

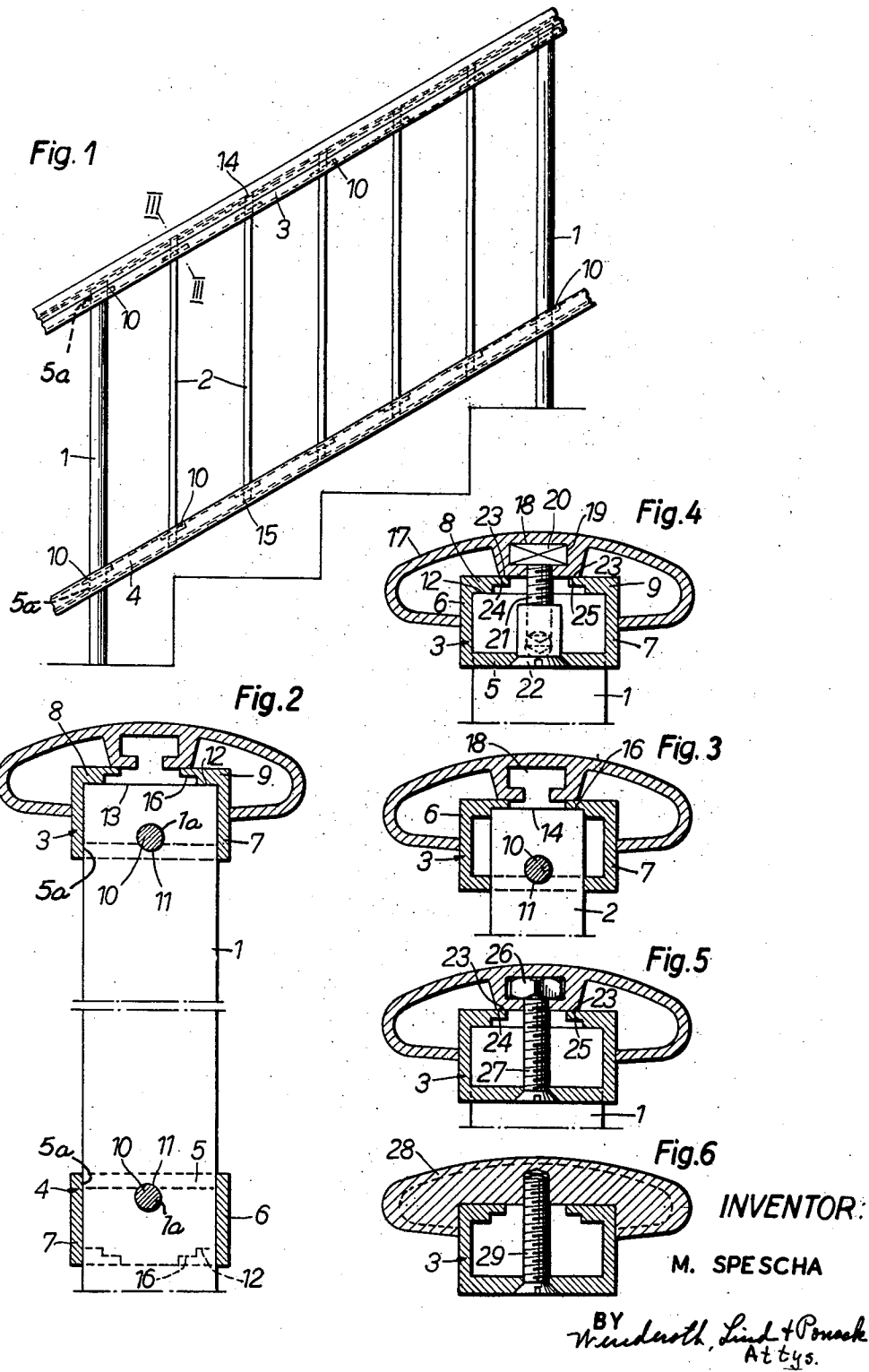
Oct. 1, 1957

M. SPESCHA
RAILING STRUCTURE

2,808,233

Filed April 19, 1955

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Fig.7

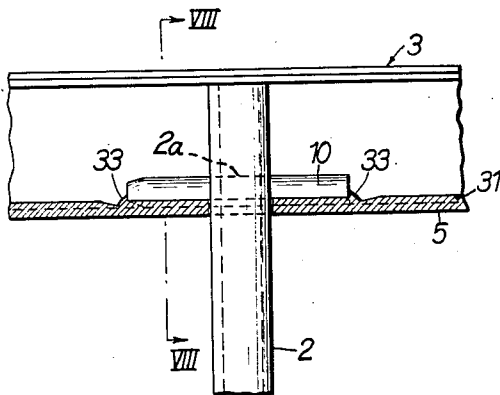


Fig.8

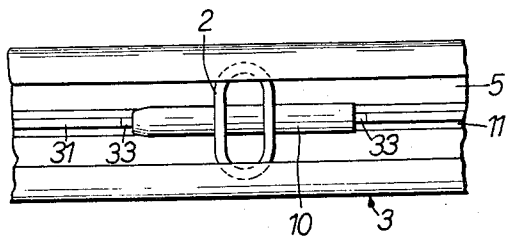
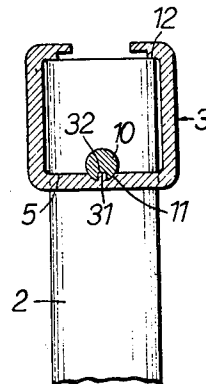


Fig.9

INVENTOR:

M. SPESCHA

BY
Wunderlich, Lind & Ponack
Attys.

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RAILING STRUCTURE

Moritz Spescha, Menziken, Switzerland, assignor to
Aluminium A. G. Menziken, Menziken, Switzerland

Application April 19, 1955, Serial No. 502,288

Claims priority, application Switzerland April 23, 1954

3 Claims. (Cl. 256—22)

The present invention relates to a railing construction of the baluster type comprising at least a supporting profile or stringer and a plurality of rod-shaped cross-members or balusters of any desired cross-section.

It is a prime object of the present invention to provide a novel arrangement of the balusters and stringers, these being adapted to be interconnected with the least possible number of parts and in as short a time as possible to constitute a low cost unitary structure that may be assembled either at the shop, or shipped knocked-down to be erected at the place where the railing is to be installed.

It is a further object of the invention to provide such a construction providing for a secure interconnection which is easy to take to pieces and which does not necessitate too great a precision in the manufacture of its separate parts.

Simultaneously the invention has as an object a railing construction permitting the provision of hand rails of different shapes and materials on standard stringers.

In order to attain this the present invention provides a railing structure of the above-mentioned type, in which the cross-members traverse the web of the stringers, constituted by a hollow profile open to one side, and are secured against rotation with respect to the stringers by means of fastening pins lying in a longitudinal groove provided in the inner surface of the web of the stringers and each traversing a transverse boring of the cross-members in such position that their end surfaces bear against shoulders provided on the stringers opposite the web thereof.

