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(54) **HAND RAIL FOR STAIRS AND INCLINED CORRIDORS**

(52) **U.S. Cl. 256/59**

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(57) **ABSTRACT**

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A wave-shaped handrail for conventional and spiral stairways and inclined corridors that is ergonomically shaped to allow the user to maintain a constant and firm grip while being fixed at an optimal height to allow the user to fully support his or her self when necessary is disclosed. The handrail includes an elongate wave-shaped handrail anchored relative to the stairs by generally U-shaped brackets. The wave-shaped handrail is configured with generally alternating horizontal and vertical portions that allow the user the most strength and support. Alignment of the handrail such that horizontal rail sections are aligned with stair treads and vertical rail sections are aligned with stair risers provides tactile feedback to the user for identifying the beginning and ending of each stair. Each bracket has a first end connected to the railing on the side thereof proximal the centerline of the stairs to enable the user to ascend or descend the stairs while maintaining her grip, and a second end thereof anchored to the wall or other supporting structure. The railing is preferably mounted such that each horizontal portion is approximately 5'-0" above a corresponding tread of the stair in typical installations.

(21) Appl. No.: **11/121,283**

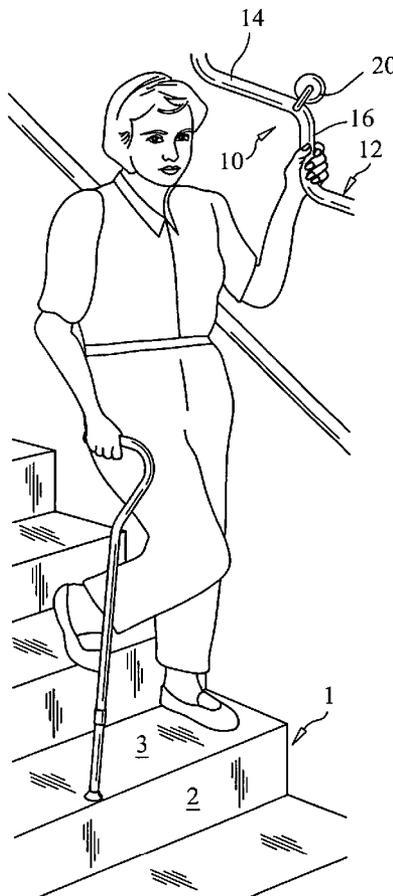
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Publication Classification

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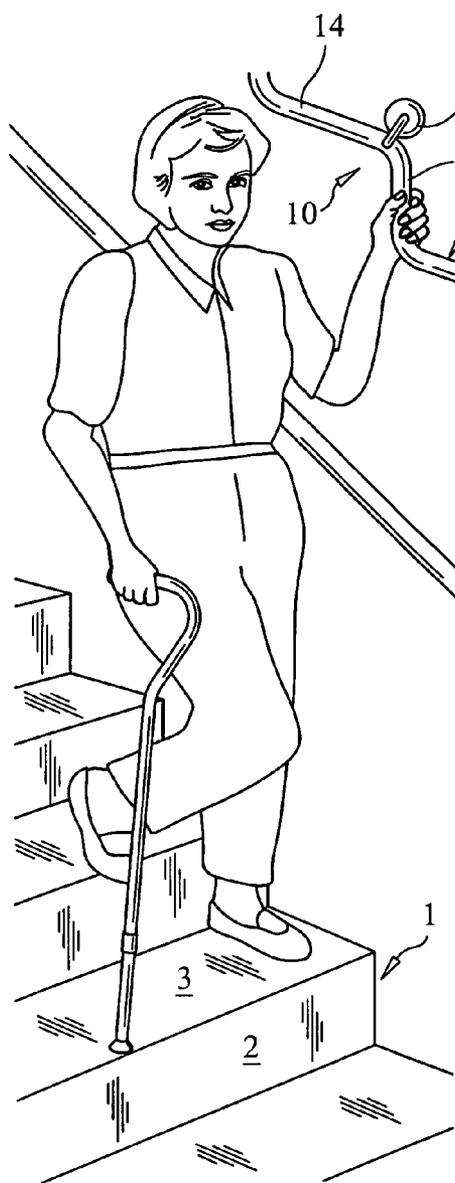


