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(54) **RAILING ASSEMBLY**

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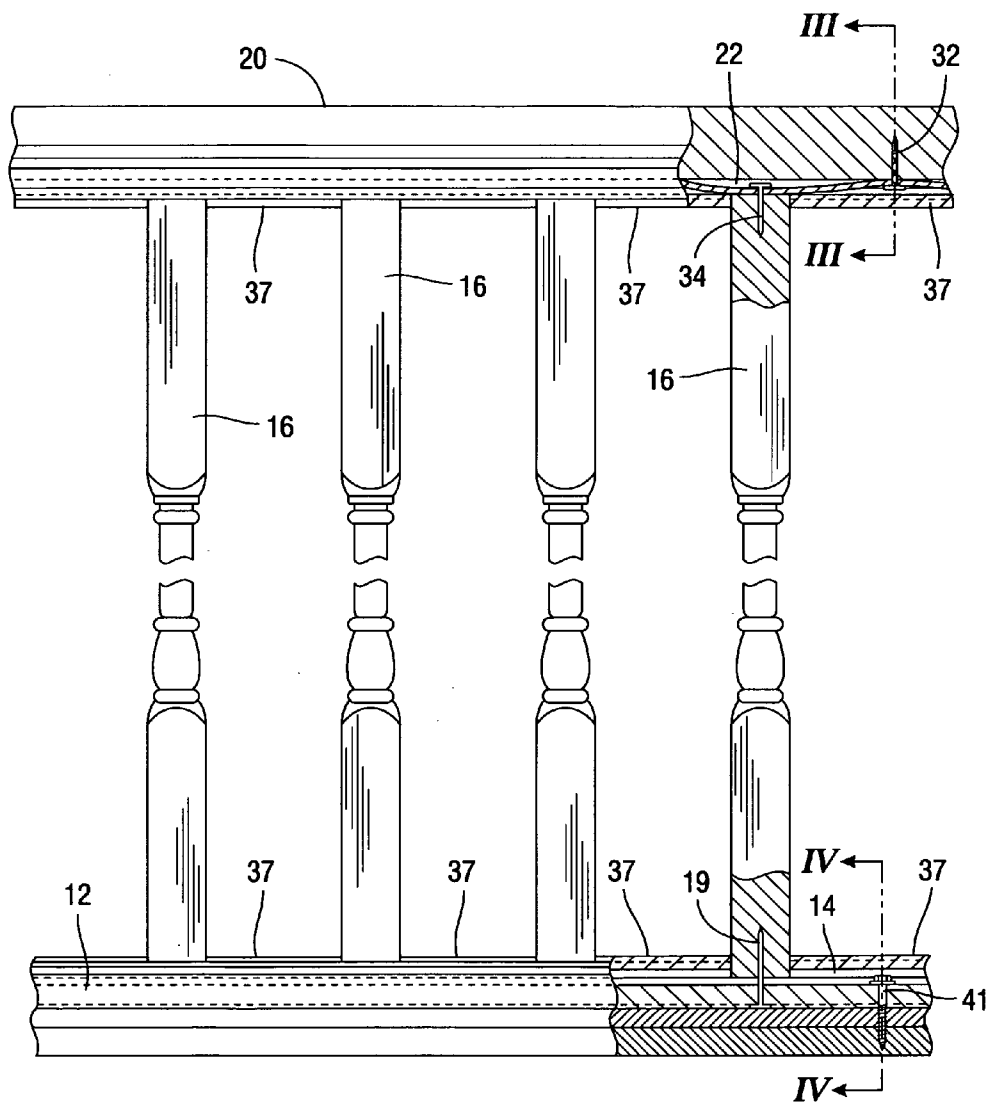
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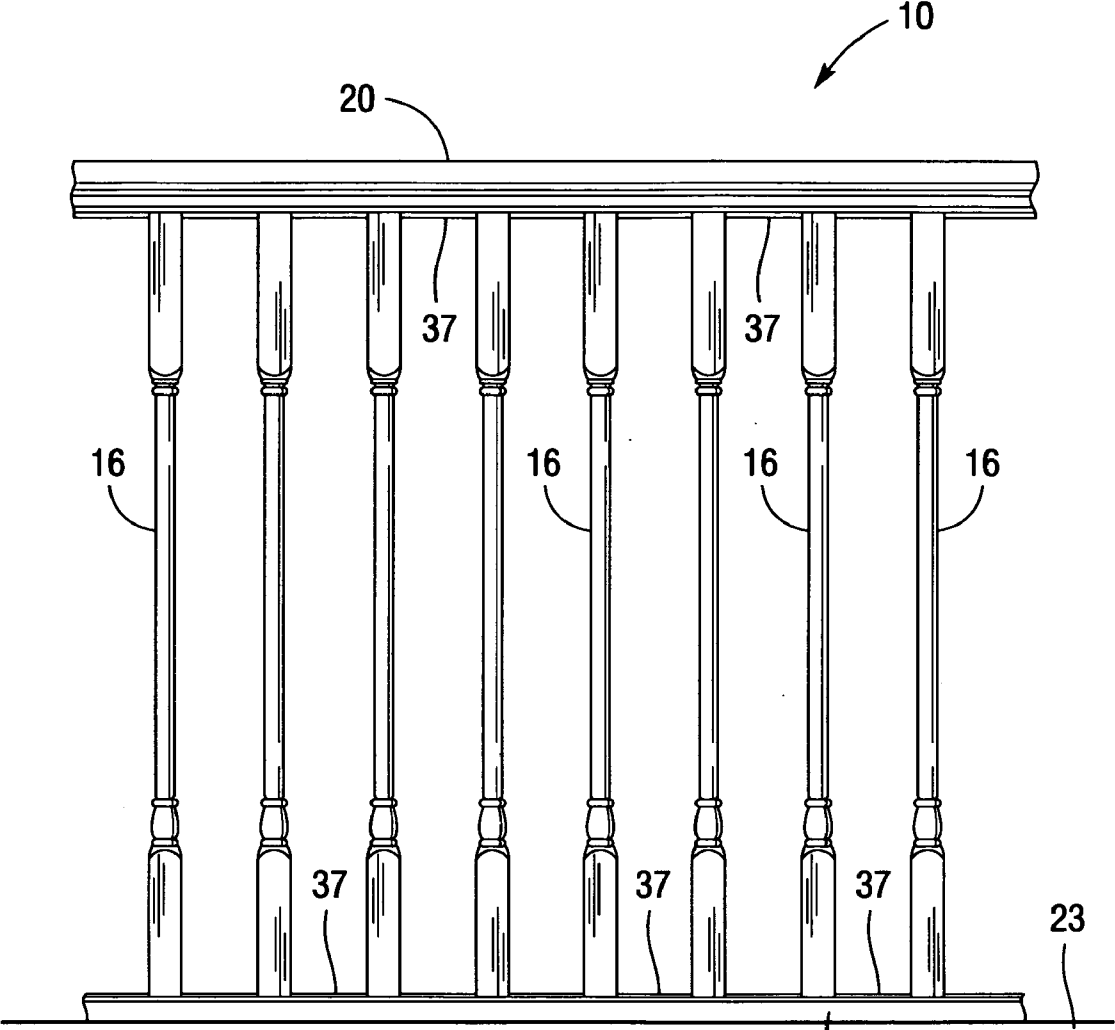
(57) **ABSTRACT**

