Title: COMPONENTS FOR MODULAR STAIRWAY SYSTEM

Abstract: The present staircase (S', S) includes a permanent framing (200, 300) made of metallic stringers (208), one of which being typically secured to a half-timbering (F). Horizontally extending step supports (210) are secured along the stringers (208) and each include upper and front flanges (254) adapted to be secured respectively to a tread (204, 304) and to a riser (206, 306) of each step (202, 302) of the staircase (S', S). Various support systems, including a corner post (312) and brackets (328, 332, 338) mounted thereto, are provided for supporting various horizontal (226c) and angled (208b, 208d) structural components of the framework (300) of the staircase (S) when the staircase (S) is L-shaped or U-shaped thereby including a turn in the staircase with flaring steps (103, 104, 105), and also possibly a landing (110). If the staircase (S', S) has an exposed side, various decorative or finishing wooden components, including treads (304), risers (306), false or decorative stringers (346, 350, 352, 360), moulding (344, 348, 362), etc., are provided to completely cover the structural metallic framework (300), including the stringers (208b, 208d). On the outside, or large, ends of corner steps (103, 104, 105), metallic L-shaped stringers (326) may be mounted to the dwelling’s framework (F) and used to support the steps (302) instead of the aforementioned step supports (210).
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COMPONENTS FOR MODULAR STAIRWAY SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to staircases and, more particularly, to components for staircases made of pre-measured components for partial or complete assembly thereof in the plant or made in the form of a kit for assembly on site.

2. Description of the Prior Art

Typically, staircases are completely produced on site with the various wood components being cut to size as the staircase is progressively erected on site. Furthermore, the finishing of a staircase is often damaged during construction, namely the carpeting which covers the steps or the solid wood finishing thereof. It is virtually impossible to defer the installation of the finishing covering of the steps of the staircase until the end of the construction thereby resulting in damages to this finishing during the final stages of the construction.

Also, it has been proposed to completely assemble a staircase in the factory such that a pre-assembled staircase is delivered to the construction site for direct and easy installation thereat. Such a modular staircase is disclosed in the present inventor's co-pending Canadian Application No. 2,149,981 which was laid-open for public inspection on November 24, 1995. In such a case, a modular staircase without its finishing covering is delivered on site and installed thereat. Once the finishing covering, e.g. carpeting, solid wood, etc. has been installed on the staircase, it might again be subject to damage before the construction process is completely finished.

SUMMARY OF THE INVENTION

It is therefore an aim of the present invention to provide a novel staircase made of individual components manufactured to size in plant which, in the form of a kit, can be assembled together and installed on site or which can be mostly assembled together in plant and then installed on site.

It is also an aim of the present invention to provide a staircase made of individual components manufactured to size such that they can then be assembled together and installed on site, or alternatively...
mostly assembled together in plant and then installed on site, including a staircase frame and a finished wood covering therefor.

It is a further aim of the present invention to provide components for staircase systems adapted to be assembled on site, or alternatively mostly assembled together in plant and then installed on site, such components including staircase frame elements and a finished wood covering therefor.

Therefore, in accordance with the present invention, there is provided a modular framework for a staircase, comprising at least two non-wooden stringers and a series of non-wooden step supports adapted to be mounted to the stringers for supporting a number of steps when the stringers are installed in a dwelling, wherein said step supports are adjustably installed to said stringers at predetermined locations therealong such that the steps can be directly mounted to said step supports and into proper position thereof for the staircase, wherein an upper end of at least one of said stringers is supported by at least one vertical support located on one side of the framework, said vertical support being retained in position at least by at least one horizontal support, said horizontal support being secured at opposed end sections thereof to said vertical support and to outside elements of said framework located on an other side of the framework located opposite said one side and anchored to the dwelling, wherein said vertical support comprises, on said one side, at least one post and at least one bracket secured thereto and, on said other side, at least one of said outside elements of said framework, whereby a riser and a tread of a step can be secured to said vertical support.

Also in accordance with the present invention, there is provided a vertical support for a modular framework for a staircase, the framework being of the type comprising at least two non-wooden stringers and a series of non-wooden step supports adapted to be mounted to the stringers for supporting a number of steps when the stringers are installed in a dwelling, said vertical support comprising, on one side of the framework, at least one post and at least one bracket secured thereto, said vertical support being adapted to be retained in position at least by one horizontal support that is secured at opposed ends thereof to said vertical support and to outside elements of the framework located on an other side of the framework located opposite said one side and anchored to the dwelling, wherein an upper end of at least one of the stringers is supported
by said vertical support, whereby a riser and a tread of a step can be secured on said one side to said vertical support, and on said other side to the outside elements.

