that laterally supports a foldable seat (2) and relative back (21), while on the front side, by means of an extension, it holds a corresponding swivelling wheel (9) and the lateral extremity of a footrest, characterised by the fact that each side (1) is made up of at least one tube with an off-round section.

2. Framework according to claim 1, characterised by the fact that each side (1) can be attached laterally with jaw-clamps to an adjustment plate (3) or similar means, used for mounting the corresponding large wheel (4).

3. Framework according to claims 1 and 2, characterised by the fact that each jaw-clamp that joins the side (1) to a regulation plate (3) is made up of two mobile elements (12) and (13), with each one of which that includes:

   - a shaped end with the inner part (121, 131) that is similar in shape to a portion of the oval section tube (1);

   - a through hole (122, 132) on the opposite side,

through which a screw passes for joining and tightening it to the adjustment plate (3).

4. Wheelchair for disabled people according to the previous claims, characterised by the fact that it is made up of two equal and opposite sides (1), with each side made up of a tubular element bent accordingly to shape and supported on its back part by a corresponding large wheel (4), with the said element that laterally supports a foldable seat (2) and relative back (21), while on the front side, by means of an extension, holds a corresponding swivelling wheel (9) and the lateral extremity of a footrest (10), and in which each side (1) is joined to an adjustment plate (3) by means of two jaw-clamps on each side, with the said plate (3) having the following elements around its perimeter:

- two straight bars (31), (32) of which at least one (31) forms the adjustment axis by means of a series of through holes (311), and with the said bars (31) (32) converging on one side to form a common through hole (33) for attaching a corresponding large wheel (4);

- a third adjustment bar (34) with a series of holes (341), with a curved portion that joins the opposite ends of the said straight bars (31), (32).

5. Wheelchair for disabled people according to the previous claims, characterised by the fact that around the perimeter of the said plate (3) there is a first bar (31) that forms the vertical adjustment rod for the side (1) and of the seat (2), and a second bar (32) at approximately 750 $\pm 15^{\circ}$ from the first one, so that the two lower ends converge in the same position (33) to form a fixing hole, by means of at least one sleeve (5) for a large wheel (4).

6. Wheelchair for disabled people according to the previous claims, characterised by the fact that both of the peripheral bars (31) and (32) of each plate (3) are straight and are manufactured with a series of evenly pitched through holes in them (311) (312), and that there is a third bar (34) that is curved with a similar series of holes (341) positioned longitudinally, and which in this case permits the adjustment of the side (1) inclination and, therefore, of the seat (2).

7. Wheelchair for disabled people according to claim 5, characterised by the fact that the sleeve (5) has an out of line hole to define the camber of the relative large wheel (4).