A railing assembly and method of forming same having a hand rail, shoe rail, and a plurality of spaced, parallel balusters secured at their respective upper and lower ends to resilient straps received and fixed in plows formed in the hand rail and shoe rail. The respective upper and lower ends of each baluster are arcuately shaped allowing the balusters to be moved to any angular orientation with respect to the rails while maintaining the balusters parallel to each other with the ends of the balusters being in contact with the straps.

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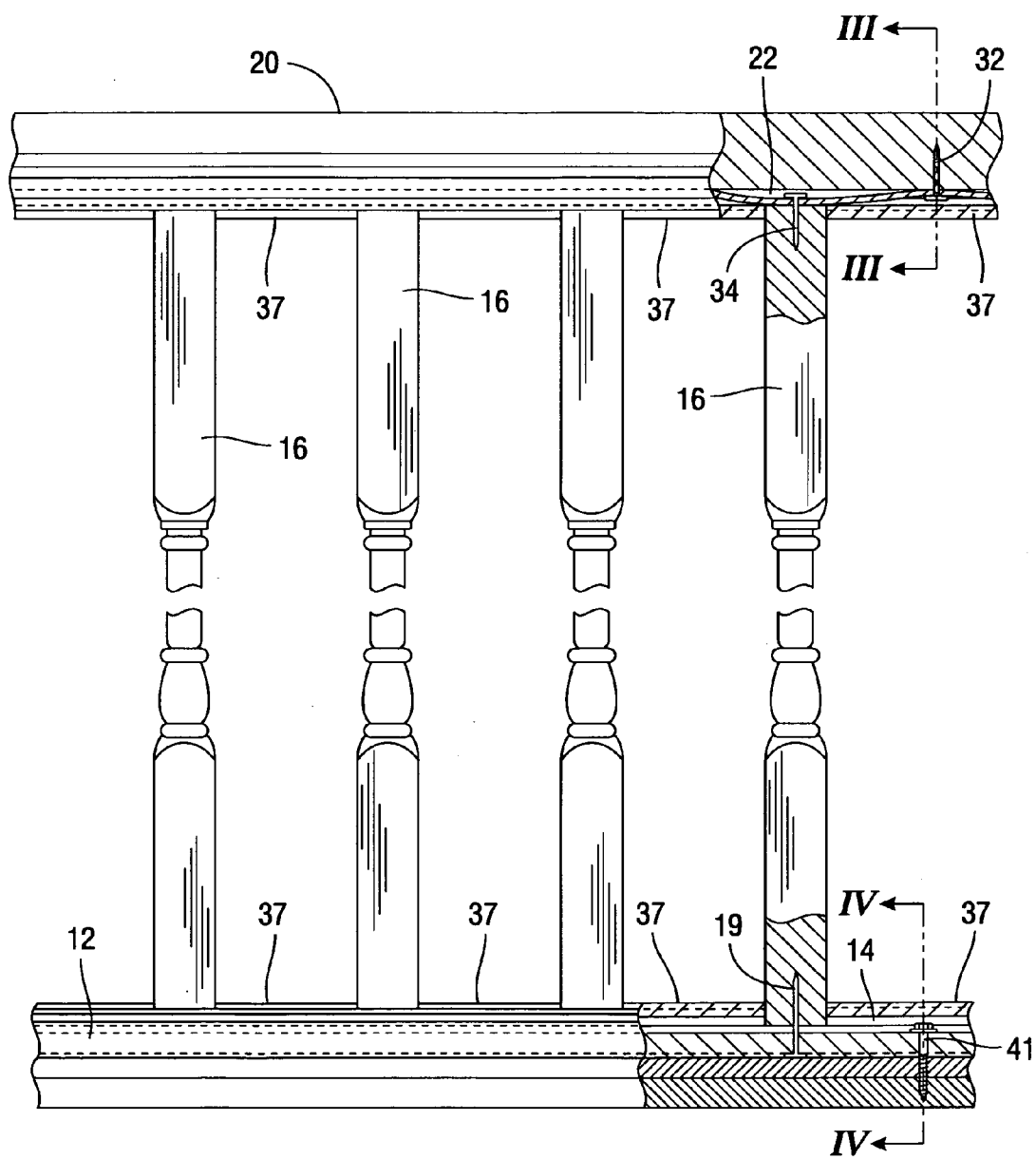
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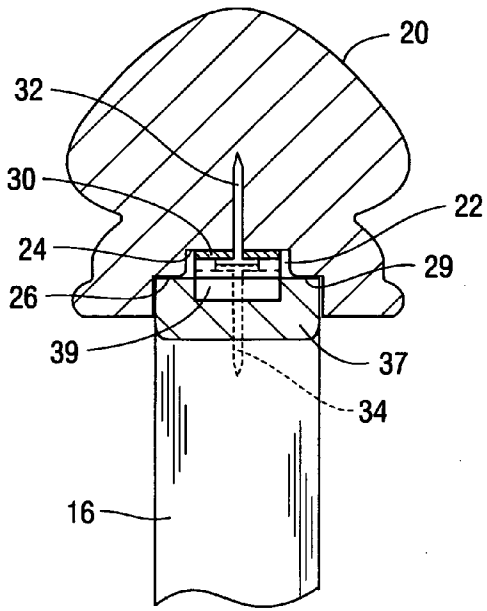
*Fig.1*