Further in accordance with the present invention, there is provided a modular framework for a staircase, comprising at least two hidden structural stringers and a series of step supports adapted to be mounted to the hidden stringers for supporting a number of steps when the hidden stringers are installed in a dwelling, wherein said step supports are installed to said hidden stringers at predetermined locations therealong such that the steps can be directly mounted to said step supports and into proper position thereof for the staircase, a number of steps, each including a tread and a riser, being mounted to said framework, at least one decorative stringer being provided for mounting to said framework, including to at least one of said hidden stringers, for concealing said hidden stringers and said step supports.

BRIEF DESCRIPTION OF THE DRAWINGS

Having thus generally described the nature of the invention, reference will now be made to the accompanying drawings, showing by way of illustration a preferred embodiment thereof, and in which:

Fig. 1 is a schematic side elevational view of a staircase in accordance with the present invention shown in a first state thereof;

Fig. 2 is a schematic side elevational view similar to Fig. 1 but showing the staircase in a second state thereof;

Fig. 3 is a schematic front elevational view, partly broken away, of the staircase of Fig. 2;

Fig. 4 is a detailed view of the sliding anchor for adjustable step support of Fig. 2;

Fig. 5 is a schematic side elevational view similar to Fig. 2 and showing details of the assembly of the risers and the steps to the step support attached to the stringers;

Fig. 5A is a cross-sectional view taken along section line A of Fig. 5;

Fig. 5B is a cross-sectional view taken along section line B of Fig. 5;

Fig. 6 is a schematic top plan view of a staircase in accordance with the present invention;
Fig. 7 is a schematic top plan view of a support for an angular section of the staircase;

Fig. 7A is a schematic elevational view of the support of Fig. 7;

Fig. 8 is a top plan view of the angular section of the staircase and schematically showing the support of Fig. 7 and various brackets used in the support frame of the angular section of the staircase;

Figs. 8A to 8E are schematic views of various support structures used in the framing of the angular section of the staircase of Fig. 8;

Figs. 9A to 9E show various brackets used in Fig. 8;

Fig. 10 is a perspective view of a framework of a second embodiment of a staircase also in accordance with the present invention, the framework being shown mounted to a dwelling's wall framework;

Fig. 11 is a perspective view similar to Fig. 10 but showing some of the staircase's steps mounted to the framework;

Fig. 12 is a perspective view similar to Fig. 11 but showing more of the staircase's steps mounted to the framework;

Fig. 13 is a front elevational view of the framework of Fig. 10 which also shows additional upper components of the framework;

Fig. 14 is a top plan view of the framework of Fig. 13;

Fig. 15 is a bottom perspective detailed view of part of the framework and of the steps of Fig. 12;

Fig. 16 is a bottom perspective detailed view of another part of the framework and of the steps of Fig. 12;

Fig. 17 is an elevational detailed view of a part of the framework and showing the assembly of sub-components thereof;

Fig. 18 is a detailed view of part of the framework and showing the assembly of sub-components thereof;

Fig. 19 is a cross sectional view taken along line 19-19 of Fig. 18;

Fig. 20 is a detailed view of part of the framework and showing the assembly of sub-components thereof;

Fig. 21 is a cross sectional view taken along line 21-21 of Fig. 20;

Fig. 22 is a detailed view of part of the framework and showing the assembly of sub-components thereof;
Fig. 23 is a cross sectional view taken along line 23-23 of Fig. 22;

Fig. 24 is a schematic perspective view of a framework of a third embodiment of a staircase also in accordance with the present invention, the framework being shown mounted alone, that is without the dwelling's wall framework to which the staircase framework is mounted, and with Fig. 24 also showing a pair of wooden treads mounted to corner steps of the staircase framework;

Figs. 24A and 24B are enlarged detailed views of Fig. 24;

Fig. 25 is an enlarged schematic perspective view, similar to Fig. 24, but partly shown in exploded manner, and also showing the dwelling's wall framework, while not showing the treads of Fig. 24;