FIG. 1

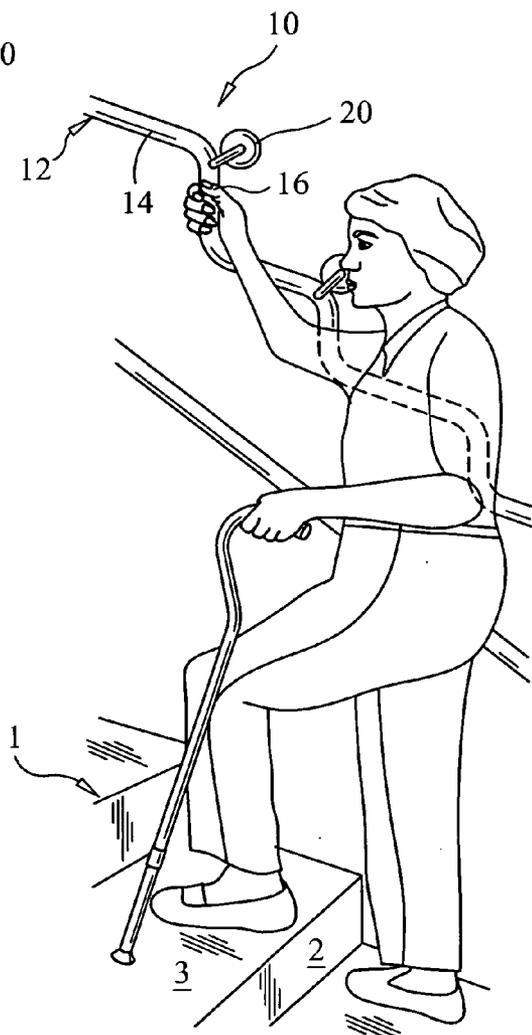


FIG. 2

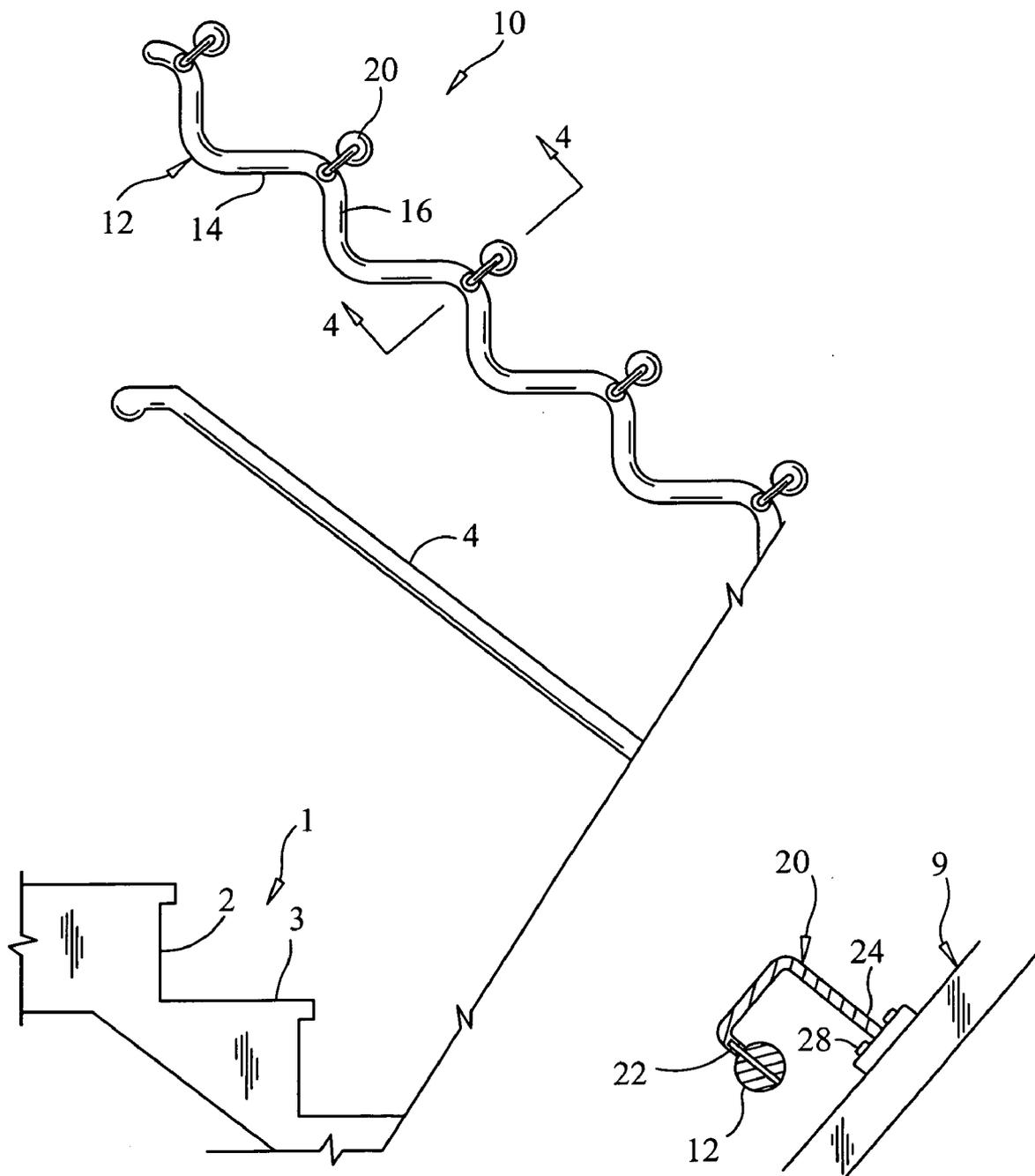


FIG. 3

FIG. 4

