



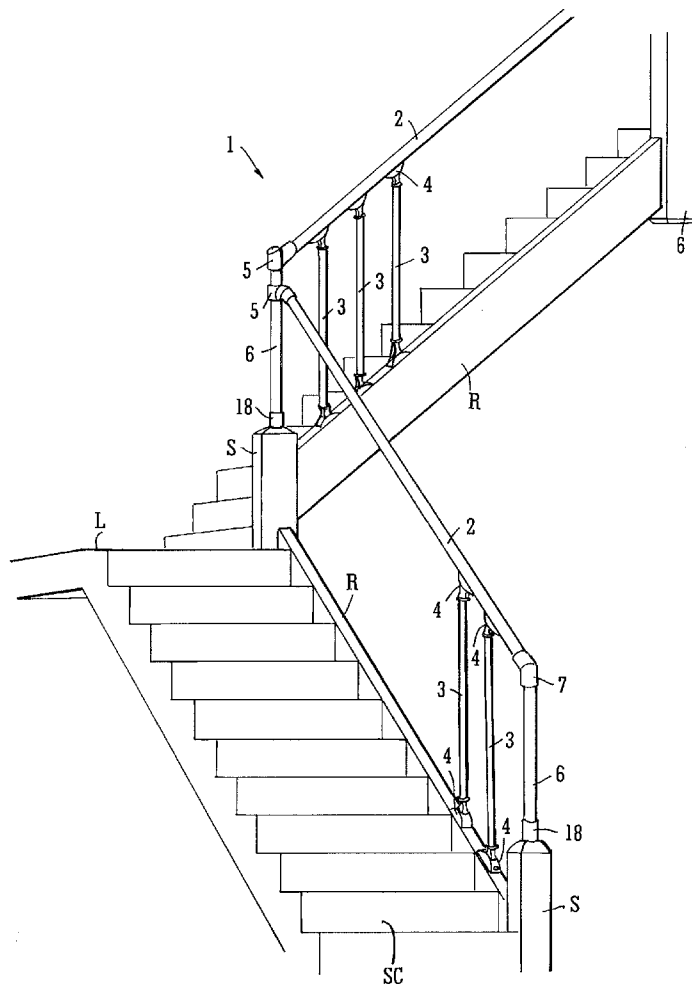
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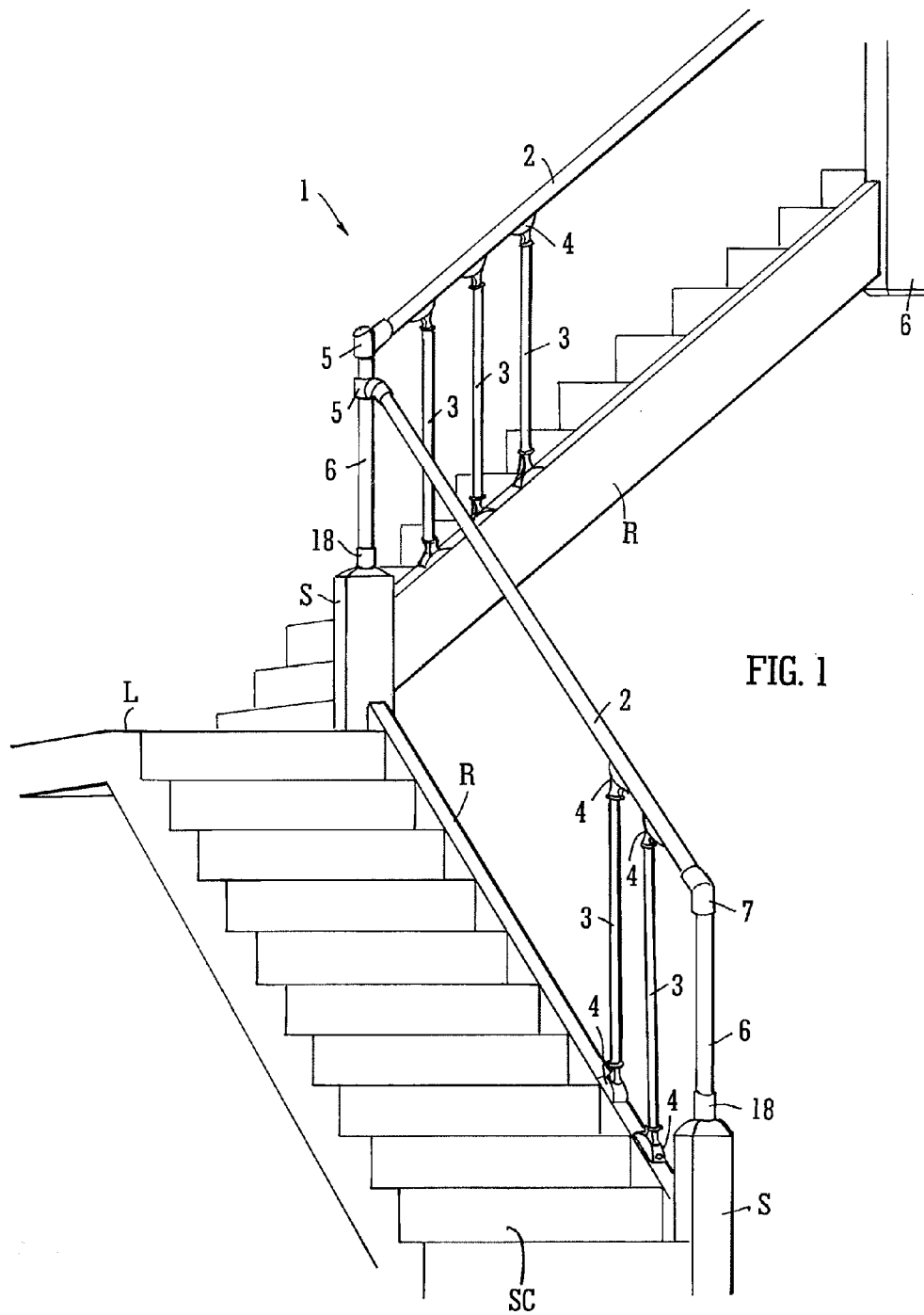
(19) **United States**(12) **Patent Application Publication**
Barnes et al.(10) **Pub. No.: US 2008/0191185 A1**(43) **Pub. Date: Aug. 14, 2008**(54) **HANDRAIL ASSEMBLIES****Publication Classification**(75) Inventors: **Lloyd Paul Barnes**, Powys (GB);
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(GB)(51) **Int. Cl.**
E04H 17/00 (2006.01)
E04H 17/14 (2006.01)(52) **U.S. Cl.** **256/67; 256/65.01; 256/65.02**

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LIMITED, Oswestry (GB)(21) Appl. No.: **12/106,123**(22) Filed: **Apr. 18, 2008****Related U.S. Application Data**(63) Continuation of application No. 10/423,585, filed on
Apr. 25, 2003.(57) **ABSTRACT**

A handrail assembly 1 for a staircase or the like comprises a base rail R and a handrail 2 each preferably having at least one substantially flat surface (2a, FIG. 18), at least one upright post 3 and a bracket 4 to connect one rail 2 to the upright post 3, the post-to-rail bracket 4 having a base 40 for engagement with the substantially flat surface (2a, FIG. 18) of the rail 2 and a deformable portion 45 to accommodate different inclinations of the rail 2 relative to the post 3. An assembly 1 may further comprise a connector 5 to interconnect the handrail 2 with a rail 6, the connector 5 preferably having a first hollow portion with an internal cross-sectional shape to match the cross-section of the handrail 2, the handrail 2 extending at least partially into the first hollow portion.