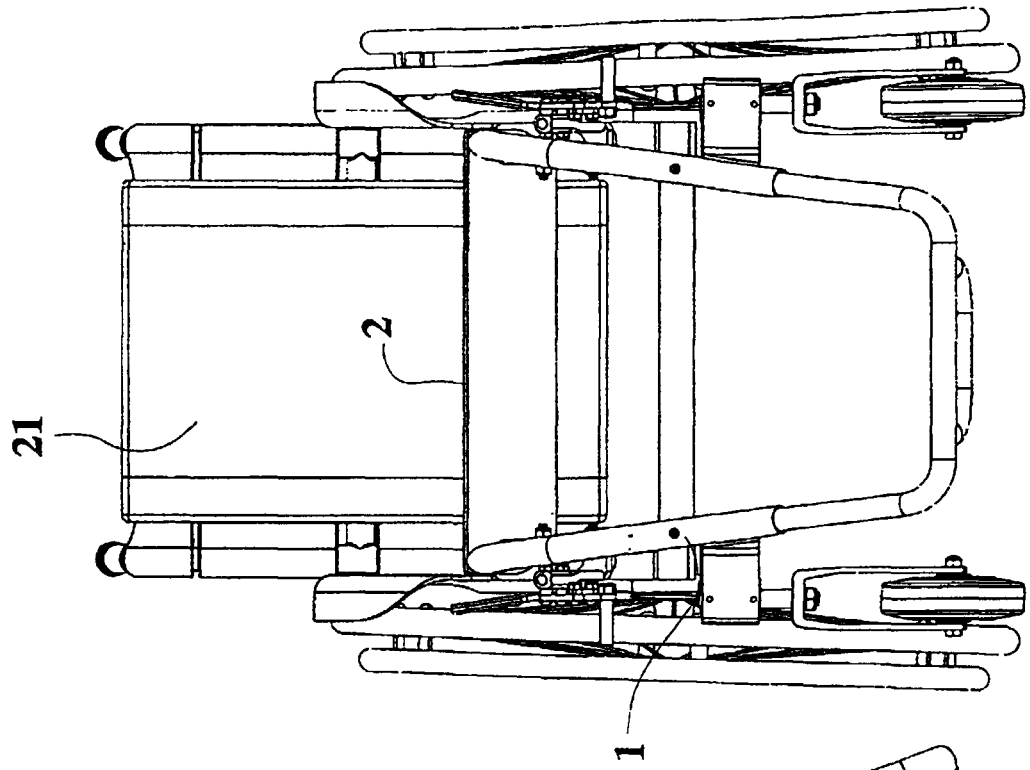


FIG. 2

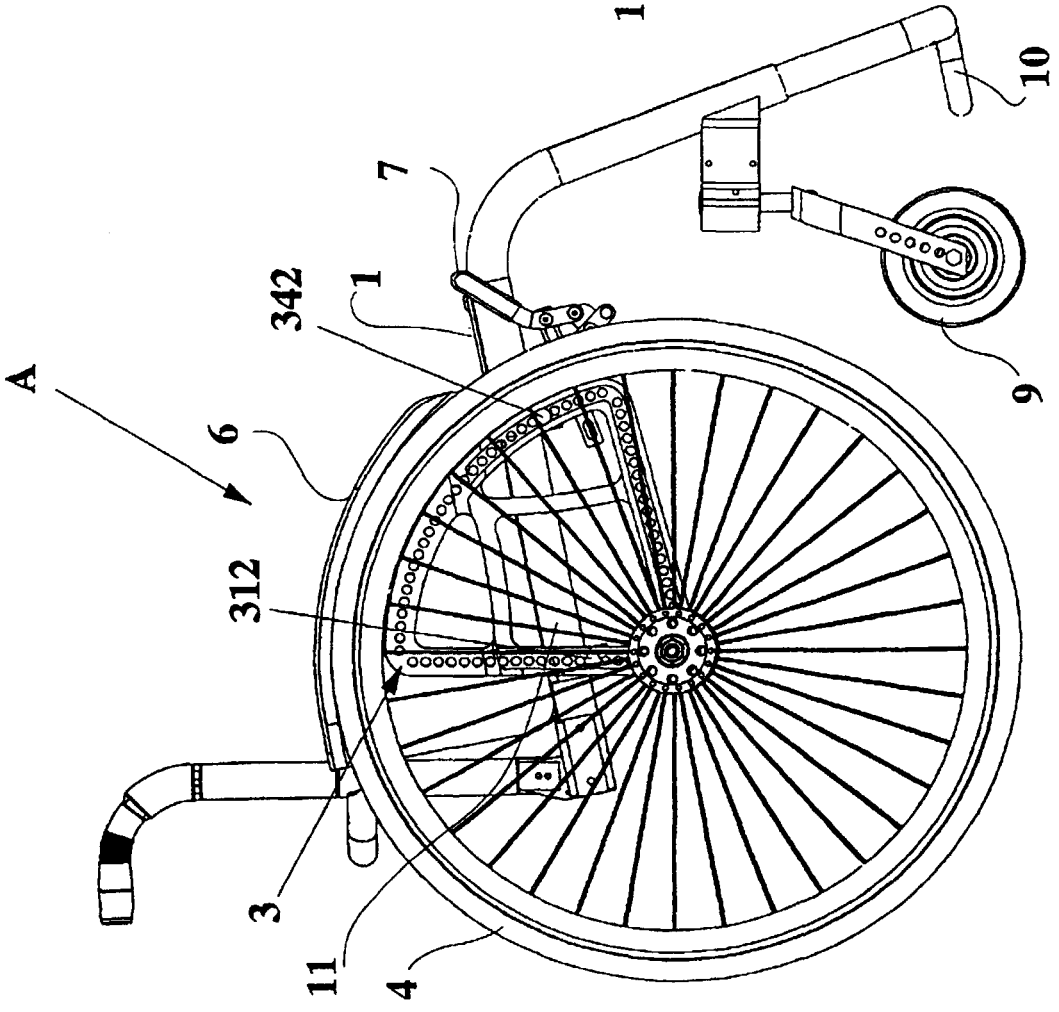


FIG. 1

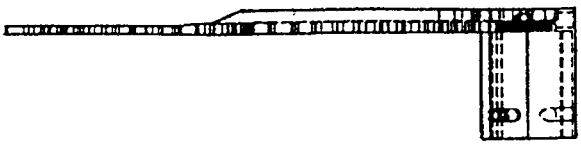


FIG. 6

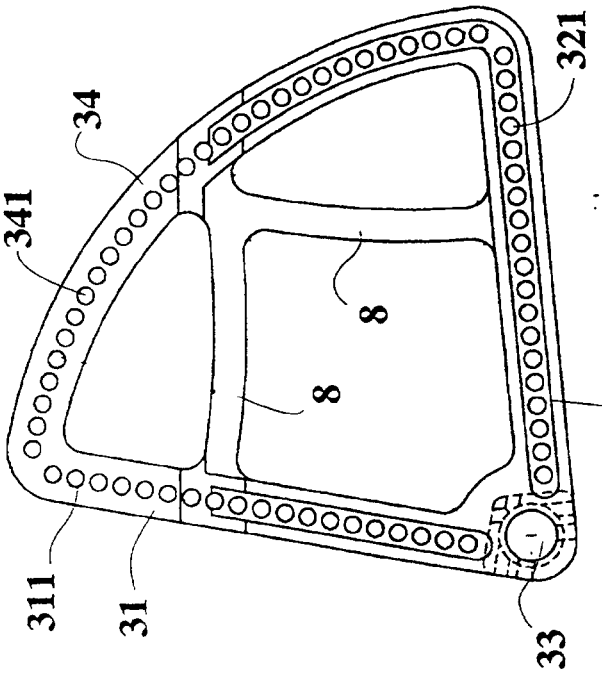