12



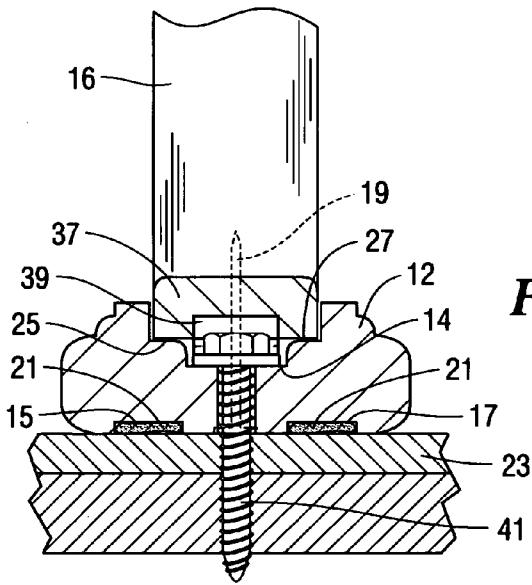
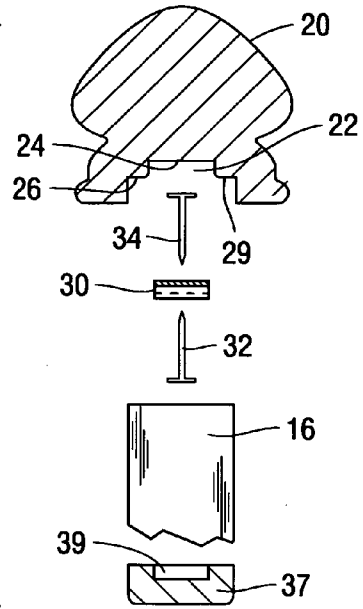
**Fig.2**