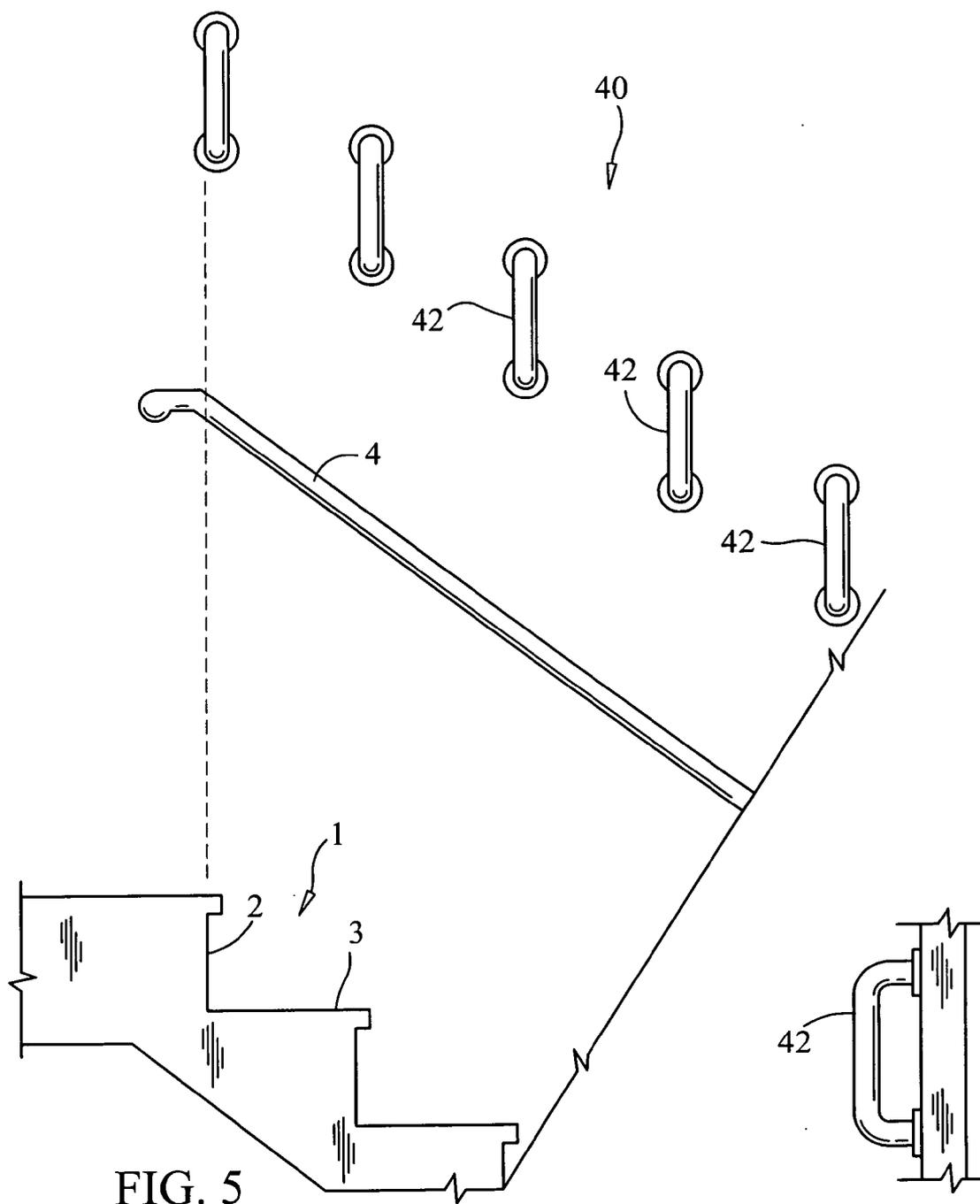


FIG. 5

FIG. 6

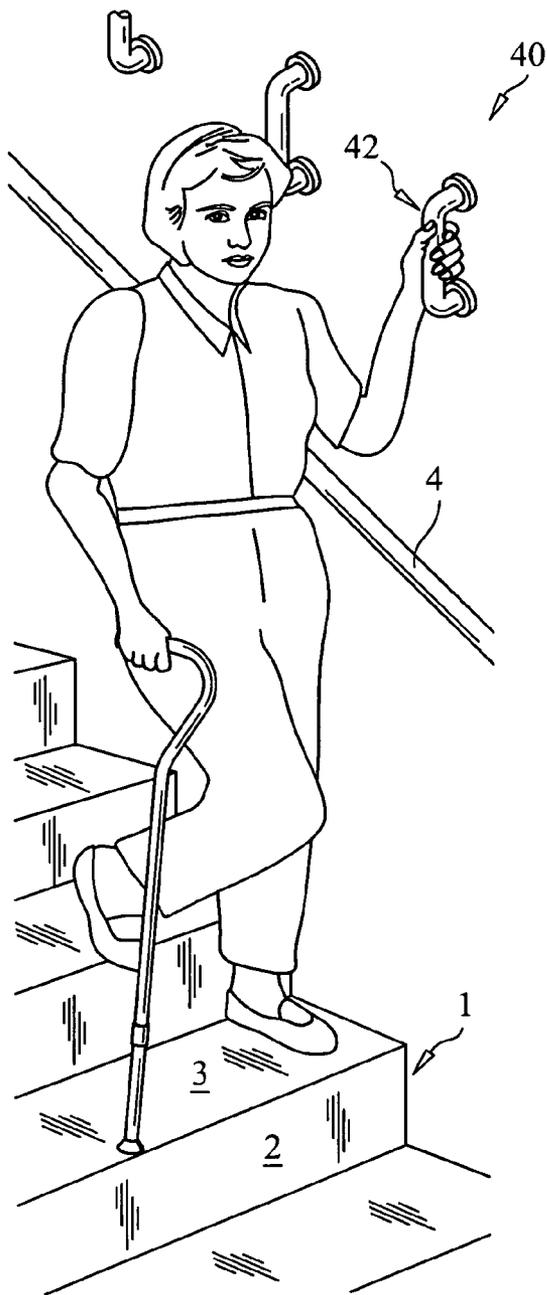


FIG. 7



FIG. 8

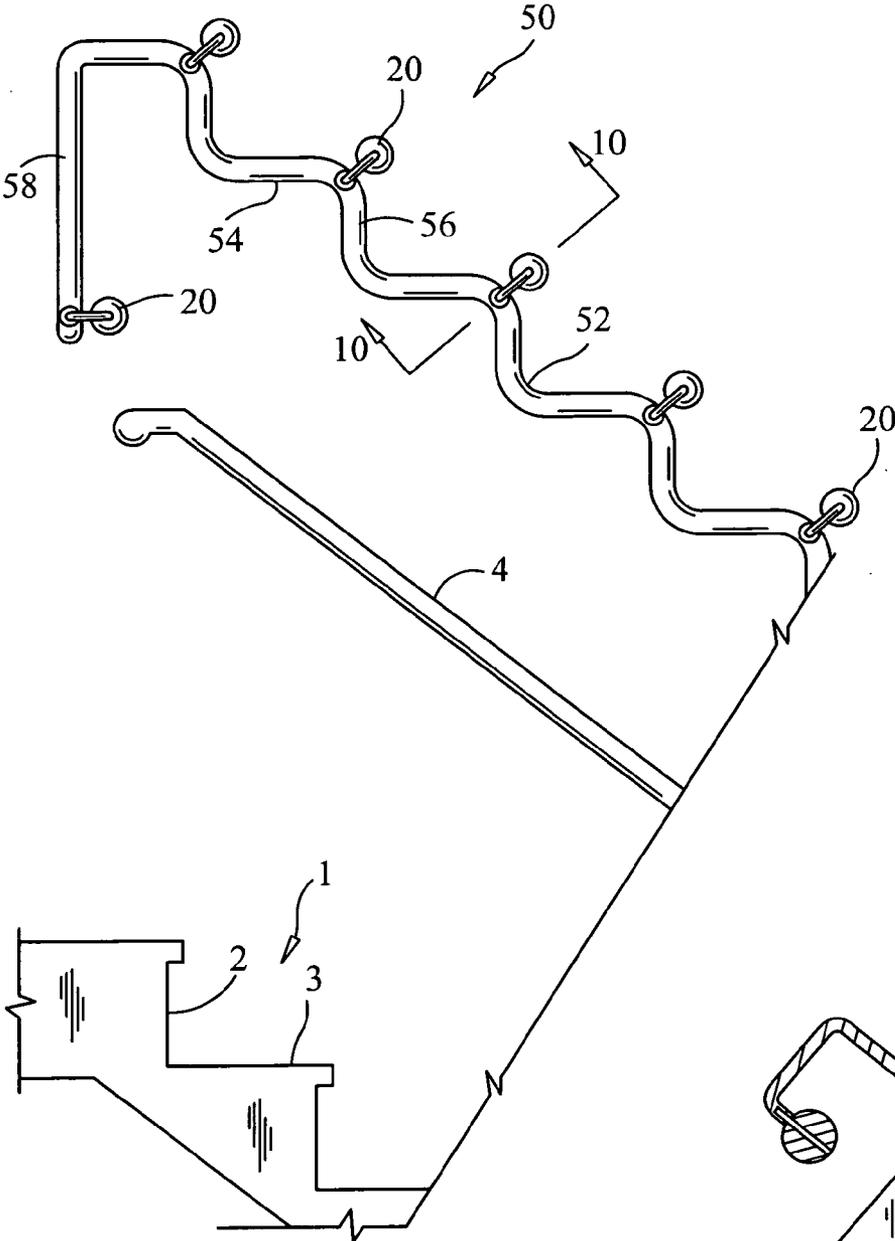