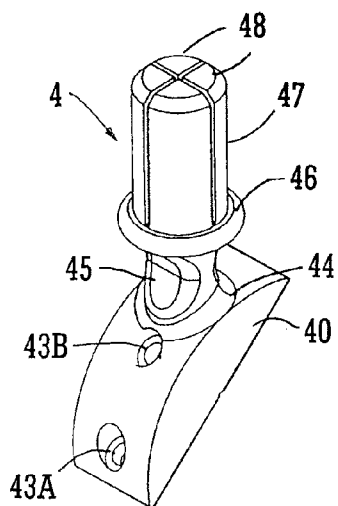


FIG. 2A

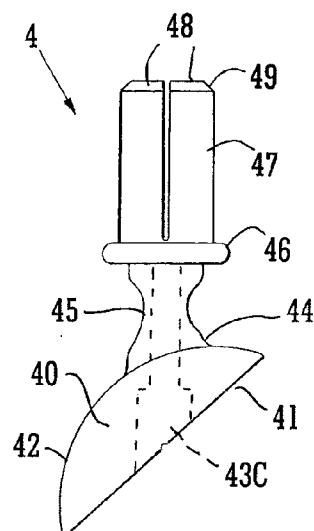


FIG. 2B

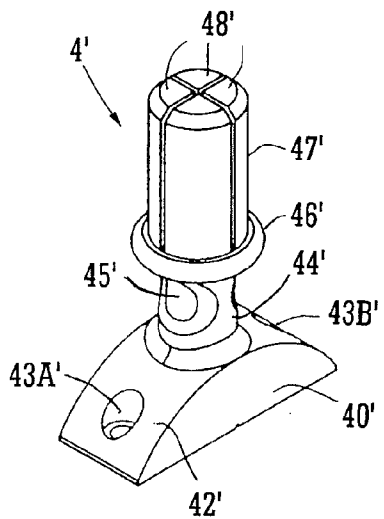


FIG. 3A

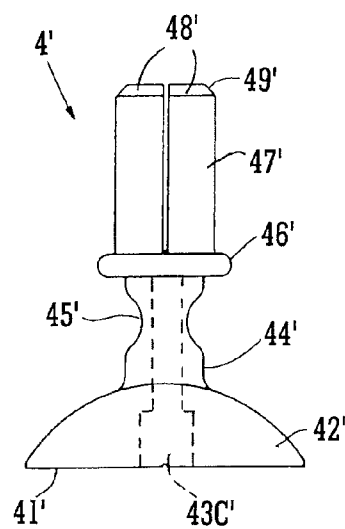


FIG. 3B

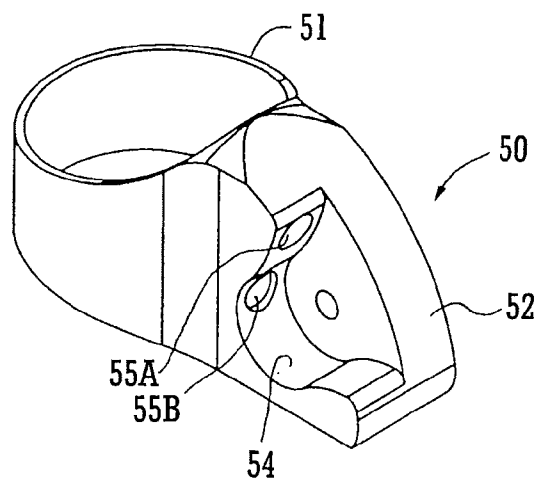


FIG. 4A

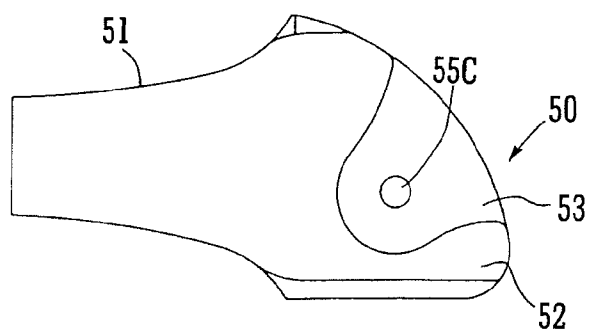


FIG. 4B

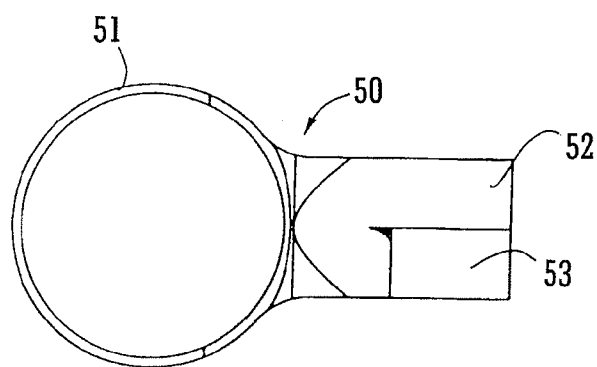


FIG. 4C

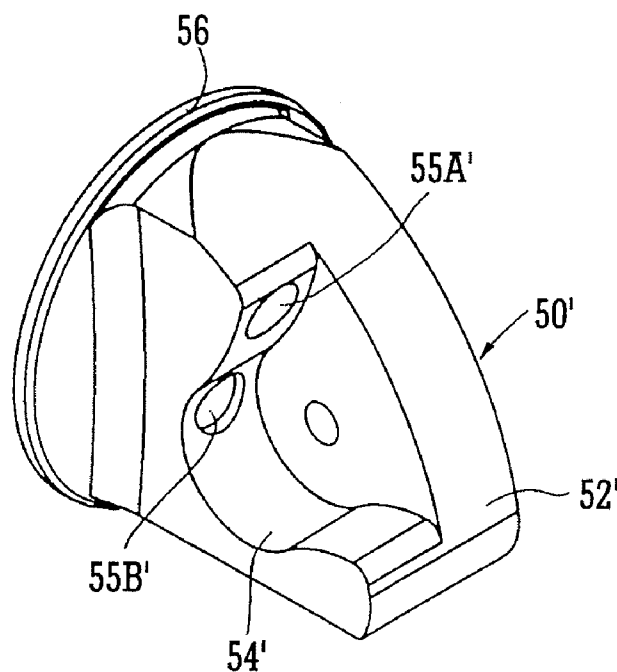


FIG. 5A

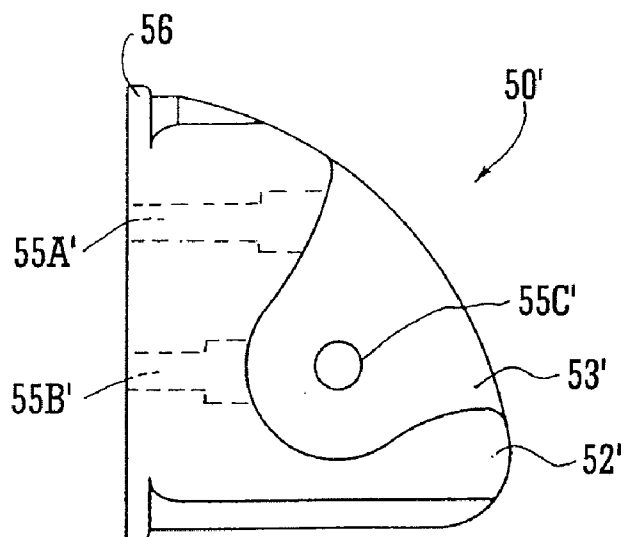


FIG. 5B

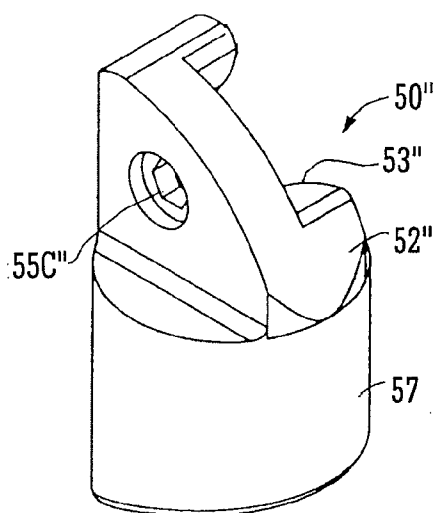


FIG. 6A

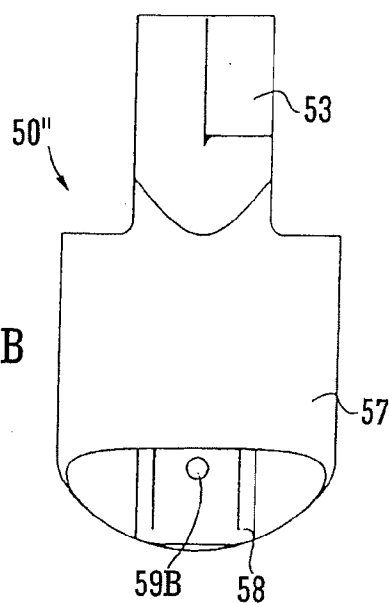


FIG. 6B

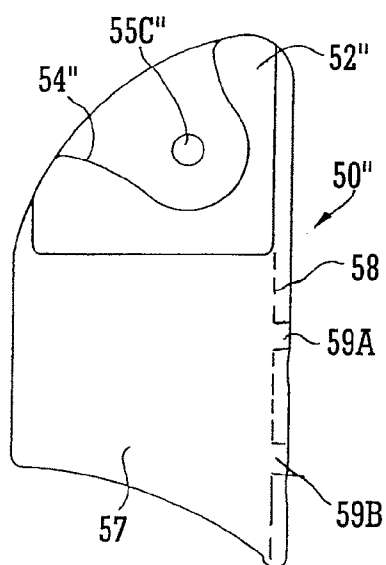
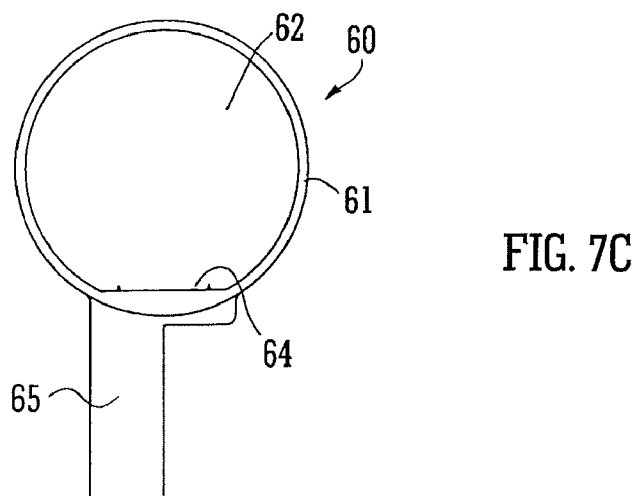
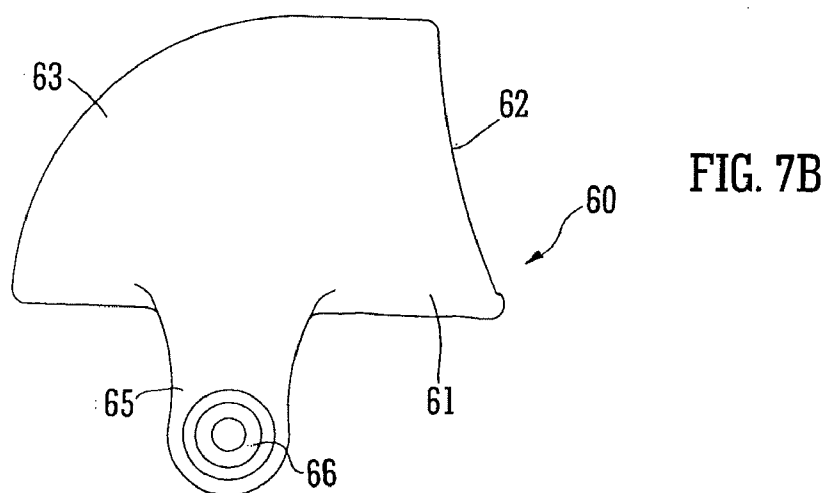
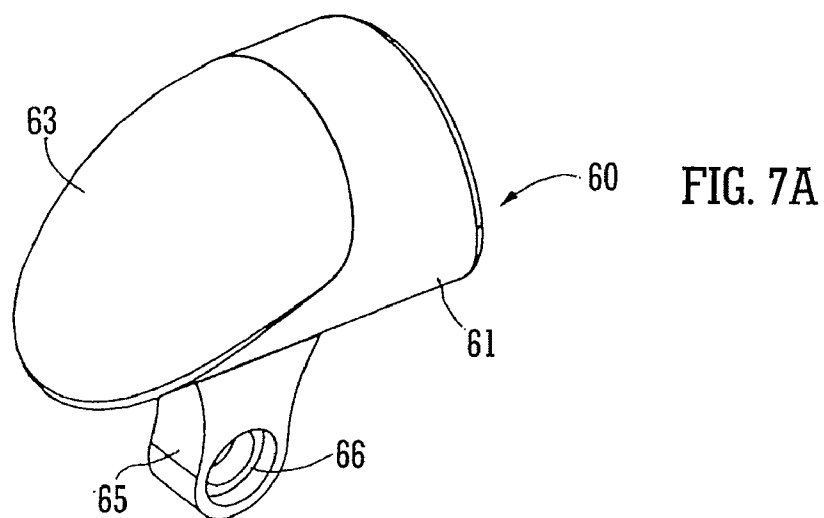