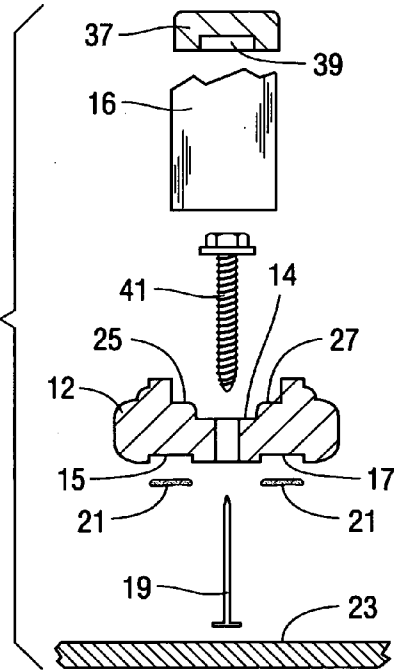
**Fig.3**

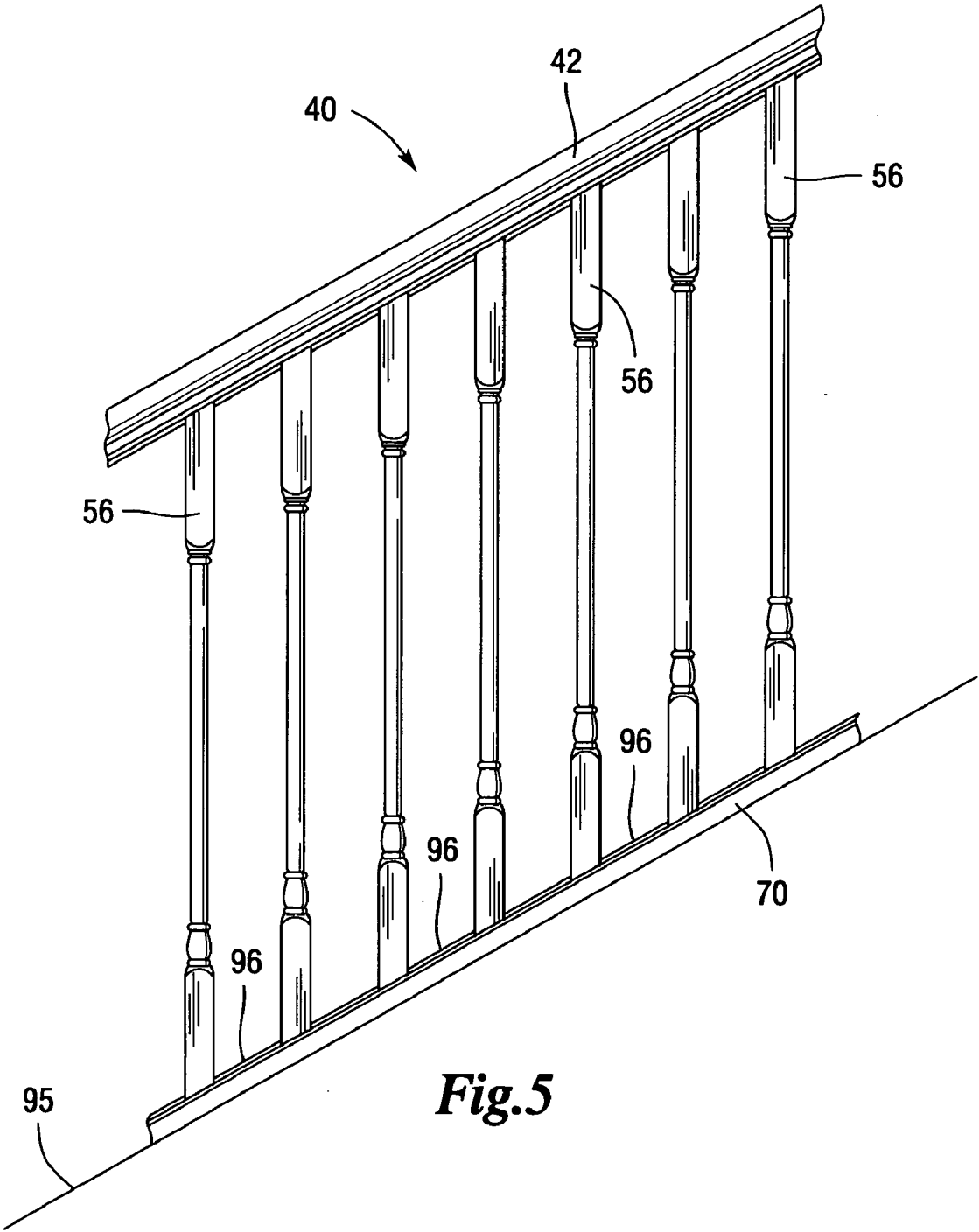
**Fig.3A**



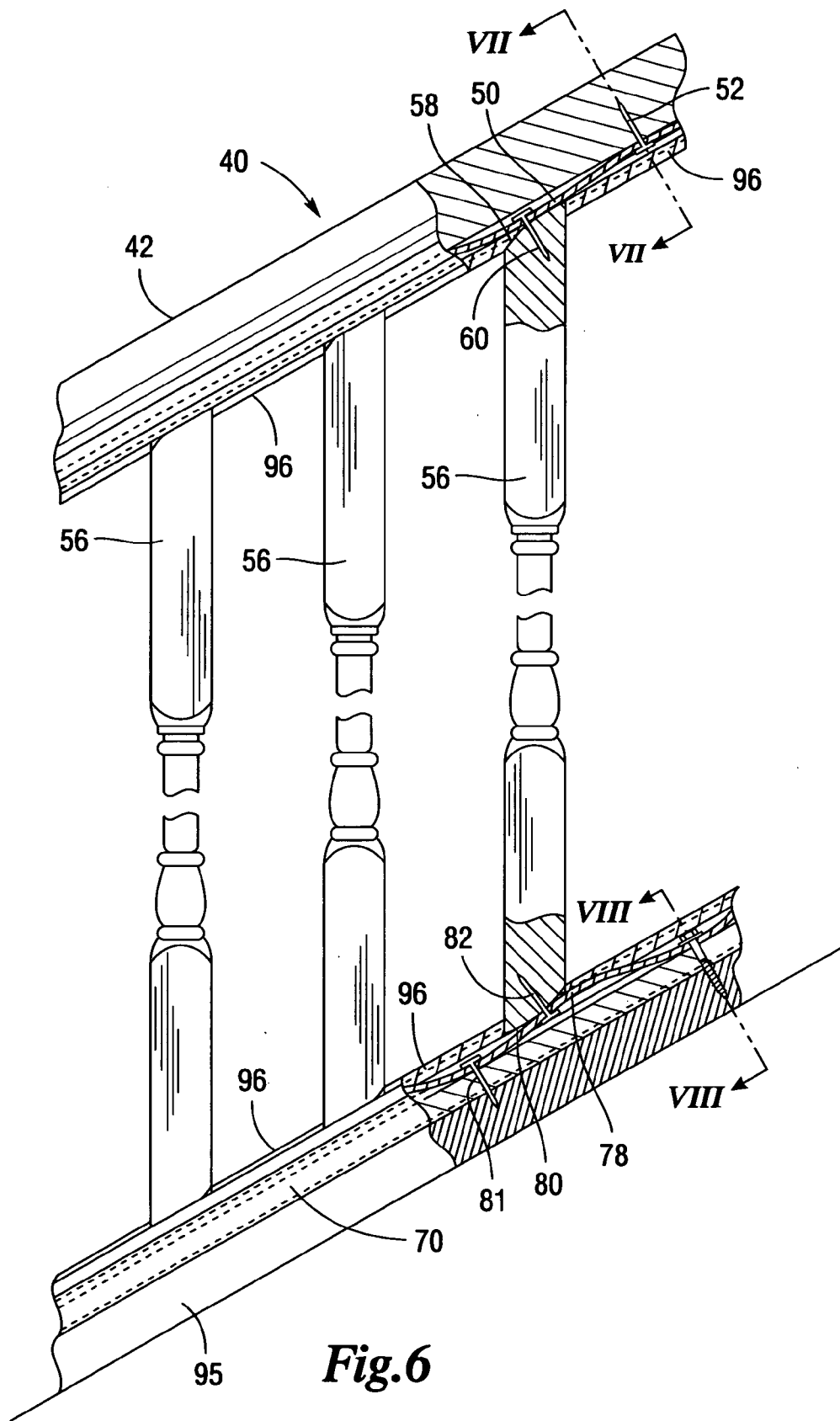
**Fig.4**

**Fig.4B**

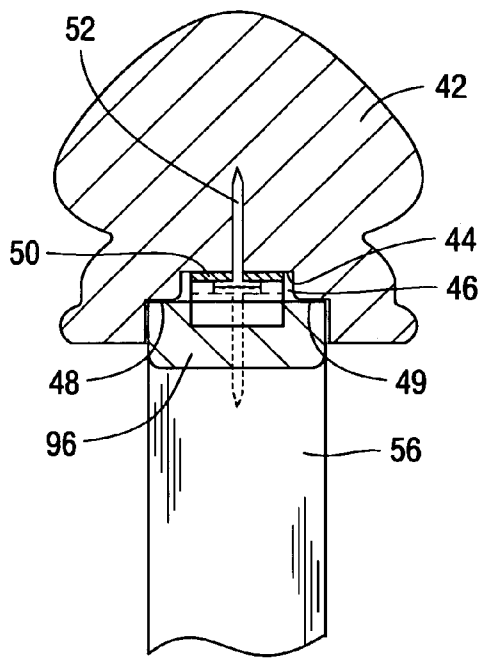




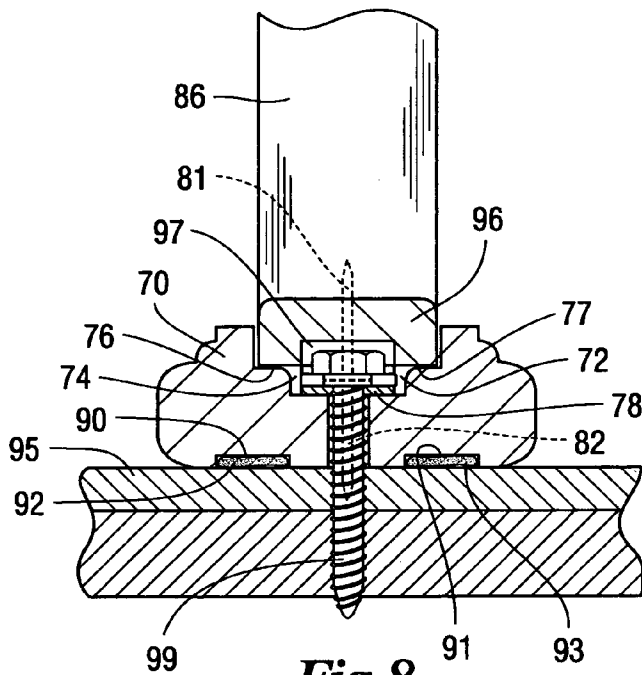
*Fig.5*



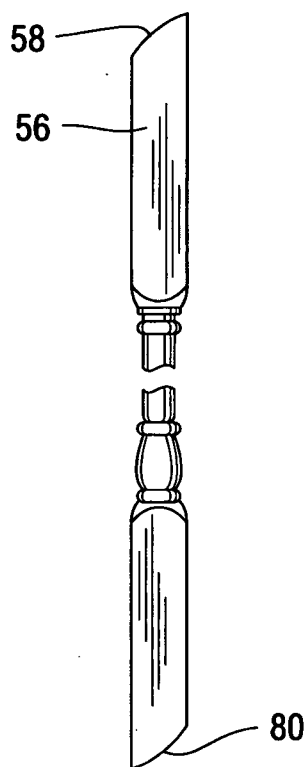
**Fig. 6**



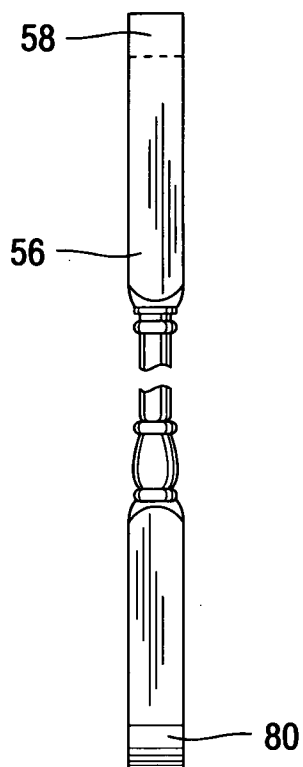
**Fig. 7**



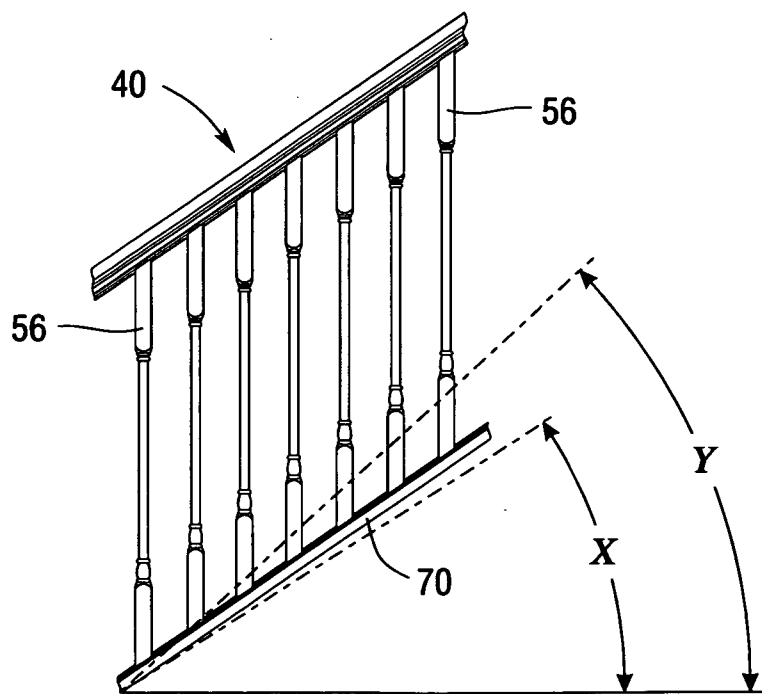
**Fig. 8**



**Fig. 9**



**Fig. 10**



**Fig. 11**

## RAILING ASSEMBLY

### BACKGROUND OF THE INVENTION

#### [0001] 1. Field of Invention

[0002] This invention relates to a railing assembly such as those used for stairs and landings found in dwellings, and to methods of forming the assemblies.

#### [0003] 2. Description of the Prior Art

[0004] Railings for stars and landings of dwellings such as residences are well-known and have been used for as long as there have been such dwellings. Typically, the railings have included a hand rail, shoe rail and vertical, parallels spaced balusters secured at their respective ends to the hand rail and shoe rail. In some instances the railings are installed piece by piece in the dwelling, usually by a craftsman skilled and experienced in making such installations. More recent designs are railing assemblies prefabricated and installed in place as a unit on the stairs or landings. Typically, a prefabricated railing is disclosed in U.S. Pat. No. 5,056,283 which makes reference to railing designs disclosed in various other U.S. patents. The prefabricated railing assemblies, in order to be installed, are required to accommodate stair steps of different pitches, that is the angle between the inclination of the stairs and the horizontal planes of the floor surfaces below and above the stairs. The various designs of railing assemblies referred to in the aforementioned Patents attempt to provide railing units useable for any stair design.

[0005] There are problems inherent in the known railing assembly designs. While the designs are useable where stair constructions are ideal and virtually perfect they are complex in their respective arrangements and make no provisions for stair constructions that are not perfect, as for example, where the stair pitch might differ several degrees from the intended pitch. The prefabricated