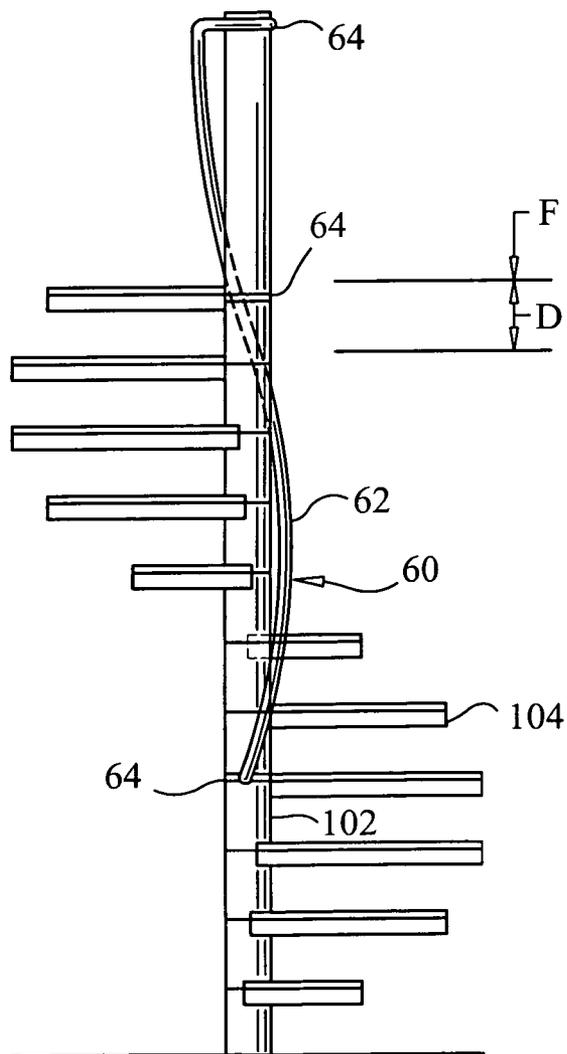
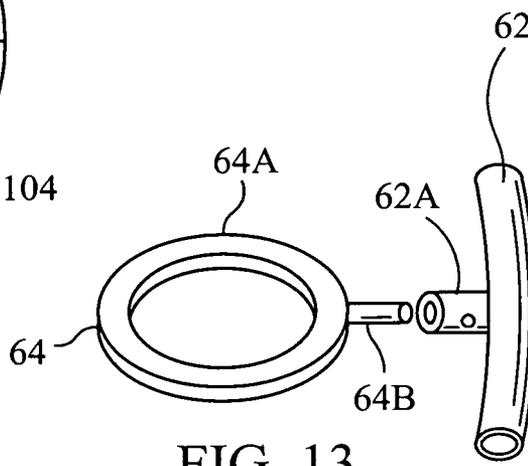
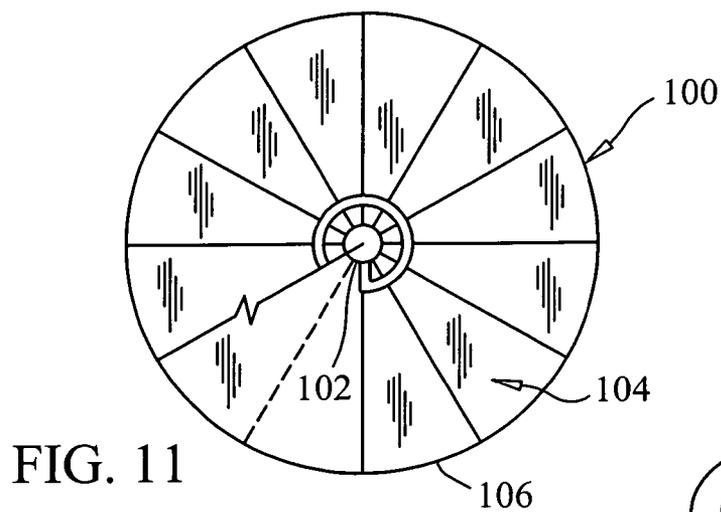