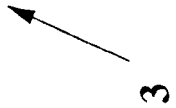


FIG. 3



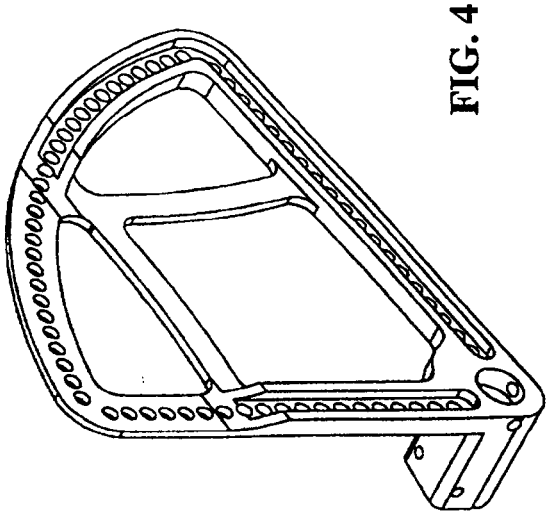


FIG. 4

FIG. 5

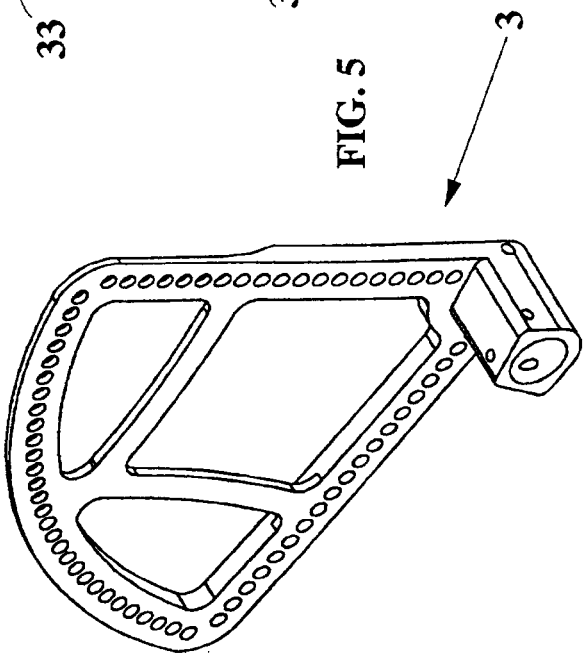
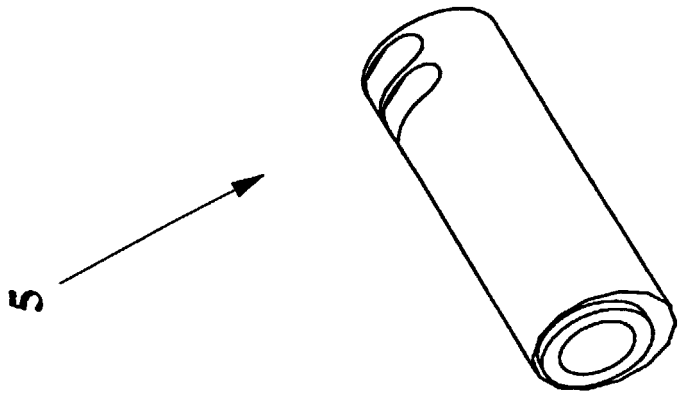