railing assembly might be constructed for a stair having a pitch of 33 degrees while the stair, though less than ideal in construction, might have a pitch slightly less or more than desired 33 degrees. In such instances the balusters would be off the vertical plane of each by the same degree the angle or the stairs varies from the intended pitch.

[0006] Another problem inherent in the known railing assembly designs is that they generally make no provision for a straight rail, such as would be used on a horizontal landing or balcony. The adjustable rail assembly disclosed in the U.S. Pat. No. 5,056,283, for all practical purposes, would not be used in a balcony installation because the cost of the railing assembly would be overly high. Also, the structural integrity of the railing assembly would be compromised due to the reduced support of the balusters by the hand rail and shoe rail.

[0007] The problems inherent in the known railing assemblies are open to simple solutions and no solutions are offered by those skilled in the railing construction art.

[0008] The present invention overcome the problems existing in the known railing arrangement by providing a simply designed and effective railing assembly readily usable on stairs and landings such as balconies. The assembly is configured to accommodate stairs where the pitch might be at an angle different from the desired pitch of the stairs. The angle of the balusters of the railing assembly of

the present invention may be adjusted over a wide range of angles and at any angle within that range. Adjusting the baluster angle for maintaining parallelism of the balusters will not compromise the structural integrity of the railing assembly. The adjusting of the baluster angle is achieved simply without need of replacing or changing any parts of the railing assembly. In addition to the simple angle adjustability of the railing assembly of the present invention, its general design is adapted to a structurally sound straight railing commonly called a balcony rail. Additionally, the railing assembly of the present invention eliminates the need of any external fasteners of the balusters to the rails as well as exposed fasteners for the shoe rail providing smooth, quality installation without need for puttying or such like.