FIG. 6C



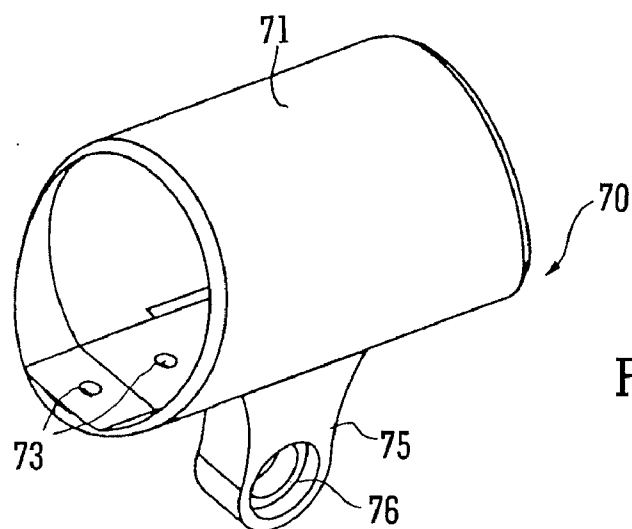


FIG. 8A

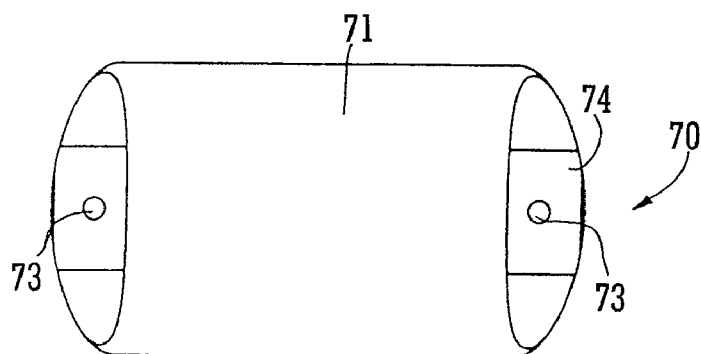


FIG. 8B

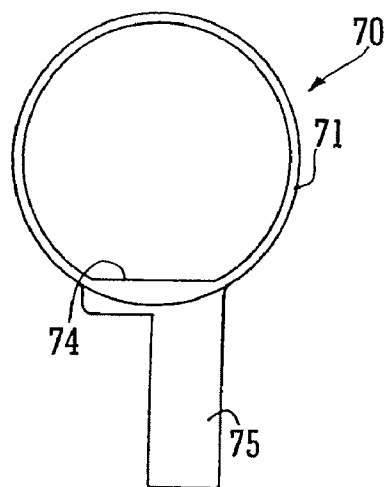


FIG. 8C

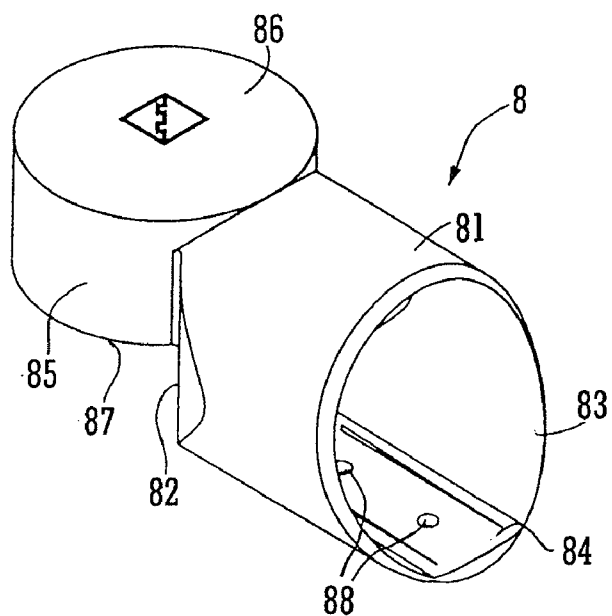


FIG. 9A

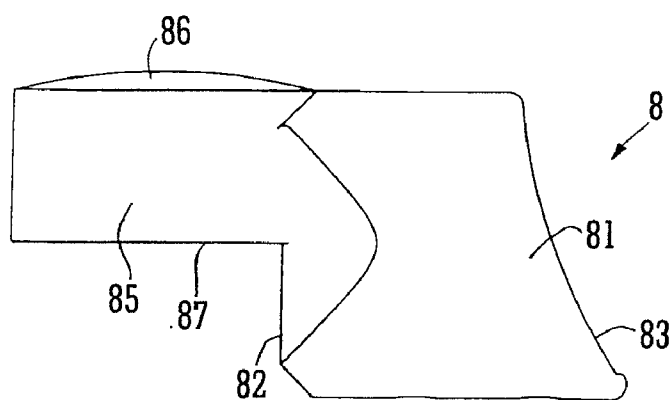


FIG. 9B

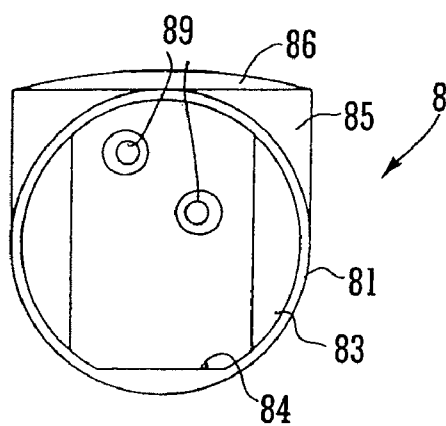


FIG. 9C

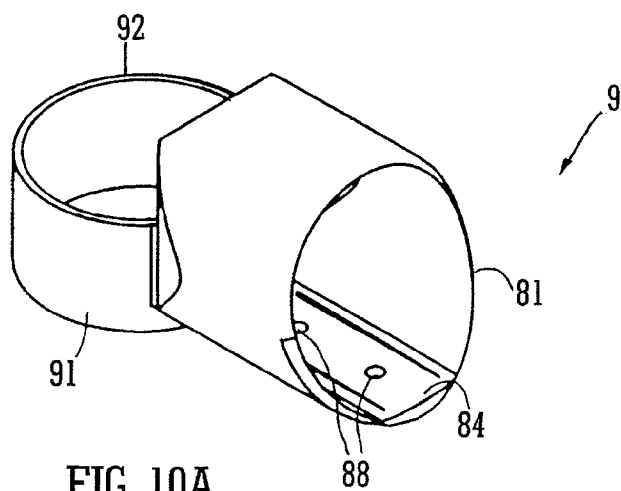


FIG. 10A

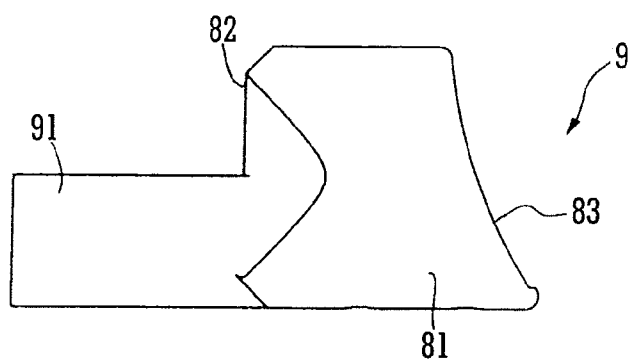


FIG. 10B

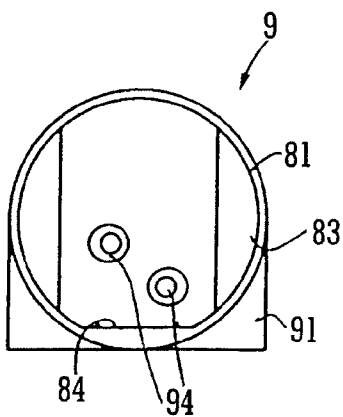
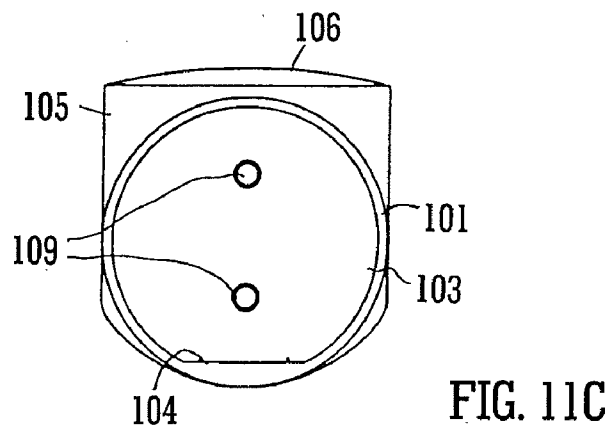
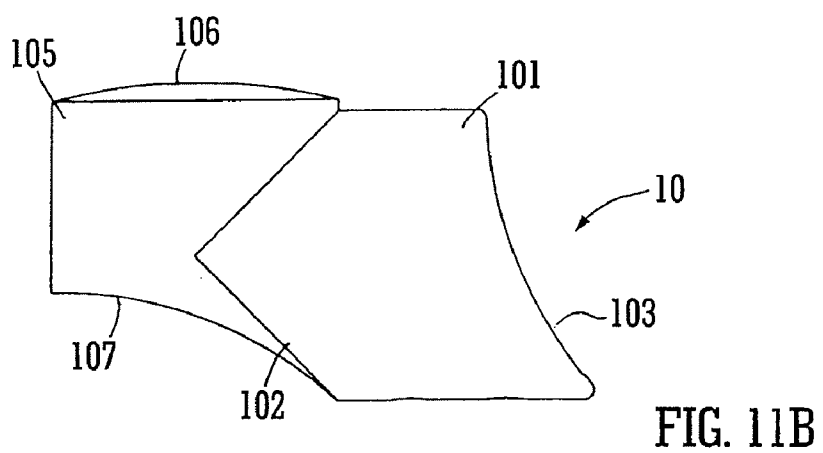
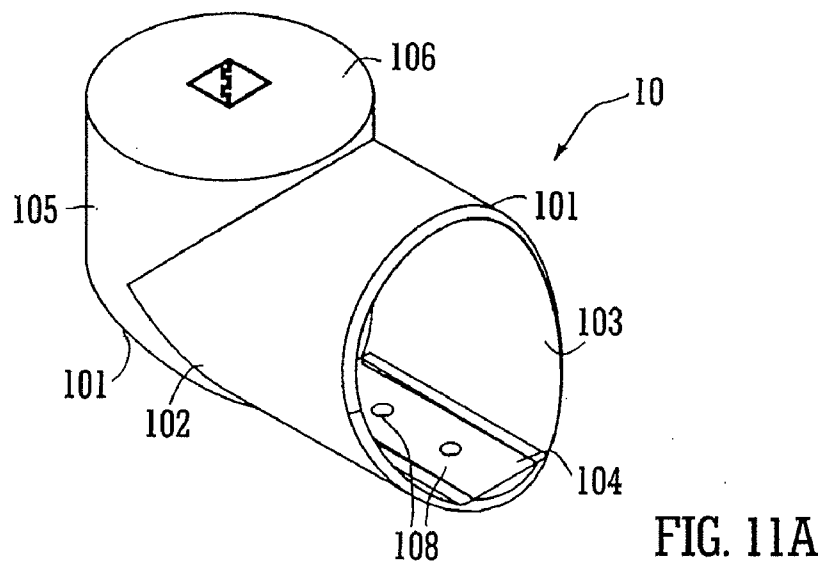
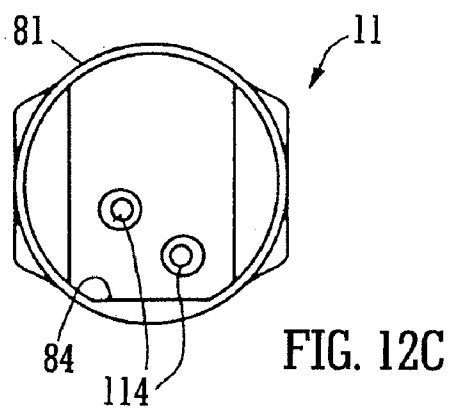
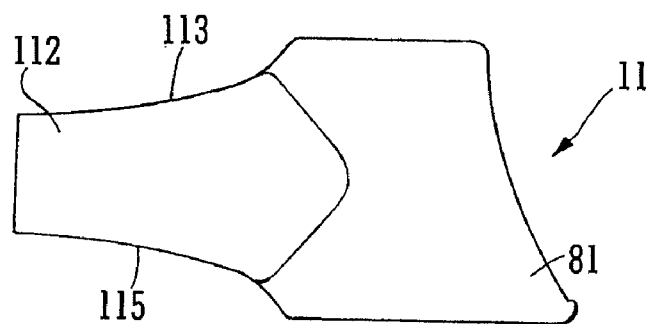
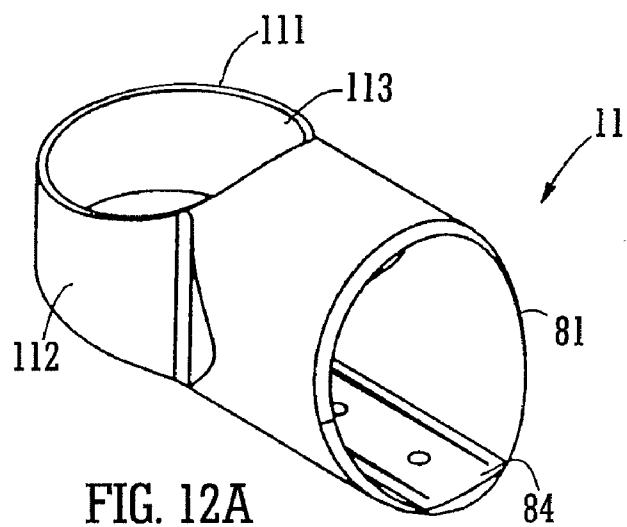