In order to prevent a loosening or even a loss of the fastening pins which could, more particularly in connection with cross-members of circular cross-section, result in rattling of the cross members and permit rotation of the cross-members with respect to the stringers, the present invention further provides the said longitudinal groove in the web of the stringers with a central ridge engaging a corresponding groove of the fastening pin, which ridge is upset on both sides of the latter in order to prevent axial displacement of the pin.

Other features and advantages of the invention will become apparent from the description now to follow, of preferred embodiments thereof, given by way of example only, and in which reference will be made to the accompanying drawings, in which:

Fig. 1 is a fragmentary elevation of a stair railing;

Fig. 2 is an enlarged vertical section illustrating the connection between a cross member or baluster and a lower and upper supporting member or stringer of the railing;

Fig. 3 is an enlarged section taken along the line III—III in Fig. 1 showing the connection of a filling post of the railing with the upper stringer of the latter;

Figs. 4 and 5 illustrate, in an enlarged cross-sectional view, two different examples for securing a metal hand rail to the upper stringer;

Fig. 6, also in an enlarged cross-sectional view, shows

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the fastening of a hand rail of wood or of any synthetic material to the upper stringer of the railing;

Fig. 7 is a partly sectional elevation illustrating an improved connection between the balusters and stringers;

Fig. 8 is a section taken along the line VIII—VIII in Fig. 7, and

Fig. 9 is a top view to Fig. 7.