FIG. 9

FIG. 10



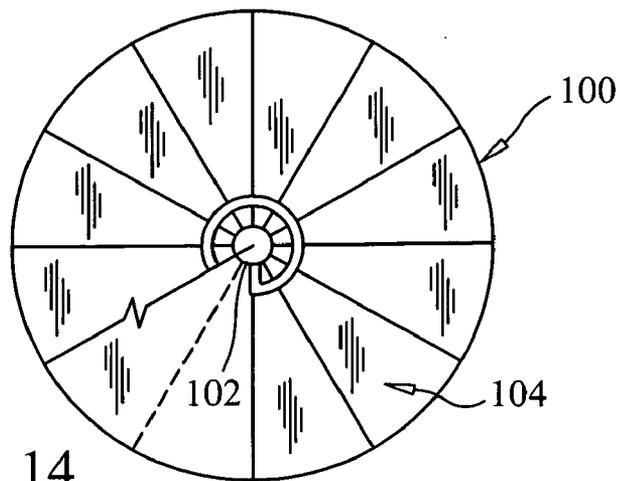


FIG. 14

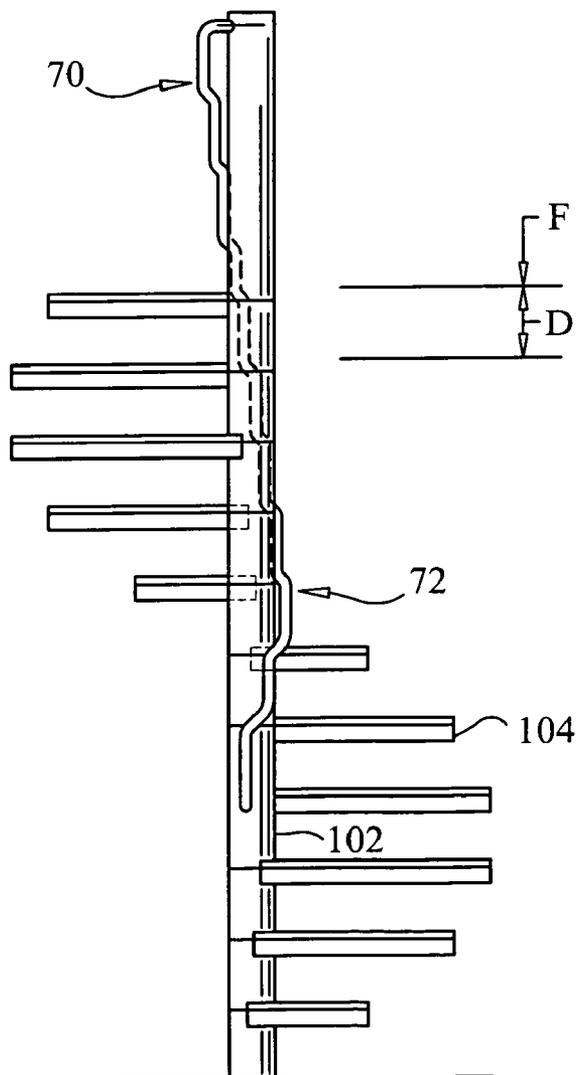


FIG. 15

HAND RAIL FOR STAIRS AND INCLINED CORRIDORS

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a Continuation-In-Part of U.S. patent application Ser. No. 10,991,117, filed Nov. 17, 2004.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] N/A

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BACKGROUND OF THE INVENTION

[0004] 1. Field of the Invention

[0005] The present invention relates to handrails for stairs, and more particularly, to a generally wave-shaped handrail design for stairs and sloped corridors that provides the user with structure positioned and shaped for maximum gripping potential thereby preventing fall-related accident and injury, while further reducing stress and strain on the user's legs.

[0006] 2. Description of Related Art

[0007] Many people are afflicted with conditions that affect mobility. Even if walking itself does not present severe difficulty, climbing and descending stairs can make movement about the house or building difficult if not impossible. Many people, particularly the elderly, are afflicted with ailments that weaken their legs and the joints in their legs. Arthritis and other illnesses slowly deteriorate muscles, bones, and joints, making walking increasingly difficult. As a result, such people often experience difficulty in supporting their own weight, particularly when walking up and down stairs and sloped walkways.

[0008] The difficulty such people experience in walking up and down stairs limits their mobility in public buildings as well as in their home. Probably the most helpful device for climbing stairs is the fixed handrail or banister mounted alongside the staircase. While the conventional fixed handrail provides the person with a rigid support during their entire trip up or down the stairs, it fails to provide adequate support. More particularly, conventional handrails are limited in that they only allow the person to hold on thereto with one hand, as the staircase is often too wide to allow the person to simultaneously use handrails on both sides of the staircase. In addition, conventional handrails are often placed relatively low, typically between 34" and 38" above the stairs, and thus are positioned poorly to provide support to a person who has lost his or her balance and is falling.

[0009] As a result of the limitations associated with conventional handrails, the prior art reveals a number of attempts directed to assisting people while climbing and descending stairs and inclined walkways. For example, U.S.