FIG. 10C





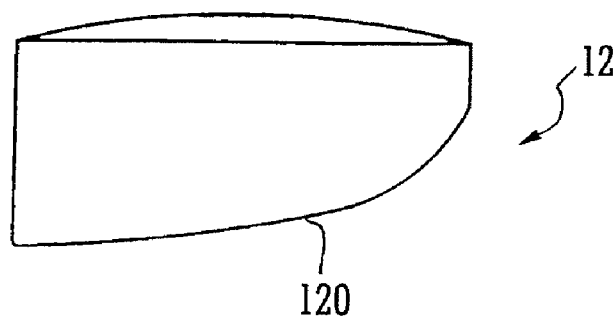


FIG. 13A

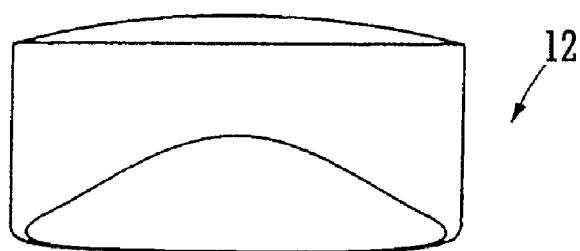


FIG. 13B

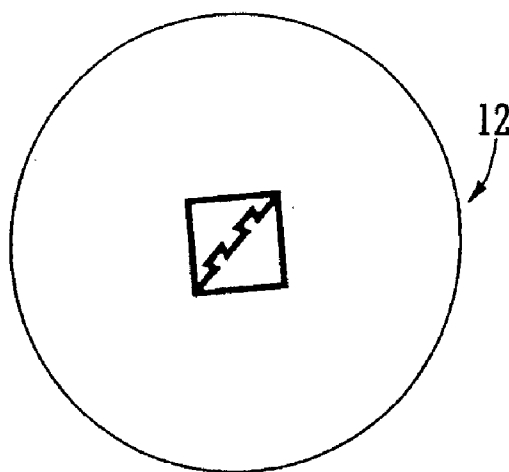
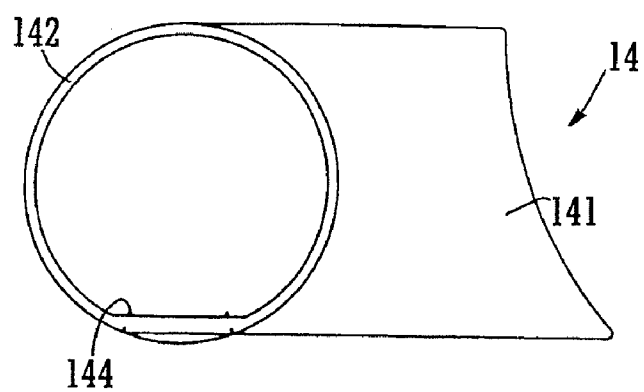
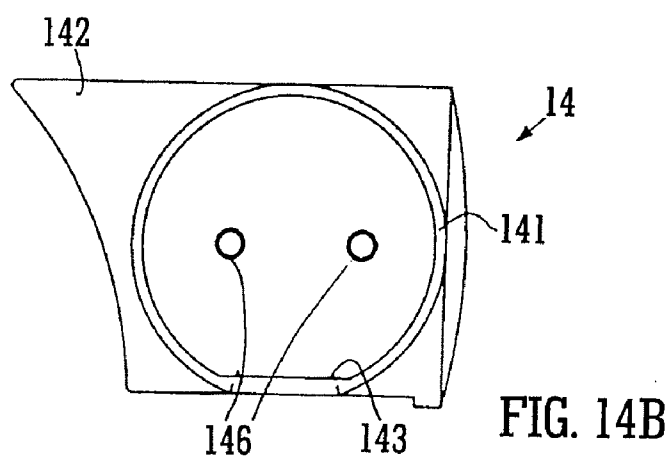
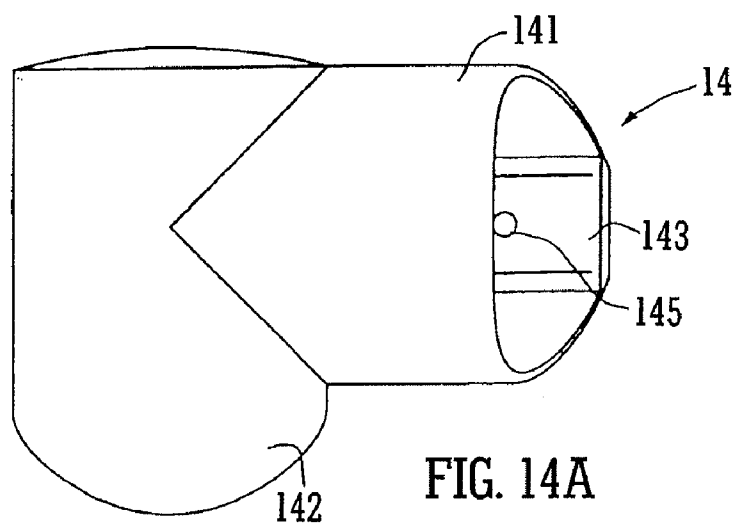
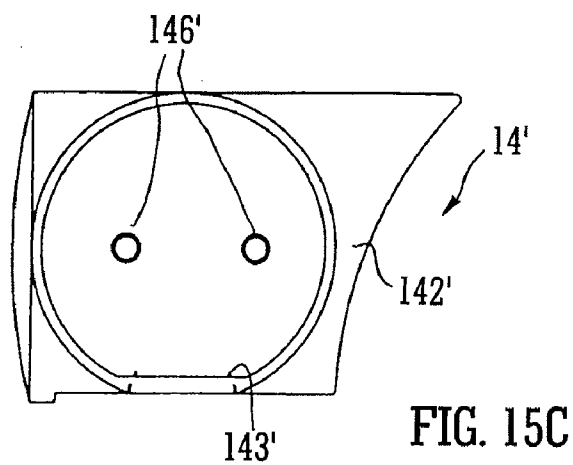
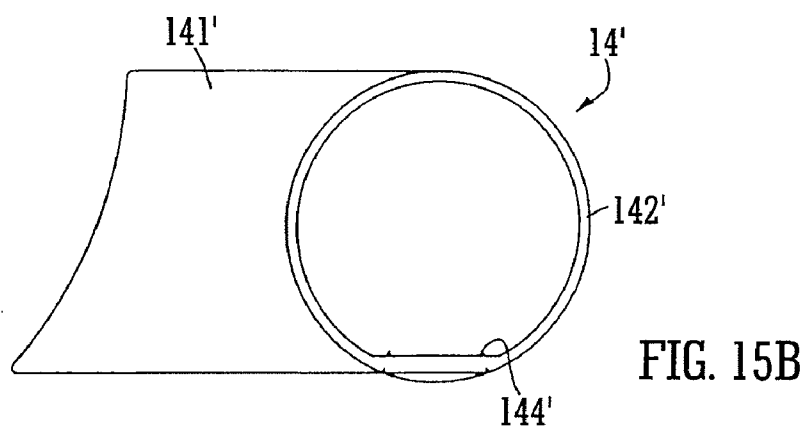
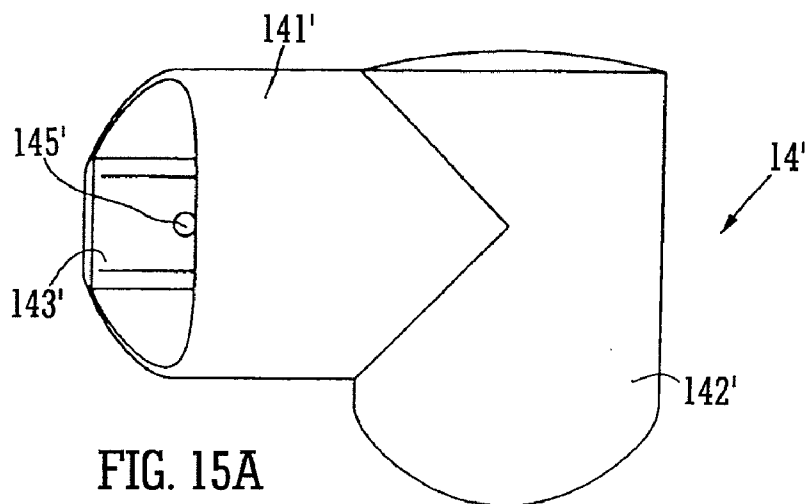
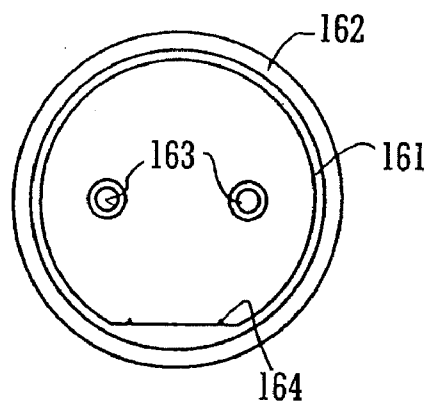
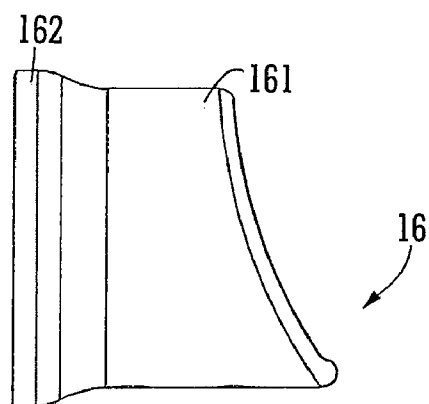
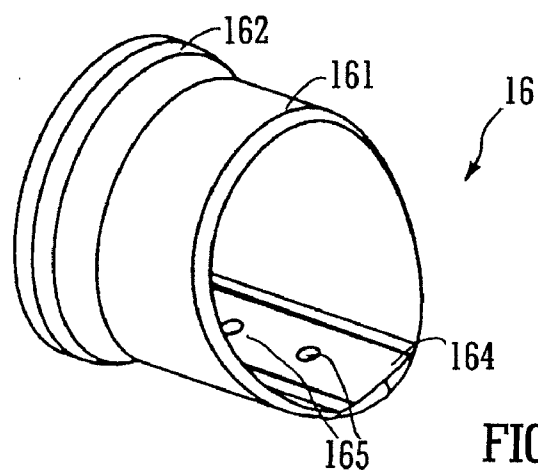