In the drawings similar elements are designated by the same reference numerals. Reference numeral 1 designates the railing posts and 2 the balusters constituting the cross-members of a stair railing. Upper and lower supporting members or stringers of the railing are designated by 3 and 4, respectively. The railing posts 1 of the railing are cemented or otherwise anchored in the ground and they are formed by hollow profiled rods of any desirable cross-section. They traverse the lower stringer 4 through appropriate openings 5a thereof and enter the upper stringer 3 through similar appropriate openings 5a provided in the web 5 of the latter. The upper and lower stringers 3 and 4, respectively, are constituted by identical hollow profiles open on one side and comprising in addition to the web 5 side walls 6, 7 having their upper, free ends extending inwardly to form inwardly directed flanges 8, 9. The lower stringer 4 is slipped over the cross-member 1 with its web 5 directed upwardly and is held in its final position by short fastening pins 10 hammered through transverse bores 1a of the cross-member 1 and extending parallel to the stringer in a longitudinal groove 11 provided in the inner surface of the web 5. The upper stringer 3 has web 5 likewise provided with openings 5a for the passage of the cross-members and is supported, by means of shoulders 12 provided on inwardly directed flanges 8, 9, on the upper end surface 13 (Fig. 2) of the cross-member 1. The latter are provided with a transverse bore 1a adapted each to receive a short upper fastening pin 10, which pins 10 again extend in longitudinal grooves 11 in the inner surface of the web 5 of the stringer. These grooves serve to guide the short fastening pins 10 while they are hammered into place into the bores of the cross-members, and they constitute, in the assembled railing, a means for preventing rotation of the cross-members, such as those designated by 2 in the drawings, with respect to the upper and lower stringers 3 and 4, respectively. The filling posts 2 arranged between the cross-members 1 have a smaller, circular or square cross-section and connect the lower with the upper stringer. The means for fastening them to the latter, visible in Fig. 3, corresponds to the means described with respect to the cross-members 1 except that the end surfaces 14, 15 of the members 2 bear against shoulders 16 of the inwardly directed flanges 8, 9 of the stringers.

The fact that the upper stringer is not unitary with the hand rail has the first advantage that the upper and lower stringers are interchangeable, i. e. that the same hollow profile may be used either as an upper or as lower stringer, and moreover, according to the requirements or to the conditions of a particular installation, hand rails of different shapes and materials, either wood or synthetic material, may be fixed to the same stringer.

In the variant illustrated by Figs. 7–9 reference numeral 11 again designates the longitudinal groove in the web 5 of the stringer 3 serving as a guide for the fastening pin 10 hammered through a corresponding transverse bore 2a in the cross-member 2 for securing the latter in position with respect to the stringer and preventing any rotation of the cross-member with respect to the stringer even if the cross-member is of a circular, or as shown, of an ellipsoid cross-section. In addition to the embodiment of Figs. 1–3, in which this longitudinal groove 4 serves, as stated above, as a guide for this pin and for preventing rotation of the latter with respect to the stringer, in the

variant illustrated in Figs. 7-9 this longitudinal groove is further provided with a central ridge 31, the upper end surface of which does not protrude beyond the plane of the inner surface of the web 5 of the stringer. A groove 32 provided in the fastening pin 10 corresponds to this ridge 31 and is adapted to cooperate therewith in order to ensure an improved guiding of the pin 10 in the groove 11 when the pin is hammered into place. In addition the improved guiding elements 31, 32 permit, subsequent to the insertion of pin 10 into the position illustrated in the drawings, a fixing of the pin in the axial direction thereof by upsetting the ridge 31 at both ends of the pin 10 as indicated at 33. This upsetting is easily made by means of a suitable tool previous to the securing of the hand rail to the stringer. This additional consolidation of the connection between the stringers and the cross-members is possible with practically no additional expense since the stringer profile with groove 11 and ridge 31 as well as the fastening pins 10 with their groove 32 may be produced in a single extruding operation.

Figs. 4-6 of the drawing illustrate the fastening of three different hand rails to the upper stringer 3, all of these hand rails at least partly surrounding said stringer. The variants shown in Figs. 4 and 5 are suitable for hand rails of metal, such as for example aluminium and alloys thereof, while the variant of Fig. 6 is more appropriate for the use of hand rails made of wood or of synthetic material.