Pat. No. 3,005,242, issued to Roberts, discloses an auxiliary stair railing adapted to be used in conjunction with a standard stair railing to assist children, and includes a plurality of hangers mounted on the brackets securing the standard stair railing to the wall. An elongated rail member is provided, and supported by the hanger generally parallel to the standard stair railing and closer to the steps. U.S. Pat. No. 3,992,832, issued to Ferwerda, discloses a stairway safety suspension support means that includes suspended loops of flexible strand material with the bottoms of the loops located above the steps less than the heights of people.

[0010] U.S. Pat. No. 4,556,201, issued to Turner, discloses a handrail assembly for the erection of a temporary handrail designed for a toddler or young child. The assembly includes a set of elongate rail members which can be connected end-to-end to provide a handrail member of the desired length. Two or more elongate hanging devices are used to mount the handrail member below another handrail.

[0011] U.S. Pat. No. 5,337,528, issued to Jaworski et al., discloses an assist rail and support system is disclosed which is adapted for attachment to an existing or new handrail at a stairway. The assist rail and support system includes a plurality of suspension elements and a strap associated with each suspension element. The strap is adapted to suspend the associated suspension element below the handrail.

[0012] U.S. Pat. No. 5,657,968, issued to Marsden, discloses an adjustable stair railing for a stairway railing being a plurality of balusters supporting a handrail on a stairway. The adjustable stair railing comprises an auxiliary rail and a facility for attaching the auxiliary rail to some of the balusters in a height adjustable manner and a parallel relationship below the handrail on the stairway railing.

[0013] U.S. Pat. No. 5,853,166, issued to Koza, discloses a handrail assembly which may be mounted on an existing handrail and used to aid children in ascending or descending a set of stairs. The handrail assembly includes a plurality of clamping devices which may be removably mounted on an existing handrail and which support a secondary handrail at a predetermined position below the existing handrail. The secondary handrail includes a plurality of telescopically mated rods which enable the overall length of the secondary handrail to be adjusted to coincide with the overall length of the existing handrail. The secondary handrails are telescopically attached to the clamping devices which allows the distance from the secondary handrail to the stairs to be adjusted according to the needs of a particular child.

[0014] U.S. Pat. No. 5,957,146, issued to Corey, discloses a portable banister, for use by a person in climbing or descending a staircase. The portable banister comprises a foot portion, a handgrip portion, and mast members extending between the foot portion and handgrip portion. The foot portion includes a pair of horizontal slabs that rest against sequential steps, and a vertical member that extends between the horizontal slabs and rests against the riser therebetween. The mast members each extend between one of the horizontal slabs and the handgrip portion, and are each adjustable in length to vary the height and angle of the handgrip portion for the comfort and safety of the user.

[0015] U.S. Pat. No. 6,209,854, issued to Sedlack et al., discloses a handrail assembly consists of four equally spaced connector brackets having three sections of plastic tubing interconnected therebetween.

[0016] The above referenced disclosures of the background art, however, fail to provide a simple and effective handrail system that provides optimal support for the user while ascending or descending stairs and inclined corridors. Consequently, a need exists in the art for an apparatus that would aid the infirm in walking up and down stairs. In addition, there is a need for such an apparatus that would be inexpensive and useful in public buildings as well as in private homes. There further exists a need for such an apparatus that would not interfere with the normal activities of people who would not ordinarily need to use such an apparatus.

BRIEF SUMMARY OF THE INVENTION

[0017] The present invention overcomes the limitations and disadvantages in the art by providing a wave-shaped handrail for stairways and inclined corridors that is ergonomically shaped to allow the user to maintain a constant and firm grip while being fixed at an optimal height to allow the user to fully support his or her self when necessary. A handrail according to the present invention includes an elongate wave-shaped railing anchored relative to the stairs by generally J-shaped brackets. The wave-shaped railing is configured with generally alternating horizontal and vertical portions that allow the user the most strength and support. Each bracket has a first end connected to the railing on the side thereof proximal the centerline of the stairs, and a second end thereof anchored to the wall or other supporting structure. The railing is preferably mounted such that each horizontal portion is approximately 5'-0" above a corresponding tread of the stair.

[0018] Accordingly, it is an object of the present invention to provide an improved handrail for use alongside stairs and inclined walkways or corridors.

[0019] Still another object of the present invention is to provide an improved handrail that maximizes a person's ability to maintain his or her grip.

[0020] A further object of the present invention is to provide a wave-shaped handrail designed to permit a person to slide his or her hand along the railing without having to let go.

[0021] Yet another object of the present invention is to provide a handrail having generally horizontal portions generally aligned with the horizontal tread portions of the stairs and vertical portions generally aligned with the riser portions of the stairs.

[0022] In accordance with these and other objects, which will become apparent hereinafter, the instant invention will now be described with particular reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0023] **FIG. 1** illustrates a person descending stairs equipped with a handrail according to a preferred embodiment of the present invention;

[0024] **FIG. 2** illustrates a person climbing stairs equipped with a handrail according to a preferred embodiment of the present invention;

[0025] **FIG. 3** is a side elevational view of a handrail according to the present invention installed in relation to stairs and a conventional handrail;

[0026] **FIG. 4** is a sectional view of the handrail taken along line A-A of **FIG. 3**;

[0027] **FIG. 5** is a side elevational view of an alternate embodiment handrail according to the present invention;

[0028] **FIG. 6** is a sectional view of the alternate embodiment handrail taken along line A-A of **FIG. 5**;

[0029] **FIG. 7** illustrates a person descending stairs equipped with an alternate embodiment handrail of the present invention;

[0030] **FIG. 8** illustrates a person climbing stairs equipped with an alternate embodiment handrail of the present invention;

[0031] **FIG. 9** is a side elevational view of a handrail adapted with an alternate terminal end with the handrail returning downward;

[0032] **FIG. 10** is a sectional view of the handrail taken along line A-A of **FIG. 9**;

[0033] **FIG. 11** is a partial top view of a spiral stair adapted with a helical center post handrail in accordance with an alternate embodiment of the present invention;

[0034] **FIG. 12** is a side elevational view thereof;

[0035] **FIG. 13** is a detailed view of an annular connection component for attaching the helical handrail depicted in **FIGS. 11 and 12** to the center post;

[0036] **FIG. 14** is a partial top view of an alternate embodiment, stepped helical handrail for a spiral stair; and

[0037] **FIG. 15** is a side elevational view thereof.