FIG. 13C







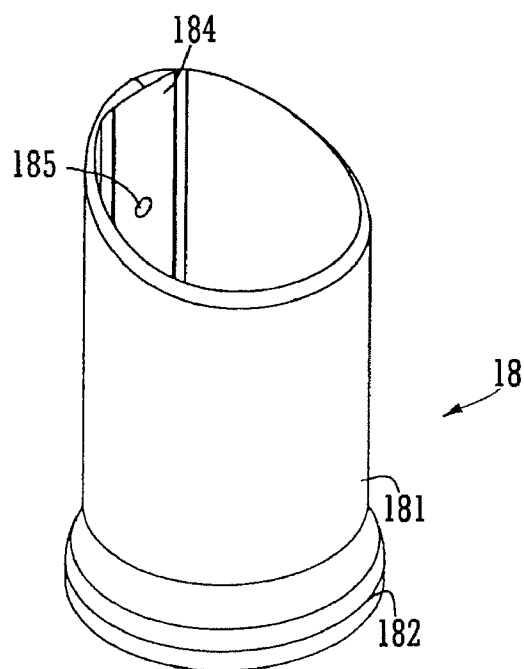


FIG. 17A

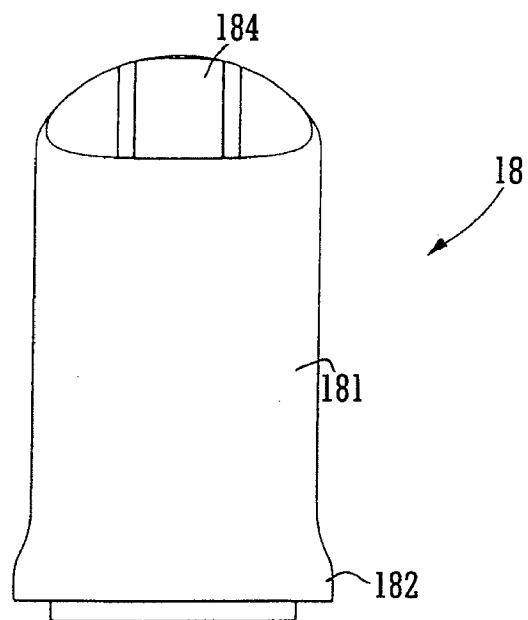


FIG. 17B

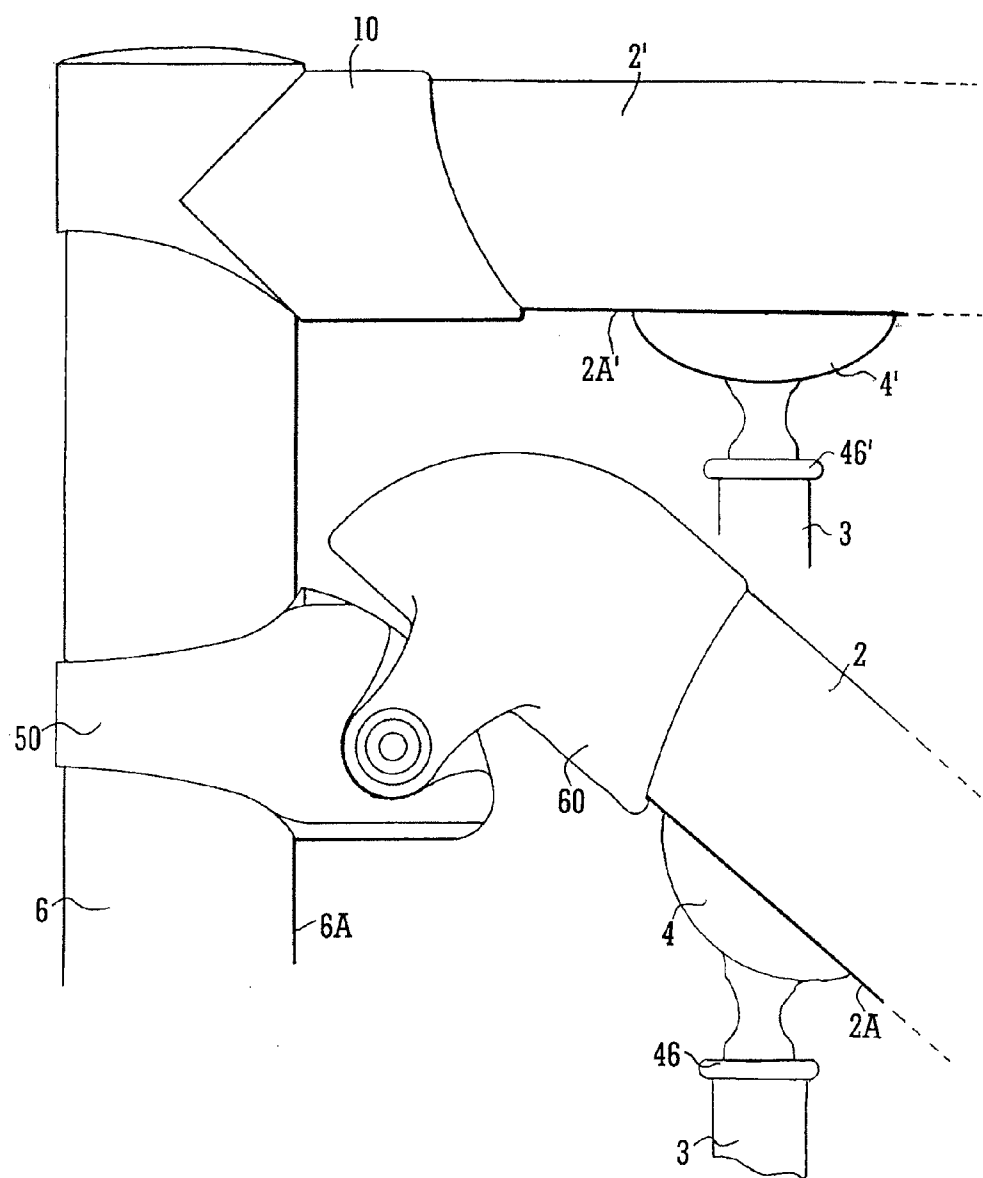


FIG. 18

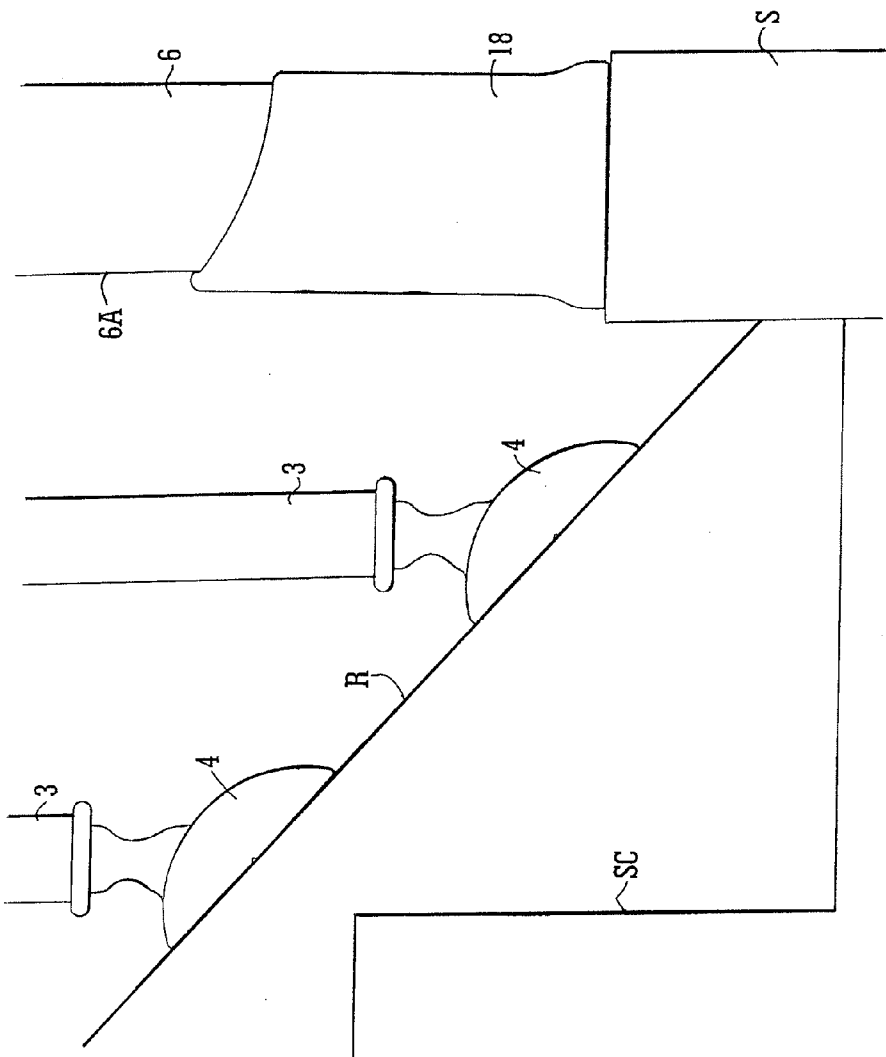


FIG. 19

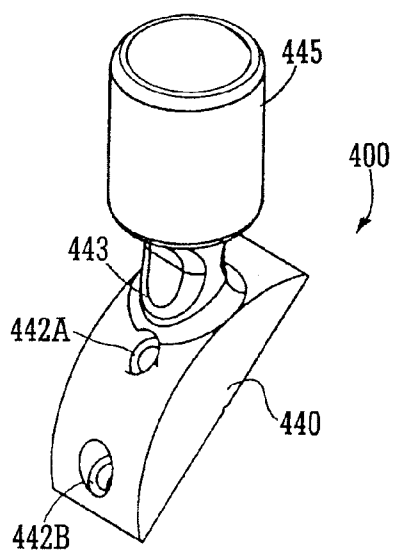


FIG. 20A

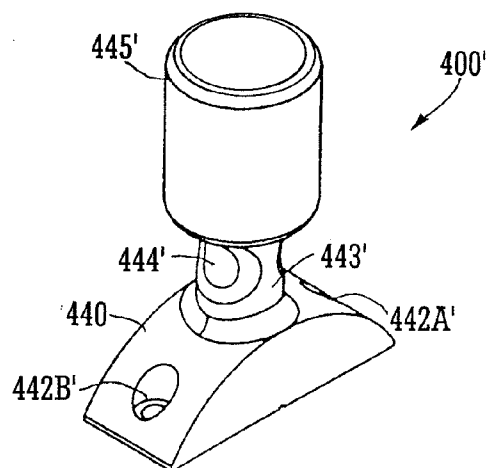


FIG. 21A

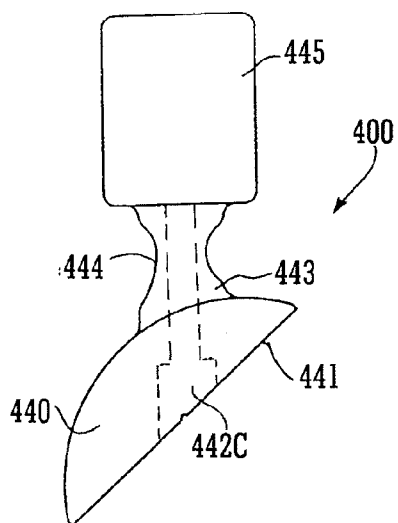


FIG. 20B

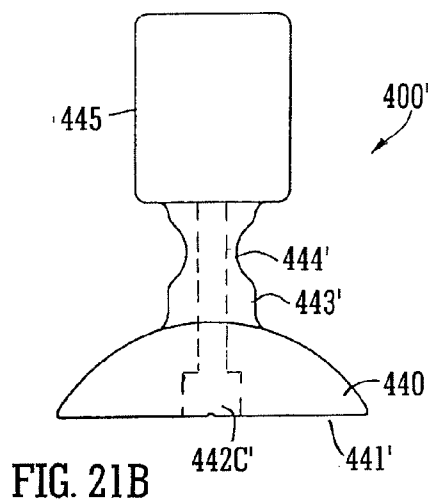


FIG. 21B

HANDRAIL ASSEMBLIES

[0001] This invention relates to a handrail assembly suitable for use as a safety rail or on a staircase and the like.

[0002] Handrail assemblies for a staircase usually comprise a base rail or support, a hand rail and a set of posts called balusters or banisters which extend in between and support the handrail. Each end of the handrail may be further supported by a newel post. The handrail is supported such that it is parallel to the stairs, and the banisters are generally vertical.

[0003] There are wide variations in the inclination of staircases, in the distance that they have to span and in the total number of bends or changes of direction required. Regulations normally confine modern, new-built staircases to within a certain range of inclinations. Older houses, which were built before the introduction of modern regulations, often have staircases whose inclination falls outside of the proscribed range. Accordingly, replacing a staircase in an older building can often require a builder to install a bespoke staircase, rather than using standard available components. Because of these factors there is a requirement to provide a handrail assembly which can accommodate wide variations of inclination and which can be assembled and installed both by the professional and by the do-it-yourself enthusiast.

[0004] Several variable pitch stair railing assemblies have been proposed. For example, those disclosed in U.S. Pat. No. 5,056,283, U.S. Pat. No. 4,533,121 and U.S. Pat. No. 4,352,485. Further, adjustable connecting members for connecting rigid handrails or safety rails have also been disclosed in GB-A-2299370.

[0005] It is an object of the present invention to provide a handrail assembly which allows for changes of direction and which can be used on stairways which have varying degrees of inclination and varying spans. It is a more specific aspect of the invention to provide a handrail assembly which can be readily assembled by the unskilled or at least partially skilled labour.

[0006] Accordingly, one aspect of the invention provides a kit of parts for the assembly of a handrail installable to adopt a plurality of inclinations, the kit comprising:

[0007] A length of rail for use as a handrail;

[0008] Two parts of a two-part pivotable mount or connector for the rail, one part having a hollow portion into which an end of the rail is insertable, the other part being mountable on a supporting surface, the two parts being interconnectable and being mutually pivotable when interconnected.

[0009] A second aspect of the invention provides a kit of parts for the assembly of a handrail installable to adopt a plurality of inclinations, the kit comprising:

[0010] A length of rail for use as a handrail;

[0011] A plurality of posts; and

[0012] A plurality of brackets to interconnect the posts and handrail, each bracket having a surface shaped for flush engagement with a surface of the rail and a deformable portion to accommodate a plurality of inclinations of the installed handrail.

[0013] The rail may have, in cross section, a rounded portion and a flat surface, the hollow portion of the mount preferably having an internal cross-sectional which is complementary to that of the rail.

[0014] The kit will preferably include a plurality of posts and a plurality of brackets attachable to the handrail, the posts

and brackets may have have respective mating portions for engagement therebetween, each bracket will usually have a deformable portion to accommodate a plurality of inclinations of installed handrail. The deformable portion will preferably be able to deform to accommodate a variation in inclination of, say, 10° i.e. 5° either side of its as-formed, supplied, or equilibrium, position. In a particular embodiment, the angle of deformation is preferably 7° (3.5° either side of the as-formed position).

[0015] The kit may further include at least one two-part pivotable mount for supporting the handrail, a first part of the mount having a hollow portion into which an end of the rail is insertable, the second part being mountable on a support surface, the two parts being interconnectable to provide pivotable motion with respect to one another.

[0016] Also included in the kit may be one or more connectors having hollow portions into which an end of a length of rail is insertable to interconnect two lengths of rail, one or both hollow portions preferably having an internal cross section having a rounded portion and a flat portion.

[0017] There is also provided, in a third aspect of the invention, a two-part pivotable mount or connector for a handrail, the first part of the mount having a hollow portion into which an end of a handrail is insertable, the second part of the mount being attachable to a support surface, the two parts being pivotable with respect to one another when interconnected, and wherein the internal surface of the hollow portion is shaped to prevent, in use, rotation of the hollow portion about a complementarily shaped handrail end inserted therein.

[0018] A yet further aspect of the invention provides a connector to connect non-parallel lengths of rail, the connector having two hollow parts into which lengths of rail are insertable, the hollow parts having openings which are non-parallel, at least one of the hollow parts has an internal surface shaped to prevent, in use, rotation of that part about the end of the length of rail when inserted therein.

[0019] The internal surface of the hollow portion may be shaped to have a rounded part and a flat surface

[0020] Preferably, the openings of two hollow parts are orthogonal to one another.

[0021] In a fifth aspect of the invention there is provided a bracket to connect a post to a rail, the bracket comprising a terminal portion for engagement with an end of the post and a surface for flush engagement with a surface of the rail, and an intermediate deformable portion between the terminal portion and the surface which is deformable to accommodate different angles between the rail and post.