FIG. 7



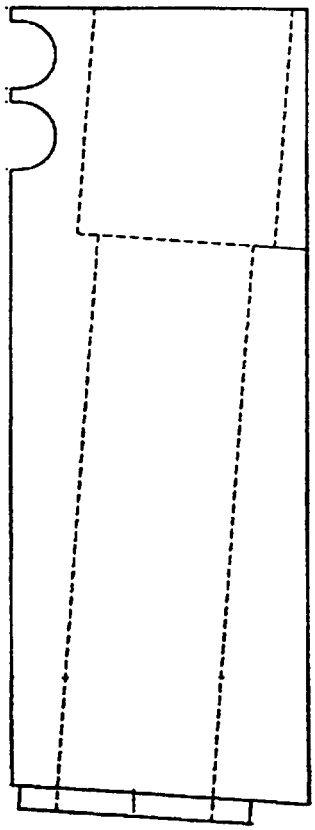


FIG. 8

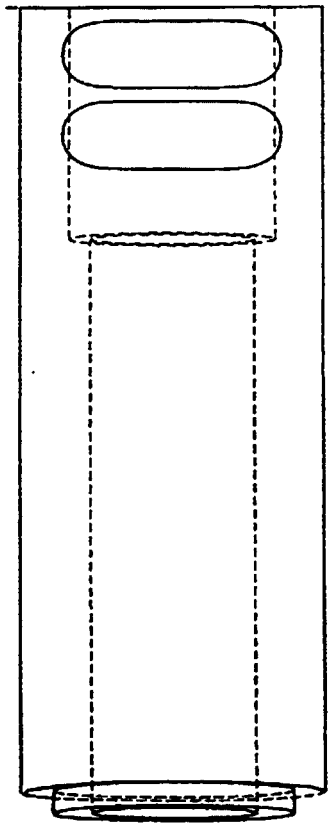


FIG. 9

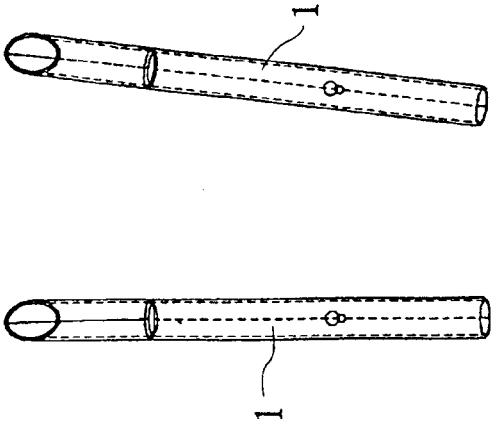


FIG. 11

FIG. 12

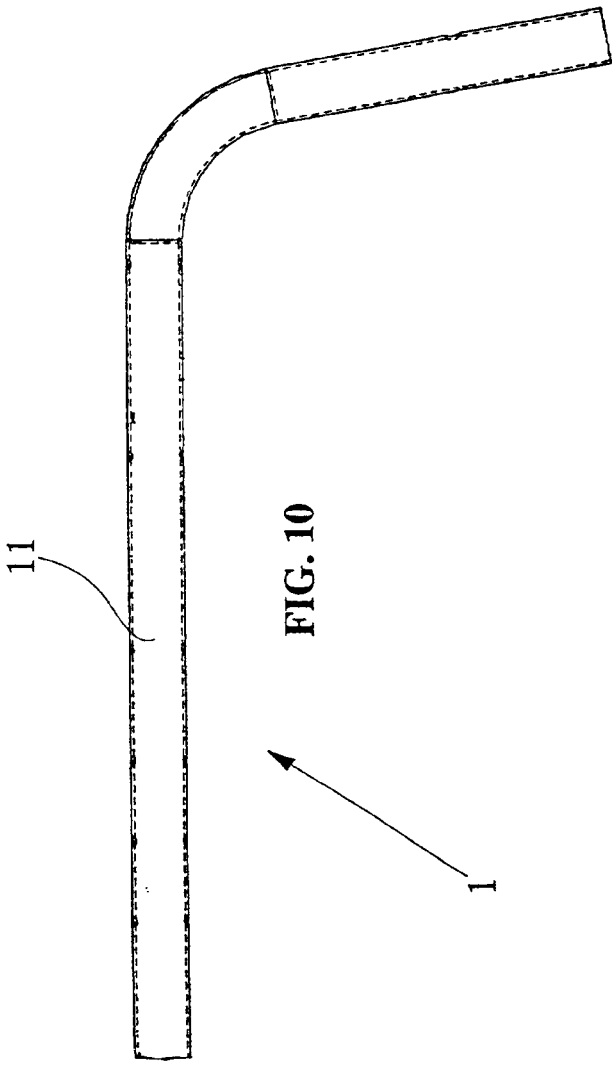