The metal hand rail 17 illustrated in Fig. 4 comprises a longitudinally extending hollow slot 18 (Fig. 3) in which are slidably arranged square head bolts 20, held against rotation by the side walls 19 of said slot. The thread portion 2 of these bolts 20 projects into the hollow space of the upper stringer 3. In the spaces between the short pins 10 holding cross-members 1, 2, sleeve bolts 22 are threaded upwardly through the web 5 of stringer 3 over the thread portion 21 of bolt 20 thereby rigidly securing the hand rail 17 to the stringer 3 by pressing its surfaces 23 towards the upper surfaces 24, 25 of the flanges 8, 9 of the upper stringer 3.

Fig. 5 illustrates another means of fastening the hand rail 17 with a same profile the same as the hand rail of Fig. 4 to the upper stringer 3. According to this variant hexagon nuts 26 are inserted into the slot 18 of the hand rail, into which nuts countersunk head bolts 27 are screwed through the web 5 of the stringer 3.

Finally Fig. 6 illustrates the simplest manner for securing a plain hand rail 28 of wood or synthetic material to the upper stringer 3. According to this embodiment counter sunk head wood screws are screwed in spaced relationship between the cross-members 1, 2 through the web of the upper stringer 3 into the bottom of the hand rail 28.

The assembling of the described railing is very simple and when it is assembled and the hand rail secured thereto, no fastening screws or bolts are visible from the outside.

In the embodiment according to Fig. 1 the lower stringer 4 is first slipped over the cross-members 1 with its web 5 turned upwardly and the fastening pins 10, which are accessible from below through the open side of the stringer 4 are hammered into place. Hereafter the filling posts or balusters 2 previously cut to the correct length are inserted through the appropriate openings in the web of the lower stringer 4 whereby they are supported by their lower end surfaces 15 on the shoulders 16 of the stringer 4. The lower fastening pins 10 are then hammered through the lower transverse bores of the cross-members 2, whereby the longitudinal groove 11 of the stringer effectually prevents rotation of the posts 2 with respect to the stringer. Now the upper stringer 3 may be set in place with its web turned downwardly, whereby the

upper end surfaces of the cross-members 1 and 2 bear against the shoulders 12 and 16, respectively, of the upper stringer. By hammering the fastening pins 10, which are accessible from above, into the associated upper transverse bores of the cross-members 1, 2 the whole structure is rigidly interlocked and the hand rail may be secured to this structure according to any of the proceedings described with respect to Figs. 4-6.

The described structure permits use of cross-members of any desired cross-sectional shape and it has the great advantage of necessitating at the place of assembly, besides the cutting of the elements to the correct length, no other preparatory work than the boring of holes.

Of course it is also possible to use only upper stringers for example by anchoring the lower end of all cross-members in the ground.

I claim:

1. A railing structure comprising in combination, a pair of stringers each constituted by a profile member open on one side and comprising a web, a pair of side walls on the edges of said web and flanges on the upper free ends of said web extending inwardly toward each other, said webs each having a longitudinal groove on the surface thereof between said side walls, said two stringers being in parallel spaced relationship with their webs facing each other, a plurality of rod-shaped cross members of a length corresponding to the distance separating the stringers, said webs having a plurality of openings spaced from each other receiving the ends of said cross members therethrough with the ends of said cross members abutting said inwardly extending flanges, a further plurality of cross members extending through the lower of said stringers and through the web of the upper of said stringers and abutting against the inwardly extending flanges on said upper stringer, said cross members having transverse bores therein in alignment with said longitudinal grooves, a plurality of short fastening pins in said longitudinal grooves one extending through each transverse bore in said cross members, whereby said cross members are interlocked with said stringers and are prevented from rotating with respect to said stringers, a hand rail partly enclosing the upper stringer and closing the open side thereof, said hand rail having a longitudinal hollow slot therein, and means for detachably securing said hand rail on said stringer comprising threaded means having a polygonal shaped portion engaged in said longitudinal hollow slot, and further threaded means having a countersunk head thereon spaced between cross members and extending upwardly through the web of the upper stringer and threadably engaged with said threaded means.

2. A railing structure as claimed in claim 1 in which said threaded means comprise square head bolts having a threaded portion thereof extending into the hollow space enclosed by said upper stringer, and said further threaded means comprise countersunk head sleeve bolts extending upwardly through the web of the upper stringer and threadably engaged with the threaded portion of said square head bolts.

3. A railing structure as claimed in claim 1 in which said threaded means comprise hexagon nuts and said further threaded means comprise countersunk head bolts extending upwardly through the web of said upper stringer and threadably engaged in said hexagon nuts.

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