[0022] A further aspect of the invention provides a method of installing a handrail assembly comprising a two-part pivotable mount or connector, a length of handrail, the assembly being capable of accommodating different inclinations of handrail, the method comprising the steps of:

[0023] Connecting one part of the mount to a supporting surface;

[0024] Inserting an end of the handrail into a hollow part of the second part of the mount;

[0025] Interconnecting the two parts of the mount;

[0026] Mounting a second end of the handrail at an intended location; wherein, the two parts of the mount are pivotable with respect to one another to allow the handrail to adopt the inclination between the support and the intended location.

[0027] A yet further aspect of the invention provides a handrail assembly comprising a length of rail having one end

inserted into a body portion of a connector, the connector being mounted on and secured to a support surface and being pivotable about a pivot point to accommodate a desired angle of inclination of the handrail, a plurality of posts and a plurality of brackets which connect the posts to the handrail, the brackets having a portion which is deformable to accommodate a desired angle of inclination.

[0028] The bracket may be formed from a plastics material, the material may be acrylonitrile butadiene styrene (ABS), nylon, polyethylene, polypropylene or other hard wearing and deformable materials.

[0029] The hand rail preferably has a substantially flat lower surface and an upper generally rounded shape. Most preferably the cross-section of the handrail will be in the form of a segment of a circle, most preferably a major segment of a circle. Alternatively, the rounded portion of the cross-section may be elliptical or square in shape, or may be non-uniform.

[0030] It is most preferred that the cross-sectional shapes of at least one hollow portion of the connector, the handrail, the hollow portion of the mount are major segments of a circle.

[0031] The hand rail and rail member are advantageously formed from wood, although they may also be formed from a core material provided with a sheath, veneer or other protective coating.

[0032] A plurality of brackets and upright posts may be connected to the handrail. Further, brackets and upright posts may be connected to the rail member.

[0033] In order that the invention may be more fully understood, it will now be described, by way of example only, and with reference to the accompanying drawings, in which:

[0034] FIG. 1 is a perspective view of a staircase provided with a handrail assembly according to the invention;

[0035] FIG. 2A is a perspective view of a bracket according to the invention;

[0036] FIG. 2B is an elevation of the bracket of FIG. 2A;

[0037] FIG. 3A is a perspective view of a second bracket according to the invention;

[0038] FIG. 3B is an elevation of the bracket of FIG. 3A;

[0039] FIG. 4A is a perspective view of a connector part according to the invention;

[0040] FIG. 4B is an elevation of the connector of FIG. 4A;

[0041] FIG. 4C is an end elevation of the connector of FIG. 4A;

[0042] FIG. 5A is a perspective view of a connector part according to the invention;

[0043] FIG. 5B is an elevation of the connector of FIG. 5A;

[0044] FIG. 6A is a perspective view of a connector part according to the invention;

[0045] FIG. 6B is an elevation of the connector of FIG. 6A;

[0046] FIG. 6C is an end elevation of the connector of FIG. 6A;

[0047] FIG. 7A is a perspective view of a connector part according to the invention;

[0048] FIG. 7B is an elevation of the connector of FIG. 7A;

[0049] FIG. 7C is an end elevation of the connector of FIG. 7A;

[0050] FIG. 8A is a perspective view of a connector part according to the invention;

[0051] FIG. 8B is an elevation of the connector of FIG. 8A;

[0052] FIG. 8C is an end elevation of the connector of FIG. 8A;

[0053] FIG. 9A is a perspective view of a connector according to the invention;

[0054] FIG. 9B is an elevation of the connector of FIG. 9A;

[0055] FIG. 9C is an end elevation of the connector of FIG. 9A;

[0056] FIG. 10A is a perspective view of a connector according to the invention;

[0057] FIG. 10B is an elevation of the connector of FIG. 10A;

[0058] FIG. 10C is an end elevation of the connector of FIG. 10A;

[0059] FIG. 11A is a perspective view of a connector according to the invention;

[0060] FIG. 11B is an elevation of the connector of FIG. 11A;

[0061] FIG. 11C is an end elevation of the connector of FIG. 11A;

[0062] FIG. 12A is a perspective view of a connector according to the invention;

[0063] FIG. 12B is an elevation of the connector of FIG. 12A;

[0064] FIG. 12C is an end elevation of the connector of FIG. 12A;

[0065] FIG. 13A is a perspective view of a cap according to the invention;

[0066] FIG. 13B is an elevation of the cap of FIG. 13A;

[0067] FIG. 13C is an end elevation of the cap of FIG. 13A;

[0068] FIG. 14A is a perspective view of a connector according to the invention;

[0069] FIG. 14B is an elevation of the connector of FIG. 14A;

[0070] FIG. 14C is an end elevation of the connector of FIG. 14A;

[0071] FIG. 15A is a perspective view of a connector according to the invention;

[0072] FIG. 15B is an elevation of the connector of FIG. 16A;

[0073] FIG. 15C is an end elevation of the connector of FIG. 15A;

[0074] FIG. 16A is a perspective view of a connector according to the invention;

[0075] FIG. 16B is an elevation of the connector of FIG. 16A;

[0076] FIG. 16C is an end elevation of the connector of FIG. 16A;

[0077] FIG. 17A is a perspective view of a connector according to the invention;

[0078] FIG. 17B is an elevation of the connector of FIG. 17A;

[0079] FIG. 18 is part of a handrail assembly according to the invention;

[0080] FIG. 19 is part of a handrail assembly according to the invention;

[0081] FIG. 20A is a perspective view of a third bracket according to the invention;

[0082] FIG. 20B is a side elevation of the bracket of FIG. 20A

[0083] FIG. 21A is a perspective view of a fourth bracket according to the invention; and

[0084] FIG. 21B is a side elevation of the bracket of FIG. 21A.