FIG. 10

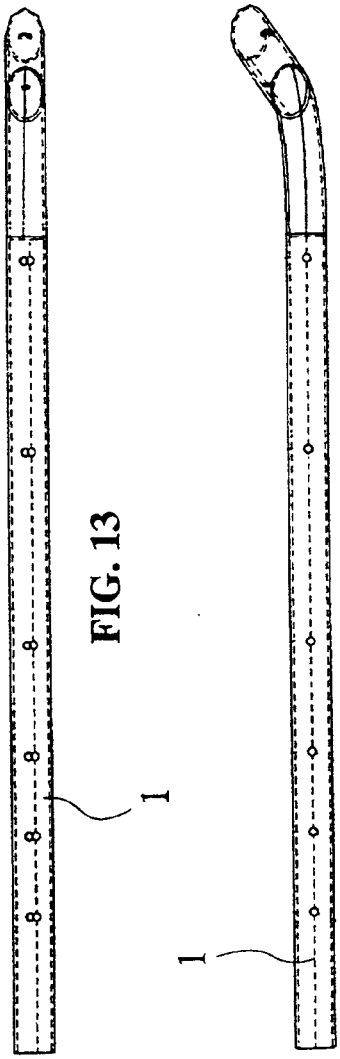


FIG. 13

FIG. 14

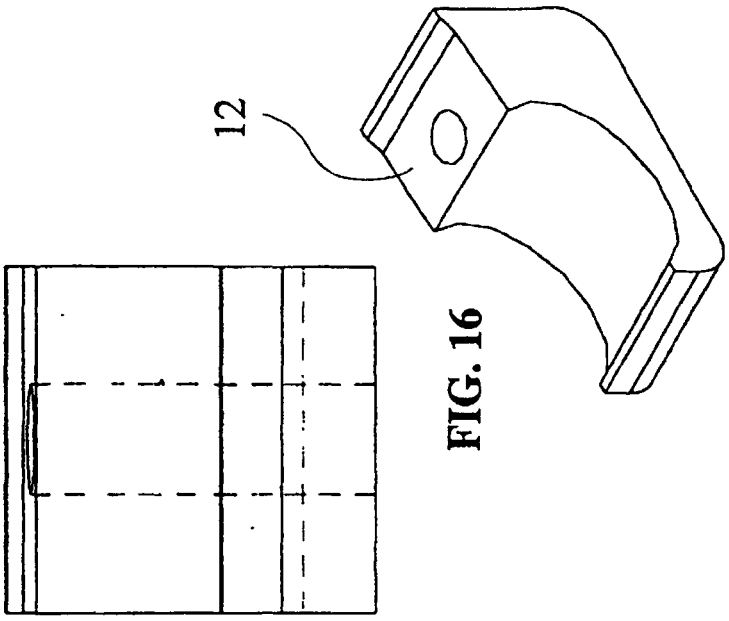


FIG. 16

FIG. 18

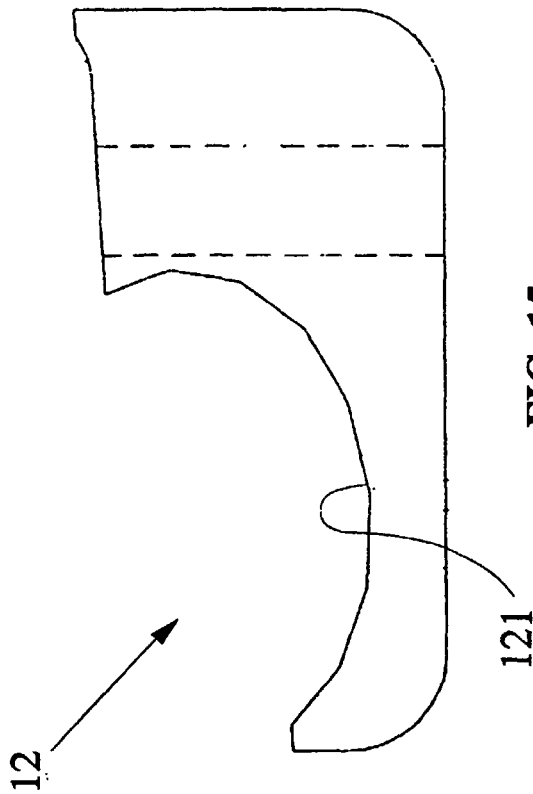


FIG. 15

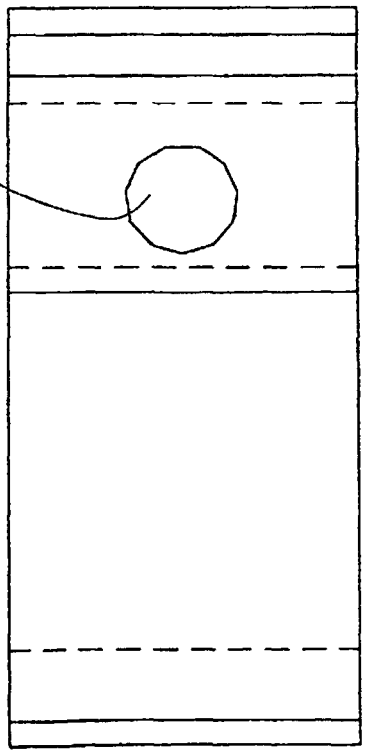