Figs. 26 to 30 are views of various wooden components which can be used with the staircase framework of Fig. 24, wherein Figs. 26A and 26B are respectively side elevational and perspective views of a first moulding, Figs. 27A and 27B are respectively side elevational and perspective views of a first "false" stringer, Figs. 28A and 28B are respectively side elevational and perspective views of a second moulding, Figs. 29A and 29B are respectively side elevational and perspective views of a second "false" stringer, and Fig. 30A is a side elevational view of a third "false" stringer;

Fig. 31 is a schematic perspective view of various finishing wooden components mounted to the staircase framework;

Fig. 32 is an enlarged schematic front elevational view of part of the staircase framework and finishing wooden components mounted thereto;

Figs. 33 to 36 are various perspective views showing various finishes around the staircase framework; and

Figs. 37 to 42 respectively show side elevational, top plan and four perspective views of various stages of assembly of the staircase framework of the present invention, wherein Figs. 39A and 39B are enlarged exploded detailed perspective views of Fig. 39, Figs. 40A and 40B are enlarged detailed perspective views of Fig. 40, Figs. 41A and 41B are enlarged detailed perspective views of Fig. 41, Figs. 41C and 41D are enlarged exploded detailed perspective views of Fig. 41, Figs. 42A, 42D and 42E are enlarged detailed perspective views of Fig. 42,
Figs. 42B and 42F are enlarged exploded detailed perspective views of Fig. 42, and Fig. 42C is an enlarged detailed top plan view of Fig. 42.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figs. 1 to 23 are described in PCT Publication No. WO 00/01902 published on January 13, 2000 based on PCT Application No. PCT/CA99/00607 filed on June 30, 1999.

Fig. 6 shows a top plan view of a staircase S in accordance with the present invention, wherein, from the ground up, there are three straight steps 100, 101 and 102, followed by an angular section of the staircase S including flaring steps 103, 104 and 105. Then, the staircase S includes four straight steps 106, 107, 108 and 109, followed by a landing 110, and then by three straight steps 111, 112 and 113.

Now referring to Fig. 2, a steel C-shaped stringer 10 is used on each side of the staircase S, the stringers 10 being attached with screws 11 to structural wooden components, such as half-timberings, in the form of a wall stud 12 in Fig. 3. The angle of the stringers 10 is governed by the height of the risers of the staircase S.

The staircase S also includes successive steps 14 (also called treads) and risers 16. To attach the steps 14 and the risers 16 to the stringers 10, there are provided for each riser 16 and step 14 located thereabove an adjustable step support 18 in the form of a metallic plate defining planar upper and front perpendicular flanges 20 and 22 adapted to respectively abut the step 14 and the riser 16 and to be attached thereto, as seen in Figs. 2 and 5. Angled oblong openings 24 are defined in one of the stringers 10 and the step support 18 to allow for the relative positioning of the step support 18 with respect to the stringer 10 such that a same step support 18 can be used with risers 16 of different heights and steps 14 of different depth. More particularly, a slidable anchor 26 (see Figs. 2 and 4) allows for the step support 18 to be adjusted with respect to the stringers 10.

As seen in Fig. 3, a finished stringer covering 28 is provided on the staircase S to provide an aesthetic finishing to the exposed side of the staircase S, that is the side thereof which is visible and thus opposed to the side anchored to the wall stud 12, in the case of staircases having one such exposed side.
In Fig. 2, the staircase S is shown in its finished state, that is with aesthetic and quality steps and risers 14 and 16. However, the present modular staircase S has further use in that the finished steps and risers 14 and 16 can be only installed to the step support 18 after the construction has been completed. During construction, the steps and risers 14 and 16 are replaced by temporary steel steps and risers which take the form, as seen in Fig. 1, of a series of successive L-shaped units 30, each including a horizontal section 32 which acts as a step and a vertical section 34 which acts as a riser, the front edge of the horizontal section 32 defining an inturned lip 36. These L-shaped units 30 are temporarily secured to the steps support 18 such that the staircase s can be used during construction without causing damage thereto. After the construction has been terminated, the L-shaped units 30 are replaced by finished steps 14 and risers 16 (see Fig. 2). Therefore, the staircase S takes the form of a kit which, in its simplest form, includes the stringers 10, the adjustable step support 18, the temporary L-shaped step units 30 and the finished steps 14 and risers 16.