[0085] Referring to FIG. 1, there is shown a handrail assembly 1, on a staircase SC which has a landing L. The flights of stairs which lead from and to the landing L extend at right angles to one another, within a corner of a building (not shown).

[0086] The handrail assembly 1 has handrails 2 and upright posts or banisters 3, which are connected to the handrails 2 by brackets 4. The upright banisters 3 are connected, at their lower end, to a base rail R by further brackets 4. The handrails 2 are connected to newel posts 6 by connectors 5. The newel posts 6 are mounted on supports S by further connectors 18.

[0087] The individual components of the handrail assembly 1 will now be described.

[0088] FIGS. 2A and B show an individual bracket 4 formed from a material such as ABS comprising a body 40 having a flat or planar base 41 and a curved surface 42. The body has three apertures 43A, 43B and 43C. Two of the apertures 43A and 43B have wider, or countersunk, portions which extend from the curved surface 42 of the body 40. The third aperture 43C extends from the planar base 41 into an extension 44 which extends upwards at an angle from the curved surface 42 of the body 40. The aperture 43C has a countersunk portion which extends from planar base 41.

[0089] The extension 44 has a narrow waist 45 which widens to form an annular abutment member 46. A cylindrical spigot 47 extends from the distal end of the extension 44. The spigot 47 is split twice, diametrically, to form four portions 48, each having a quadrant-like cross section and each having a chamfered edge 49.

[0090] FIGS. 3A and 3B show another bracket 4' (like features being indicated by the same numeral as in FIGS. 2A and 2B with the addition of a prime (')) having a body 40' with a planar lower surface 41' and curved upper surface 42'. Three apertures 43A', 43B', 43C' extend through the body 40', two of which 43A' and 43B' having a relatively large diameter portion communicating with the curved upper surface 42' of the body 40' and the third 43C' having a large diameter portion communicating with the lower planar surface 41' and extending into an extension 44' having a narrow waist 45'.

[0091] The extension portion 44' terminates, at its distal end, in an annular abutment member 46' which is provided with a substantially cylindrical engagement spigot 47'. The spigot 47' is split to form four quadrant-like portions 48' each extending substantially the entire length of the spigot 47'.

[0092] The brackets 4 and 4' differ in the positions of the apertures, respectively 43A, 43B, 43C and 43A', 43B', 43C', with respect to the bodies 40 and 40' and in the angle at which the respective extensions 44, 44' make with the respective planar surfaces 41 and 41'. The reasons for these differences will be explained below.

[0093] FIGS. 4A, 4B and 4C show a one half of a rail/post connector 50 having an annular portion 51 with a circular internal surface. A body portion 52 is connected to the annular portion 51. The body portion 52 has a recess 53 extending into one half thereof, the recess 53 having a curved surface 54. Extending from the recess 53, and communicating with the internal surface of the annular portion 51, are a pair of countersunk apertures 55A and 55B. An aperture 55C extends through the body portion 52 to communicate with the recess 53.

[0094] FIG. 5A and 5B show a second embodiment of one half of a rail connector 50', which is identical to that shown in FIGS. 4A to 4C (like parts being denoted by identical numerals with a prime (')) except that the body 52' extends from a circular plate 56 instead of from an annular portion. The countersunk apertures 55A' and 55B' extend through the body 52' and plate 56.

[0095] FIGS. 6A, 6B and 6C show a third embodiment of one half of a rail connector 50'' which has a body 52'' similar

to that shown in FIGS. 4A to 5B, (like features being denoted by identical numerals with a double prime ('')) except that the body 52'' is mounted upon, and connected to, a tubular portion 57. The aperture 55C'' is countersunk on the side distant from the recess 53'' (as may be those shown in FIGS. 4A to 5B).

[0096] The tubular portion 57 has an external surface which is circular in cross-section and an internal surface which has a cross section of a major segment of a circle. The planar surface 58 is shown in dotted lines in FIG. 6C. A pair of apertures 59A and 59B extend through the tubular portion 57 which emerge on the planar surface 58. The apertures 59A and 59B may be countersunk (not shown) on the outer surface of the tubular portion 57.

[0097] It will be appreciated that the parts 50, 50' and 50'' may be configured as left-hand or right-hand parts, which is to say that the recess 53, 53', 53'' may extend into either half of the body 52, 52', 52''. As shown, parts 50, and 50' may be described as left-hand parts, the recess 53, 53' respectively, extending into the left-hand portion of the body 50, 50'. In contrast, the recess 53'' of part 50'' extends (as shown) into the right-hand portion of the body 52''. As described below, whether left-hand or right-hand parts are used will depend on the particular staircase to which the rails are installed.

[0098] FIGS. 7A to 7C show a second part of a rail connector 60 having a tubular body 61 which tapers from an open end 62 to a closed end 63. The internal surface of the tubular body has a cross-section (at the open end 62) of a major segment of a circle with a planar surface 64 extending the length of the body 61. A pair of apertures (not shown) extend through the tubular body 61 to emerge on the planar surface 64.

[0099] Extending from the body 61 is a male member 65 which extends substantially orthogonally to the plane of the planar surface 64 and from one side of the midpoint of the plane of the planar surface 64. The distal portion of the male member 65 has an aperture 66 formed therethrough which is countersunk on one side. It will be appreciated that the part 60 may be configured as a left-hand or right-hand part by altering the side of the part 60 from which the male member 65 extends.

[0100] In use, the male member 65 can extend into the recess 53, 53', 53'' of any of the parts 50, 50', 50'' to form a connector 5, the aperture 66 being aligned with the aperture 55C, 55C', 55C'' extending through the body 52, 52', 52''. A nut and bolt (not shown) may be used to secure the two parts 50, 50', 50'' and 60 together to form a connector 5 which is pivotable about the nut and bolt (not shown) to adopt a multiplicity of configurations for use on any desired inclination of hand rail.

[0101] FIGS. 8A, 8B and 8C show a further half of a connector 70 for use with part 50'' having a tubular body portion 71 with a substantially circular external cross section and an internal cross section in the form of a major segment of a circle with a planar surface 74. Two pairs of apertures 73, one pair at either end, extend through the body portion 71 in the region of the planar surface 74.

[0102] A male member 75 extends from the body portion 71, the distal end of which having an aperture 76 extending therethrough, the aperture 76 being countersunk on one side.

[0103] In use, the male member 75 of part 70 is located or locatable in the recess 53'' of part 50'' the respective apertures 76 and 55C'' being aligned. A nut and bolt may be passed through the apertures 76 and 55C'' to hold the parts 50'', 70 together, the parts 50'', 70 being pivotable about the bolt to

allow the so-formed connector **5'** to accommodate a large number of desired inclinations of hand rail.

[0104] FIGS. 9A and 9B show a further rail/post one-piece connector **8** having two substantially orthogonal tubular portions **81, 85**, each having a closed end **82, 86** and an open end **83, 87**. The first portion **81** has an internal surface with a cross section which is in the form of a major surface of a circle, with a planar surface **84**. Apertures **88, 89** extend through each of the tubular portions **81, 85**, which, in the first portion **81**, is in the region of the planar surface **84**.

[0105] The rail/post one-piece connector **9** of FIGS. 10A, 10B and 10C, has a first portion **81** identical to that described in relation to FIGS. 9A to 9C and a second portion **91** comprising a substantially annular body **92** having an internal surface with a with a substantially circular cross-section. Apertures **94** extend through the body **92**.

[0106] FIGS. 11A, 11B and 11C show a further rail/post one piece connector **10** having two substantially orthogonal tubular portions **101, 105**, each having a closed end **102, 106** and an open end **103, 107**. The first portion **101** has an internal surface with a cross section which is in the form of a major surface of a circle, with a planar surface **104**. The second portion has a circular internal cross section. Apertures **108, 109** extend through each of the tubular portions **101, 105**, which, in the first portion **101**, is in the region of the planar surface **104**.

[0107] A further post/rail connector **11** is shown in FIGS. 12A, 12B and 12C which is similar to that shown in FIGS. 10A to 10C with a first portion **81** identical to that described in relation to FIGS. 9A to 9C and a second portion **111** comprising a substantially annular body **112** having an internal surface with a with a substantially circular cross-section. Apertures **114** extend through the body **112**.

[0108] The annular body **112** is connected to the first portion **81** about a line defining a diameter of the internal surface of first portion **81**. The upper and lower surfaces **113, 115** of the annular portion **111** taper respectively upwardly and downwardly (as shown) to meet the (respective) upper and lower surfaces of the first portion **81**.

[0109] The cap **12** of FIGS. 13A-13C is for use with the connector **11** of FIGS. 12A to 12C. It has a substantially circular internal surface. The bottom wall **120** tapers in such a fashion that it matches the taper of the wall **113** of connector **11**.

[0110] FIGS. 14A-14C show a rail connector **14** having two open, tubular parts **141, 142**, each having an internal cross-section in the shape of a major segment of a circle, with a planar surface **143, 144** respectively running the length thereof. The parts **141, 142** have their principal axes orthogonal to one another. Two apertures extend through each part, in part **141** the apertures **145** extend through the wall of the part in the region of the planar surface, in part **142** the apertures **146** extend through a wall.

[0111] FIGS. 15A to 15C show an identical connector **14'** configured for a right-hand turn (identical components being denoted by identical numerals with a prime (')).

[0112] FIG. 16A-C show a handrail support **16** having a tubular part **161** having an internal cross section in the form of a major segment of a circle, with a planar surface **164**. The part **161** terminates in an integrally formed plate **162** which has a pair of countersunk apertures **163** extending therethrough. A pair of apertures **165** extends through the tubular part in the region of the planar surface **164**.