DETAILED DESCRIPTION OF THE INVENTION

[0038] With reference now to the drawings **FIGS. 1-4** depict an improved wave-shaped handrail according to a preferred embodiment of the present invention, and **FIGS. 5-8** depict an alternate embodiment. **FIG. 1** is a perspective view showing a person descending standard stairs, generally referenced as **1**. Standard stairs **1** include a plurality of individual stair sections, each of which is formed by a generally vertical riser **2** and a generally horizontal tread **3**. Conventional stairs are set according to a ratio of 4:3 (e.g. tread to riser). A conventional handrail, referenced as **4**, is also shown. **FIG. 2** is a perspective view of a person ascending standard stairs **1**.

[0039] **FIGS. 1 and 2** further depict a preferred embodiment, namely a wave-shaped handrail, generally referenced as **10**. Handrail **10** includes an elongate wave-shaped handrail **12** anchored in position relative to stairs **1** by generally J-shaped brackets **20**. As seen in **FIG. 3**, a significant aspect of the present invention relates to the wave-shaped handrail **12** being configured with generally alternating horizontal sections **14** and vertical sections **16** that allow the user the most strength and support. Handrail **12** preferably defines a generally circular cross-section, however, any suitable cross-sectional shape is considered within the scope of the present invention. Accordingly, the present invention con-

templates any suitable non-circular cross-sectional configuration, including octagonal cross-sections and other various multi-sided configurations. Handrail 12 may be fabricated from metal, plastic, wood, composites, or any other suitable material.

[0040] As best depicted in FIG. 4, each J-shaped bracket 20 has a first end 22 connected to handrail 12 on the side thereof proximal the centerline of the stairs, and a second end thereof 24 connected to an anchor plate 26 anchored to the wall, referenced as 9, or other supporting structure by suitable fasteners 28. By securing handrail 12 using J-shaped brackets configured as disclosed herein, an important safety advantage is realized as the user is able to ascend or descend the stairs while sliding his hand along handrail 12 without the need to remove his hand to avoid the brackets. Handrail 12 is preferably mounted such that each horizontal portion 14 is generally aligned with a corresponding tread 3 of stair 1, such that each vertical portion 16 is generally aligned with a stair riser 2. J-shaped brackets 20 are used to anchor the handrail approximately 5'-0" above a corresponding tread 3 of the stair 1, a height that has been found suitable for those of current average height. As should be apparent the typical height of 5'-0" places the handrail assembly 10 substantially above the mounting height of a conventional handrail. In installations designed for taller or shorter users, the height may be adjusted upward or downward as deemed necessary. In a preferred embodiment, the length of the handrail shall be determined by the length of the stairs, plus one additional handrail shape added to the top and bottom of the stair ending to give the user an extra structure at the bottom of the stair to grasp at the final descending step and an extra structure at the top of the stair to grasp at the final ascending step.

[0041] FIGS. 5 and 6 depict an alternate embodiment structured as a handhold system, generally referenced as 40, according to the present invention. In the alternate embodiment a plurality of generally U-shaped handhold members, referenced as 42, are each anchored to the wall or other supporting structure. As best depicted in FIG. 5, each U-shaped handhold member 42 is generally aligned with a riser 2 of the stair 1 thereby providing tactile feedback to the user to assist the user in identifying the beginning of the stair, the end of the stair, and the riser location. Each handhold member 42 is generally vertically oriented so as to provide primarily a vertical handhold structure. Handhold members 42 are also mounted higher than conventional handrail 4 to maximize the user's ability to support his/her self. Each handhold members 42 preferably defines a generally circular cross-section, however, any suitable cross-sectional shape is considered within the scope of the present invention. Accordingly, the present invention contemplates any suitable non-circular cross-sectional configuration, including octagonal cross-sections and other various multi-sided configurations. In addition, handhold members 42 may be fabricated from metal, plastic, wood, composites, or any other suitable material.

[0042] FIG. 7 is a perspective view showing a person descending standard stairs, generally referenced as 1, using the alternate embodiment handhold system 40 of the present invention. FIG. 8 is a perspective view showing a person ascending standard stairs, generally referenced as 1, using the alternate embodiment handhold system 40 of the present invention.

[0043] FIGS. 9 and 10 depict an alternate embodiment handrail, generally referenced as 50, for use with conventional stairs. Handrail 50 includes an elongate wave-shaped handrail 52 anchored in position relative to stairs 1 by generally J-shaped brackets 20. As seen in FIG. 3, the wave-shaped handrail 52 is configured with generally alternating horizontal sections 54 and vertical sections 56 that provide the user with convenient grasping and support structures. As with the previously disclosed handrail, handrail 50 duplicates the riser/tread configuration in an undulating form running the length of the stair. A significant aspect present in handrail 50 are terminal ends 58 that return downward approximately 2'-0". The downwardly turned terminal end(s) provide the user, particularly the vision impaired, with a structure that defines the beginning/ending of the stairs thereby providing a tactile feedback structure that may be sensed by the user. As best depicted in FIG. 9, terminal end 58 projects vertically downward and is secured proximal the end thereof by a J-shaped bracket 20. As should be apparent, both the upper and lower handrail ends may be adapted with downwardly turned terminal ends.