### SUMMARY OF THE INVENTION

[0009] The present invention provides a railing assembly and method of forming the assembly, the assembly in its preferred and general form including an elongated hand rail; and elongated shoe rail; a resilient first strap in engagement with at least the hand rail at the lower portion or underside thereof for impressing a force in the direction of the hand rail. There are also a plurality of spaced balusters, each having at least their upper end sections in engagement with both the strap and underside of the hand rail. The balusters have their lower sections in engagement with upper portions of the shoe rail.

[0010] A specific form of the railing assembly has the hand rail and shoe rail provided with similarly shaped, longitudinally extending plows each having generally centrally disposed channels and opposed shoulders below the channel in the hand rail and above the channel in the shoe rail. The plows are sized and shaped to receive a strap in the channels, preferably secured as by staples or nails to the rails, the straps impressing forces in the direction of the respective rails. The upper and lower ends of the balusters are arcuately shaped and secured to the straps with the opposite sides of the lower and upper ends of the balusters engaging the shoulders of the respective plows of the shoe rail and hand rail. The forces impressed by the straps draws the balusters into secure and strong engagement with the rails. The arcuately shaped lower and upper ends of the balusters are arranged in a manner of the engagement of the balusters with the straps and rails permit the arcuate or angular adjustment or orientation of the balusters with respect to the hand rail and shoe rail, while maintaining engagement with the straps and rails. The balusters may also be secured, as by nailing, to the straps. Although not vital to the present invention, filets are preferably disposed over the plows between the balusters.

[0011] The basic structure of the railing assembly of the present invention is simple in construction, relatively inexpensive to produce, uncomplicated and efficient in its use. It is also structurally strong and sound, meeting any building code requirements. The railing assembly is adaptable to straight or balcony rails and is exceptionally effective as a rail for stairs of varying pitch angles including stairs that are at pitch angles varying from their specified angle.

[0012] Various other advantages, details, and modifications of the present invention will become apparent as the following descriptions of certain preferred embodiments and certain preferred methods producing the invention proceed.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0013] In the accompanying drawings I show certain present preferred embodiments of my invention in which:

[0014] FIG. 1 is a front elevation view of a straight railing commonly called a balcony rail as it would be installed on a level floor;

[0015] FIG. 2 is an enlarged detailed elevational view, partly in cross section, of a portion of the balcony rail of FIG. 1;

[0016] FIG. 2A and 2B are partial sectional views of the hand rail and shoe rail of my invention with parts separated to show details of construction;

[0017] FIG. 3 is a view looking along the line III-III of FIG. 2;

[0018] FIG. 3A is a partial sectional view of the hand rail of FIG. 3 with parts separated to show details of construction;

[0019] FIG. 4 is a view looking along the line IV-IV of FIG. 2;

[0020] FIG. 4B is a partial sectional view of the shoe rail of FIG. 4 with parts separated to show details of construction;

[0021] FIG. 5 is front elevational view of a railing assembly commonly called a stair rail as it would be installed to a flight of stairs;

[0022] FIG. 6 is an enlarged detailed elevational view, partly in cross section, of a portion of the stair rail of FIG. 5;

[0023] FIG. 7 is a view looking along the line VII-VII of FIG. 6;

[0024] FIG. 8 is a view looking along the line VIII-VIII of FIG. 6;

[0025] FIG. 9 is a side elevational view of one baluster of the present invention showing the curved or arcuate shapes of the end sections thereof;

[0026] FIG. 10 is a front elevational view of the same baluster of FIG. 9; and

[0027] FIG. 11 is a reduced in size side elevational view of the stair rail of FIG. 5, diagrammatically representing the pitch range of the stair rail.

## DESCRIPTIONS OF A PREFERRED EMBODIMENTS

[0028] Referring now to the drawings and specifically to FIGS. 1-4B, there is shown a railing assembly 10 embodying my present invention. Railing assembly 10 is a straight railing, which would be commonly known as a balcony rail. Railing assembly 10 includes an elongated shoe rail 12 of any well known cross-sectional shape, having formed through its upper section a recessed, longitudinally extending plow 14 shaped and sized to snugly receive the lower end sections of any desired number of longitudinally spaced parallel balusters 16 of any well-known shapes and sizes. The lower ends of the baluster 16 are secured to the shoe rail 12 by any suitable fasteners such as staples or nails 19. The underside of the shoe rail 12 is provided with oppositely

disposed, parallel, longitudinally extending slots 15 and 17 suitably sized to receive adhesive strips 21 for serving to initially secure the shoe rail 12 and assembly 10 to the surface of floor 23. The plow 14 is provided with oppositely disposed, longitudinally extending shoulders 25 and 27 upon which the bottom ends of the balusters 16 abut.

[0029] The railing assembly 10 also includes an elongated hand rail 20 of any well known cross-sectional shape, having formed through its lower or underside a longitudinally extended plow 22 having a stepped configuration defined by a centrally disposed channel 24 and oppositely disposed shoulders 26 and 29 below the channel 24. An elongated generally flat strap 30 formed of a resilient metallic or non-metallic material is arranged in the channel 24 and secured to the underside of the hand rail 20 by any suitable fasteners such as staples or nails 32. The strap 30 may be segmented rather than being singular and continuous.

[0030] The upper ends of the balusters 16 are secured to the strap 30 by any suitable fasteners such as staples or nails 34. The opposing sides of the upper end sections of the balusters 16 firmly engage the opposed shoulders 26 and 29 of plow 22. The resilient strap 30 impresses a force on the balusters 16 in the direction of the hand rail 20 providing a strong and positive mating of the balusters 16 to the hand rail 20, with the upper ends of the balusters 16 being in engagement with the strap 30. The arrangement of the balusters 16 with the strap 30 and hand rail 20 puts the balusters 16 in tension with the hand rail 20, without the need of using any toe nails or other external fasteners, resulting in a stronger arrangement of balusters and hand rail than that of balusters toe nailed to a hand rail.