[0113] A newel post support **18** is shown in FIGS. 17A and 17B which has a tubular portion **181** with an internal cross section the shape of a major segment of a circle, with a planar surface **184**. The portion **181** terminates in an integrally formed plate **182** which has apertures (not shown) extending therethrough. Apertures **185** extend through the tubular portion **181** in the region of the planar surface **184**.

[0114] FIG. 18 shows a part of a handrail assembly **1** at the top of a staircase SC. The hand rail **2** and newel post **6** are typically formed of wood, although other material may be utilised and they both have a cross section which is in the form of a major segment of a circle, with a planar surface **2a** and **6a** respectively.

[0115] The inclined handrail **2** is supported by a connector **5** formed from a part **50** and a part **60**, the male member **65** of part **60** being located within the recess **53** of part **50**. The two parts are secured together by a nut and bolt which extends through the aligned apertures **55C** and **66**. The male member **65** has a curved surface which faces the curved surface **54** of the recess to reduce friction therebetween during relative pivotal motion between the two parts **50, 60** about the bolt.

[0116] The part **50** is located on the newel post **6** and secured thereto by screws which extend through apertures **55A** and **55B** and into the post **6**. The rail **2** is retained within the part **60** by screwing through apertures present in the underside of the part and into the planar surface **2a** of the rail **2**.

[0117] A bracket **4** is attached to the planar surface **2a** of the handrail **2**. The spigot **47** of the bracket **4** is located within a hollow end of a baluster **3** so that the end of the baluster **3** abuts the annular abutment portion **46**. A screw is screwed through aperture **43C** to force the four portions **48** outwards, away from one another to forcefully engage the inner surface of the hollow end of the baluster **3** to prevent separation. The bracket **4** is connected to the planar surface of the handrail by screwing screws through the apertures **43A** and **43B** into the rail **2**.

[0118] A connector **10** is located at the top of the newel post **6** by screwing screws through apertures **109** and into the planar surface **6a** of the post **6**. A horizontal hand rail **2'** is supported at one end by the connector **10**. The planar surface **2a** of the handrail **2** lies adjacent the planar surface **104** of the connector **10**. As will be appreciated, the provision of complementarily-shaped internal surfaces of the connectors (**10, 60** etc) and outer surfaces of the handrails **2, 2'** ensures the accurate location of the two parts. The other end of the handrail **2'** may be supported against a wall by a connector **16** or by a further connector **10** to a newel post **6**, or by connectors **9, 11, 14, 14'** as the case may be.

[0119] A bracket **4'** is connected to the handrail **2'** such that the planar surface **41'** of the bracket **4'** lies against the planar surface **2a'** of the handrail **2'**. The bracket **4'** is secured to the rail **2'** and banister **3** as described above. The banisters **3** are secured, at their lower ends, to base rails R by brackets **4, 4'** in an identical fashion.

[0120] FIG. 19 shows a part of a staircase SC at the bottom of the stairs. A newel post **6** is located within a connector **18** which is screwed to a support S. The planar surface **6a** of the post lies against the planar surface **184** of the connector **18**, the two being secured together by screws (not shown) extending through apertures **185** in the connector **18**.

[0121] Brackets **4** are secured to the base rail R and the spigots thereof are located in the hollow end of balusters **3**, as described above.

[0122] The provision of the 'waist' 44 in the extension portion 43 of the baluster 4 allows for the deformation of the brackets 4 so that variable inclinations of staircase can be catered for, rather than that equivalent to the angle between the post 3 and the planar surface 41 of the undeformed brackets 4. The pivotal connection between the various connector parts allows for various inclinations to be accommodated. The deformable waist 43' of brackets 4' ensures that a landing handrail 2' which is not perfectly true (i.e. horizontal) can be catered for. Indeed, the waist portion 43 of a bracket 4 formed from ABS allows for a variation in incline in a staircase of about 7°, say from 38° to 45°. A similar variation in incline (i.e. 7° or 3.5° either side of the equilibrium position shown) can be accommodated by the horizontal brackets 4'. Other materials may allow variations in inclination of up to 10°. Variations outside this limit are possible and are within the scope of the present invention.

[0123] By using connectors 8 and 9, a turn in a handrail 2' can be accommodated. Parts 85 and 91 are secured to a newel post 6 by screws extending through respective apertures 89 and 94 into the post 6. The parts 81 supporting the hand rail 2'. As the internal cross section of parts 85 and 91 are not in the form of a major section of a circle, they are free to rotate about the newel post 6, allowing for any angle between the two handrail 2' parts.

[0124] If a run up the stairs is considered too long for safe support by the balusters 3 on their own, a newel post 6 can be placed mid-run with a connector 50" mounted thereon. A connector 70 can then be used to interconnect two handrail portions 2 to increase stability.

[0125] The connector part 50' will be used if a handrail 2 requires support at a terminal end against a wall.

[0126] Typically (when using a newel post 6), a handrail for a staircase SC will be installed by cutting a newel post 6 from a length of rail 2 and mounting it in a connector 8. A first part of a connector 5 will be attached to the newel post 6. The handrail 2 will be cut to length and an end thereof will be inserted into the second part of the connector 5. The support for the other end of the rail 2 will be installed (either on a second newel post 6 or against a wall or other supporting surface) and the rail located between the support and the newel post connector 5. The pivotable nature of the connector 5 will allow the handrail 2 to adopt manifold inclinations. Brackets 4 will then be fitted into the ends of posts 3 and secured therein, as previously explained. The bases of the brackets 4 will then be screwed to the base rail R and handrail 2 at a set distance apart. When the brackets 4 are screwed into the handrail 2, the deformable waist portion 45 will deform, if necessary, to accommodate the angle of inclination between the newel post connector and other end support.

[0127] Referring now to FIGS. 20A and 20B, a third embodiment of bracket 400 is shown formed from ABS comprising a body 440 having a flat or planar base 441 and a hump shaped top part. The body has three apertures 442A, 442B and 442C. Two of the apertures 442A and 442B have wider portions which communicate with the curved top surface of the body 440. The third aperture 442C extends from the planar base 441 at an angle and into an extension 443 which extends upwards at an angle from the curved top surface of the body 440.

[0128] The extension 443 has a narrow waist 444 which widens, at its' upper end to join a hollow "cup" portion 445

[0129] FIGS. 21A and 21B show another bracket 400' (like features being indicated by the same numeral as in FIGS. 20A

and 20B with the addition of a prime (') having a body 440' with a planar lower surface 441'. Three apertures 442A', 442B', 442C' extend through the body 440', two of which 442A' and 442B' having a large diameter portion communicating with the curved upper surface of the body 440' and the third 442C' having a large diameter portion communicating with the lower planar surface 441' and extending into an extension 443' having a narrow waist 444'.

[0130] The extension portion 43' terminates, at its' distal end, to join with a hollow portion 445'.

[0131] The brackets 400 and 400' differ in the positions of the apertures, respectively 442A, 442B, 442C and 442A', 442B', 442C', with respect to the bodies 440 and 440' and in the angle at which the respective extensions 443, 443' make with the respective planar surfaces 441 and 441'.

[0132] The hollow portions are sized and dimensioned to accept the end of an upright post 3, preferably fabricated from wood. A screw can be screwed through the apertures 442C, 442C' to secure the banister 3 to the bracket 400, 400'. Screws can be used to secure the bracket 400, 400' to the rail R, the deformable waist portions 444, 444' accommodating any variation in the incline of the post 3 relative to the rail 2, 9.

[0133] It will be appreciated that using a set of banisters 3, some brackets 4, 4', 400, 400' lengths of handrail 2 (to also form the newel posts 6) and some or all of a set of connector parts and connectors 50, 50', 50", 60, 70, 8, 9, 10, 11, 12, 14, 14', 16, 18, a handrail assembly 1 can be constructed for any set of stairs SC. The use of various connectors enables different bends and turns in the staircase SC to be accommodated. Moreover, the use of deformable brackets 4, 4', 400, 400' together with pivotable connectors 5 enables different inclines of staircases SC to be accommodated.

[0134] Because the ends of the handrails 2, 2' and newel posts 6 are always hidden within connectors or connector parts, there is no need to accurately and/or precisely cut the rails 2, 2', 6. Indeed, the assembly 1 of the current invention is substantially 'de-skilled' compared with other handrail assemblies. It has been found that on a typical staircase for a straight flight of timber balustrading about 125 saw cuts is required. In contrast, the assembly 1 of the current invention requires just 7.

[0135] The connectors and connector parts may be formed from a tough plastics material and may be moulded. They may also be formed from metal. The handrail 2 may be formed from wood or plastics. They may be provided with a sheath, such as veneer.

[0136] The brackets 4, 4' need not have quadrant-like portions. The brackets 4, 4' may have two or three portions or may be of unitary form and may be formed to form a friction fit within the post. The spigot 46, 46' need not be cylindrical, it may be square or otherwise shaped in cross-section. The balusters 3 need not be round.

[0137] The handrail 2 may have a cross-sectional shape substantially in the form of an ellipse with a minor segment removed, the internal surfaces of the connector parts and connectors having identical cross-sectional form. Other substantially curvilinear forms may be used, the only proviso being that the intended bottom surface is substantially flat and is matched by the surface 41, 41' of the brackets 4, 4', 400, 400' and/or by the internal surfaces of the connectors.

[0138] It will be further appreciated that the provision of a flat or planar surface is the easiest to manufacture. Further by providing the matched, preferably flat, surfaces on the components it will ease installation for the do-it-yourself enthu-

siast and for the professional handrail fitter alike. The provision of matched surfaces ensures that the components are in the correct configuration when inserted and that no rotation of the, say, connector about the end of the rail is possible.

[0139] The components of the assembly **1** may be sold as a kit bought off-the-shelf or may be ordered to complete a specific job. Clearly, the provision of the parts of the invention, together with the simple mode of construction will allow both the skilled person and the do-it-yourself enthusiast to simply and effectively install a staircase SC which is functional and attractive.

1-25. (canceled)

26. A two-part pivotable connector for a handrail, the first part having a hollow portion into which an end of a handrail is insertable, the second part comprising a plate for attachment to a flat support surface and a body extending from a face of the plate, the two parts being pivotable with respect to one another when interconnected, and wherein the internal surface of the hollow portion is shaped to prevent, in use, rotation of the hollow portion about a complementarily shaped handrail end inserted therein.

27. A two-part pivotable connector according to claim **26**, wherein the two parts are securable together by a nut and bolt.

28. A two-part pivotable connector according to claim **27**, wherein the two parts are pivotable about the nut and bolt and securable together by the nut and bolt in a multiplicity of configurations.

29. A two-part pivotable connector according to claim **26**, wherein the plate is circular.

30. A two-part pivotable connector according to claim **26**, wherein the second part comprises a pair of countersunk apertures in which fixing means are receivable for attaching the second part to the flat support surface.

31. A two-part pivotable connector according to claim **26**, wherein the internal surface of the hollow portion is shaped to have a rounded part and a flat surface.

32. A two-part pitovable connector according to claim **26**, wherein the hollow portion is in the form of a major segment of a circle.

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