FIG. 17

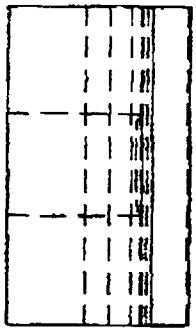


FIG. 20

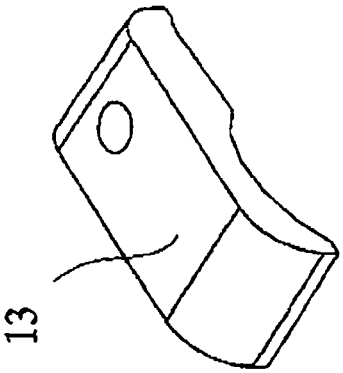


FIG. 22

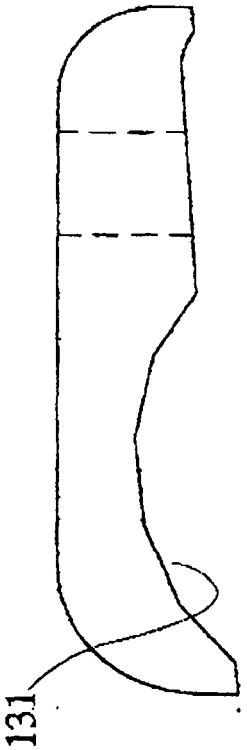


FIG. 19

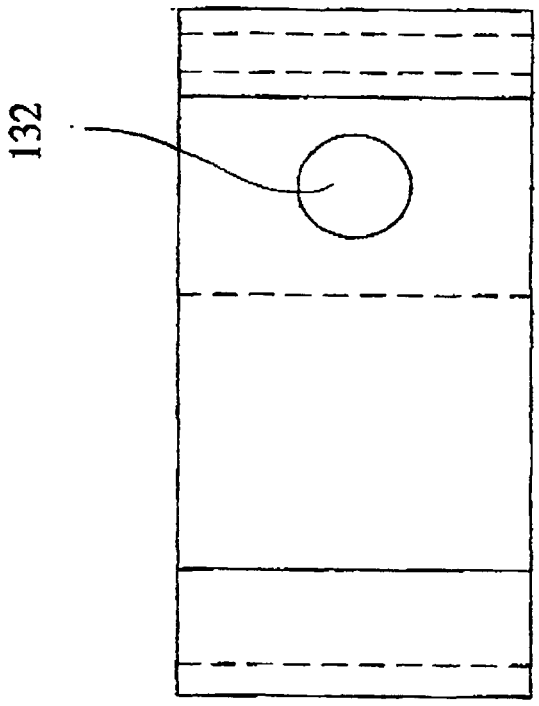


FIG. 21