[0031] Although not vital to the substance of the railing assembly 10 of my invention, filets 37 would be suitably secured over the plows 14 and 22 between the spaced balusters 16. Each filet 37 has a centrally disposed channel 39 sized to receive the head of lag bolts 41 and used to secure this shoe rail 12 and assembly 10 to the floor 23.

[0032] Referring now to the drawings and specifically to FIGS. 5-11, there is shown an adjustable stair railing assembly 40 embodying my present invention. Railing assembly 40 is typically what is commonly known as a stair rail, and includes an elongated hand rail 42 of any well-known cross-sectional shape. Hand rail 42 has formed through its lower section or underside a longitudinally extending plow 44 having a stepped configuration defined by a centrally disposed channel 46 and opposed shoulders 48 and 49 below the channel 46. An elongated, generally flat monolithic strap 50 formed of a resilient metallic or non-metallic material is arranged in the channel 46 and secured to the underside of the hand rail 42 by any suitable fasteners such as staples or nails 52. The size and shape of plow 44 and the arrangement of the strap 50 in plow 44 is similar to that of the railing assembly 10, described hereinabove. The strap 50 may be segmented rather than being singular and continuous.

[0033] Railing assembly 40 includes any desired number of longitudinally spaced parallel balusters 56 of any well-known shapes and sizes. Each upper end 58 of the balusters 56 is arcuately shaped, typically at a radius of about 12 inches on a 1 ¼ inch wide baluster end. Each baluster 56 is secured to and in engagement with the strap 50 by any suitable means such as staples or nails 60, with the opposing

sides of the upper end sections of each baluster **56** in firm engagement with the opposing shoulders **48** and **49** of plow **44**.

[0034] The railing assembly also includes an elongated shoe rail **70** of any well known shape. Similarly to hand to hand rail **42**, the shoe rail **70** has formed through its upper section a similarly shaped longitudinally extending plow **72** having a stepped construction defined by a centrally disposed channel **74** and opposed shoulders **76** and **77** above the channel **74**. Also, similarly to the hand rail **42**, a similarly shaped elongated generally monolithic flat strap **78** formed of a resilient metallic or non-metallic material is arranged in channel **74** and secured to the upper section of shoe rail **70** by any suitable means such as staples or nails **81**. As with the straps described hereinabove with respect to hand rail **42**, the strap **78** may be segmented rather than being singular and continuous.

[0035] As shown in FIGS. **9** and **10** each lower end **80** of the baluster **56** is arcuately shaped at essentially the same radius as the arc of the upper end **58** of each baluster **56**, with the arc of each lower end **80** being in a plane **180** degrees opposite the plane of the arc of the upper end **58**. Each baluster **56** is secured to, and in engagement with the strap **78** by any suitable means such as staples or nails **82**, with the opposing sides of the lower end section of each baluster in firm engagement with the opposing shoulders **76** and **77** of the plow **72**.

[0036] As with shoe rail **12** of assembly **10**, the underside of shoe rail **70** is provided with oppositely disposed, parallel, longitudinally extending slots **90** and **91** suitably sized to receive adhesive strips **92** and **93** for serving to initially secure the shoe rail **70** and assembly **40** to the surface of a rake wall **95**.

[0037] The shapes, sizes, configurations of the parts and elements of the railing assembly **40**, allows the balusters **56** to have the longitudinal axes of each to be selectively adjusted with respect to the longitudinal axes of the hand rail **42** and shoe rail **70**, while maintaining engagement of the upper end **58** and lower end **80** of each baluster **56** with the straps **50** and **78**, and shoulders **48** and **49** and shoulders **76** and **77**, respectively. Typically, the railing assembly **40** may be produced to be a adjusted between 33 degrees and 43 degrees to a horizontal plane, as shown in FIG. **11**, the typical pitches of stairs in residential dwellings. Oftentimes because of rough carpentry construction the pitch of the stairs is not exactly at either 33 degrees or 43 degrees. When such is the case, the railing assembly **40** of the present invention may be adjusted by simply moving the balusters **56** by urging them together by pushing or pulling on the hand rail **42** until the balusters **56** are in a common vertical plane. Any angular variation of the pitch of the stairs from the desired pitch will be compensated for by the adjustment to the variation of the baluster **56** as described.

[0038] As with the shape, size, and construction of the elements of railing assembly **10** described above, the resilient straps **50** and **78**, impress forces in the direction of hand rail **42** and shoe rail **70**, respectively on balusters **56** providing a strong and positive mating of the balusters **52** to the hand rail **42** and shoe rail **70**. Thus, the balusters **56** are in tension with hand rail **42** and shoe rail **70** without the need of using any toe nails or other external fasteners, resulting in a stronger arrangement of balusters and rails than that of balusters toe nailed to rails.

[0039] Although not vital to the substance of the railing assembly **40** of my invention, filets **96** would be secured over the plows **44** and **72** of hand rail **42** and shoe rail **70**, respectively. Each filet **96** has a centrally disposed channel **97** sized to receive the head of a lag bolt **99** used to secure the shoe rail **70** and assembly **10** to a rake wall **95**.

[0040] The method of forming the railing assembly **10** would be by first securing the balusters **16** to the hand rail **20** in spaced parallel arrangement to each other to the top of the shoe rail **12**; installing the strap **30** into plow **22** of the hand rail **20**; engaging the top section of the balusters **16** in the plow **22** to the strap **30** and in abutment to the shoulders **26** of the plow **22** whereby the strap **30** impresses a force on each baluster **16** in direction of the hand rail **20**. The method of forming the adjustable railing assembly **40** would be by first arranging the balusters **56** in a spaced generally parallel relationship; securing strap **50** to the upper ends **58** of the balusters **56**; securing strap **78** to the lower ends **80** of the balusters **56**; arranging the lower ends **80** of the balusters **56** into the plow **72** of the shoe rail **70**; arranging the upper ends **58** of the balusters **56** into the plow **44** of the hand rail **42**; securing the strap **50** to the hand rail **42**; securing strap **78** to the shoe rail **70**. The steps of the method of forming the adjustable railing assembly **40** and railing assembly **10** may be reversed to achieve the same results as by the methods described above. In each instance the methods described result in assemblies having the characteristics and functions of the physical railing assemblies **10** and **40**, as described hereinabove.

[0041] It should now be clearly apparent as to the new results and advantages of the railing assembly of this invention as set forth in the introductory section of this specification. In addition, the basic structure of the railing assembly is simple in construction, relatively inexpensive to produce, and uncomplicated, efficient and effective in its use. The assembly is modifiable in various ways, for example in the material of the straps, the manner of securing the balusters, and the shape and size of the plows. Also, the methods of producing the assemblies may vary by different sequents of the steps.