[0044] In an alternate configuration, the handrail may be adapted for use with spiral stairs and configured in a helical configuration. In this embodiment, the handrail is preferably placed along the center post and the horizontal components are shortened in length so as to match the shortened length of the stair tread as measured proximal the connection point with the center post. In yet another alternate embodiment directed to spiral stairs the handrail may be placed along the outer perimeter of the spiral stairs in a helical configuration. In such a configuration the horizontal sections of the handrail are sized to match the tread of the stair as measured at or near the radially outward peripheral edge. In still another alternate embodiment related to spiral stairs, the handrail may be modified such that only vertical handholds, as depicted in FIG. 6, are mounted to the center post.

[0045] FIGS. 11-15 depict various spiral stair embodiments incorporating handrails in accordance with the present invention. More particularly, FIGS. 11-13 depict a spiral (circular) stair, generally referenced as 100, adapted with a coil shaped handrail, generally referenced as 60, in relation to an upper floor and a lower floor. Spiral stair 100 includes a center post 102, and a plurality of pie piece shaped treads 104 connected to a generally cylindrical center post 102 to define an outer perimeter 106. Upper floor, referenced as "F", having a cross-sectional depth "D", is shown in relation to the uppermost tread in FIG. 12. Coil shaped handrail 60 includes a generally helically shaped rail member 62 secured to center post 102 by a plurality of ring-shaped mounting members, referenced as 64. As best depicted in FIG. 13, each ring-shaped mounting members 64 includes an annular ring 64A having an inner diameter sized for receiving center post 102 inserted therein, and a radially projecting stud 64B for engaging a mating sleeve, referenced as 62A on rail member 62. The embodiment depicted in FIG. 12, includes four ring-shaped mounting members 64 concentrically disposed in spaced relation on center post 102. Each ring-shaped mounting member 64 has a projecting stud 64B in inserted engagement with a mating sleeve 62A on rail member 62. Connection of stud 64B with rail member mating sleeve 62A may be accomplished using a set-screw, or other suitable fastener. The hand-rail assembly may further include a post cap 68 for further securing the rail.

[0046] FIGS. 14 and 15 show an alternate embodiment wherein a spiral stair is adapted with a helical handrail that is stepped with vertical and horizontal portions in correspondence with the steps (treads). Spiral stair, generally referenced as 100, is adapted with a stepped helical handrail, generally referenced as 70, in relation to an upper floor and a lower floor. Spiral stair 100 includes a center post 102, and a plurality of pie piece shaped treads 104 connected to a generally cylindrical center post 102 to define an outer perimeter 106. Upper floor, referenced as "F", having a cross-sectional depth "D", is shown in relation to the uppermost tread in FIG. 12. Stepped handrail 70 includes a generally helically shaped rail member 72, with stepped generally horizontal and vertical sections. Rail member 72 may be secured to center post 102 by a plurality of ring-shaped mounting members as disclosed above, or by any other suitable anchoring method. Rail member 72 is mounted approximately 5'-0" above the corresponding tread, and the alternating horizontal and vertical rail sections function to assist the user in maintaining a firm grip, while also providing tactile feed back as to the location of the treads and risers.

[0047] The present inventor has determined that fastening and aligning the handrail as set forth above achieves a number of advantages. A primary advantage set forth above relates to the user's ability to descend the stairs while maintaining grip and/or tactile contact with the handrail at all times during ascent or descent of the stairs. In addition, the vertical sections of a handrail secured as disclosed herein provide the user with a rigid structure that is ergonomically easier to grip such than a simple inclined conventional handrail thereby enabling the user to more fully support his body weight, particularly when ascending the stairs. The vertical sections further allow the user to pull himself up while ascending the stairs thus reducing stress on the legs while providing improved support as compared to conventional handrails. Another significant advantage of the present invention relates to handrail alignment relative to the stairs. More particularly, the present invention includes aligning the vertical handrail sections in substantial alignment with stair risers. Such alignment is particularly significant for elderly and sight impaired users as the alignment between handrail 12 and the stair risers 2 provides a tactile feedback to the user indicating where the stair tread begins, the pitch of the stair (e.g. height of each riser) and where the stair tread ends, as the shape of the handrail is preferably an exact copy of the shape of the stairs.

[0048] The instant invention has been shown and described herein in what is considered to be the most

practical and preferred embodiment. It is recognized, however, that departures may be made therefrom within the scope of the invention and that obvious modifications will occur to a person skilled in the art.

What is claimed is:

1. A handrail assembly comprising:

an elongate handrail mounted generally adjacent to and above a set of stairs, each stair including a riser portion and a tread portion;

said handrail having generally vertical portions corresponding to said riser portions, and horizontal portions corresponding to said tread portions; and

bracket means for anchoring said handrail to a supporting structure.

2. A handrail assembly according to claim 1, wherein said handrail further includes terminal ends that return downwardly approximately 2'-0".

3. A handrail assembly according to claim 1, wherein said bracket means for anchoring said handrail include generally J-shaped bracket members having a first end connected to said handrail and a second end connected to a supporting structure.

4. A handrail assembly according to claim 1, wherein said handrail is mounted at least 4'-0" above the stairs.

5. A handrail assembly according to claim 1, wherein said stairs are circular stairs.

6. A handrail assembly for use with stairs formed along an incline, each stair formed by a riser section and a tread section, said handrail assembly comprising:

an elongate, generally wave-shaped handrail for mounting in generally parallel relation with the stair incline, said handrail including generally horizontal sections and generally vertical sections, said handrail anchored relative to the stairs such that said generally vertical sections are in substantial alignment with the riser sections of the stairs; and

bracket means for anchoring said handrail to a supporting structure.

7. A handrail assembly for use with stairs according to claim 6, wherein said bracket means comprises a generally J-shaped bracket having a first end fixed relative to the stairs and a second end connected to said handrail.

8. A handrail assembly according to claim 6 wherein said incline is spiral.

* * * * *