[0042] While I have shown and described present preferred embodiments of this invention and method of producing the invention, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise embodied and practiced within the scope of the following claims.

I claim:

1. An adjustable railing assembly, comprising:

an elongated hand rail;

an elongated shoe rail

a first resilient strap means secured to the lower portion of said hand rail for impressing a force in the direction of said hand rail;

a second resilient strap means secured to the upper portion of said shoe rail for impressing a force in the direction of said shoe rail;

a plurality of spaced balusters, each having an upper end section in engagement with said first strap means and a lower end section in engagement with said second strap means;

the lower end section of each said balusters having an arcuate shape permitting selective arcuate orientation of said lower end sections with the surface of said second strap means;

the upper end section of each said balusters having an arcuate shape on a plane 180 degrees opposite to the plane of the arc of said lower end section permitting selective arcuate orientation of said upper end sections with the surface said first strap means;

each of said lower and upper ends sections of each of said balusters being shaped and sized such that to be in engagement with said first and second straps means at any selected arcuate orientation thereof; and

wherein the angle of the longitudinal axes of said balusters are selectively adjustable with respect to the longitudinal axes of said hand rail and step rail while maintaining engagement of said upper and lower end sections with said first and second straps means respectively.

2. An adjustable railing assembly as set forth in claim 1 wherein said arcuate shapes of said upper end section and lower end section have substantially the same radius of arc.

3. An adjustable railing assembly as set forth in claim 1 wherein said lower portion of said hand rail has a recessed first plow sized and shaped to receive said first strap means and said upper portion of said shoe rail has a recessed second plow sized and shaped to receive said second strap means.

4. An adjustable railing assembly as set forth in claim 1 wherein each of said arcuate shapes of said upper end section and lower end section has a radius of arc of about 12 inches.

5. An adjustable railing assembly as set forth in claim 1 wherein said first and second straps are generally flat.

6. An adjustable railing assembly as set forth in claim 5 wherein said first and second straps are non-metallic.

7. An adjustable railing assembly as set forth in claim 1 including securing means for fixing said first and second strap means to said lower portion of said hand rail and upper portion of said shoe rail, respectively.

8. An adjustable railing assembly as set forth in claim 1 including fixing means for securing said first and second straps means to said lower portions and upper portions of said balusters, respectively.

9. An adjustable railing assembly as set forth in claim 3 wherein said upper end section of each said balusters is shaped and sized to be snugly received in said first plow and said lower end section of each said balusters is shaped and sized to be snugly received in said second plow.

10. An adjustable railing assembly as set forth in claim 3 wherein said first plow as defined by a longitudinally extending centrally disposed first channel and longitudinally extending opposed first shoulders below first channel;

wherein each of said balusters have the opposite sides portions of their upper ends in engagement with the opposed said first shoulders; and

said first strap means is received in said first channel.

11. An adjustable railing assembly as set forth in claim 10 wherein said second plow is defined by a longitudinally extending centrally disposed second channel and longitudinally extending opposed second shoulders above said second channel, wherein each of said balusters of their lower

ends in engagement with the opposed second shoulders; and said second strap means is received in said second channel.

12. A railing assembly, comprising:

an elongated hand rail;

an elongated shoe rail;

resilient first strap means in engagement with at least said hand rail at the lower portion thereof for impressing a force in the direction of said hand rail;

a plurality of spaced balusters, each having at least upper end sections thereof in engagement with said first strap means and in engagement with the lower portion of said hand rail; and

13. A railing assembly as set forth in claim 12 wherein said lower portion of said hand rail defines a longitudinally extending first plow having a generally centrally disposed first channel and opposed first shoulders below said first channel; wherein each of said balusters have the opposite side portions of their upper ends in engagement with the opposed said first strap means is received in said first channel.

14. A railing assembly as set forth in claim 13 wherein said shoe rail defines a longitudinally extending second plow having a generally centrally disposed second channel and opposed second shoulders above said second channel; wherein each of said balusters have the opposite side portions of their lower ends in engagement with the opposed said second shoulders; including a resilient second strap means for impressing a force in the direction of said shoe rail and received in said second channel and in engagement with lower end sections of said balusters.

15. A railing assembly as set forth in claim 14 wherein the lower end section of each said balusters is in engagement with said second strap means with said lower sections having an arcuate shape permitting arcuate orientation of said lower sections with and on the surface of said second strap means; wherein the upper end sections of each said baluster has an arcuate shape on a plane 180 degree opposite to and parallel with the plane of the arc of said lower end section permitting selective arcuate orientation of said upper end sections with and on said first strap means.

16. A railing assembly as set forth in claim 15 including recurring means for fixing said first and second strap means to said hand rail and shoe rail, respectively.

17. A railing assembly as set forth in claim 16 including fixing means for recurring said first and second strap means to said lower portions and upper portions of said balusters, respectively.

18. A method of forming a railing assembly having a hand rail, shoe rail, a resilient strap, and a plurality of balusters, comprising the steps of;

securing the balusters in spaced relationship to each other to the top of the shoe rail by fastener means extending through the bottom of the shoe rail into the lower end of the balusters;

installing the strap onto the tops of the balusters; and

engaging the top of the baluster sections with the lower portion of the hand rail in relationship to the strap such that the strap impresses a force on the balusters in the direction of the hand rail.

19. A method of forming an adjustable railing assembly having a hand rail, shoe rail, resilient straps, and a plurality of balusters each having arcuately shaped upper and lower end sections, comprising the steps of;

arranging balusters in spaced generally parallel relationship;

securing a first strap to the upper end portions of the balusters;

securing a second strap to the lower end portions of the balusters;

arranging the lower ends of the balusters onto upper portions of the shoe rail;

arranging the upper ends of the balusters onto the lower portion of the hand rail;

fixing the second strap to the shoe rail in a position below the position of the lower ends of the balusters such that a force in the direction of the shoe rail is impressed on the balusters;

fixing the first strap to the hand rail in a position above the position of the upper ends of the balusters such that a force in the direction of the hand rail is impressed on the balusters; and

said steps being performed such that the balusters may be selectively arcuately oriented with respect to the hand rail and shoe rail while maintaining the spacing of the balusters in generally, parallel relationship.

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