As seen in Fig. 5, the upper and front flanges 20 and 22 of the step support 18 are secured respectively to the steps 14 and risers 16 by a series of screw 34 which extend through the flanges 20 and 22 and into the steps 14 and risers 16 front the blind sides thereof. Sections A and B of Figs. 5A and 5B show these screws 38 extending through the flanges 20 and 22 of the step support 18. Adhesive 40 may be used to secure the upper end of the riser 16 to the lower front end of the step 14. Also, the lower end of the riser 16 may be secured to the rear end of the step 14 by way of an appropriate resin 42, such as a polyester-based resin which, once hardened, "welds" the wooden components together as described in details in aforementioned Canadian Application No. 2,149,981.

The present invention also provides for various structural components for providing support to the staircase S. For instance, a support post 44, shown in Fig. 7A, is used to support the converging ends of steps 103, 104 and 105 of the angular section of the staircase S (see Fig. 6). The vertical post 44 includes three support plates extending at different angles therefrom, namely a lower support plate 46, an intermediate support plate 48 and an upper plate support plate 50 adapted to be attached to different risers for respectively supporting steps 103, 104 and 105. The lower end of the corner post 44 includes a connecting plate
52 for attachment to a lower stringer 10, as seen in Figs. 1 and 7A. With reference to Fig. 6, the support plates 46, 48 and 50 of the corner post 44 are generally located at 54.

Fig. 8 is a top plan view of the angular section of the staircase S including steps 103, 104 and 105. Fig. 8A to 8D show various supports and brackets for adjustably connecting the steps 14 and the risers 16 to the stringers 10, including brackets 56, 58, 60, 62 and 64. The brackets 56 to 64 are shown enlarged in Figs. 9A to 9E, respectively. The brackets 56 to 64 are each made by bending black sixteen-gage steel.

Fig. 8E shows a connection between the stringer and the landing 110.

Therefore, the present kit for erecting a staircase S can be used for a straight staircase as well as for a U-shaped staircase having angular steps and landings. For the exposed side of the staircase, the stringers are attached one to another with rigid connecting systems and are bolted such as to obtain a complete stringer of crankshaft-shape which is self-supporting, the steps and the risers being pre-assembled in a single monocoque unit.

When necessary, such as the free bearing of straight steps exceeds five of six step units, the stringer can be doubled (one upon the other) to reinforce it and to minimise vibrations.

This framing is the only permanent part of the present kit as the steps and risers can be replaced depending on the use of the staircase.

The L-shaped steel units 30 are made from folded steel and are bolted to the adjustable step support 18 to provide a temporary staircase for use during construction, and in the case of a fireproof building, the framing (e.g. the stringers 10) are screwed directly in the concrete walls or other non-flammable facing, and appropriate steel risers and steps (such as the L-shaped units 30) can then be used to obtain a fireproof staircase.

Once at the finishing step of the building, including any cabinet making step, the temporary or provisional steps, i.e. the L-shaped steel units 30, are easily detached from the step supports 18 and replaced by prefabricated units made of solid wood or any other prefabricated elements, these prefabricated units comprising steps 14 and risers 16, preferably made in a single monocoque assembly, and a finishing stringer 28 made of solid wood which nests under the steps 14 and behind the
risers 16 in addition to being attached with screws to the metal stringer 10 from inside.

The step supports 18 are made from light steel folded to form flanges 20 and 22 and are each connected to the stringers 10 by two keys 26 capable of sliding in the C-shaped stringers 10 for allowing to shorten or lengthen the span of the steps 14 which varies in view of the height of the risers 16. An additional adjustment is provided by way of the oblong openings 24 which allow for an adjustment of the height of riser 16.

The present stairway system is thus universal in that it allows for the staircase to turn left or right, or remain straight. The corner post 44 for the angular section of the staircase being of different configuration whether the staircase turns right or left.

Figs. 10 to 23 illustrate a variant staircase S' also in accordance with the present invention. The staircase S' comprises basically a framework 200 and a series of steps 202. The steps 202 can be temporarily mounted to the framework 200 during the construction period and then can take the form of permanent steps. The steps 202 are herein L-shaped and each step 202 includes a horizontal section or tread 204 and a vertical section or riser 206.

The framework 200 includes a series of components, some of which being cut to size in the plant such that all of the components of the framework 200 can be assembled together and installed on site with minimal adjustment, if any. Alternatively, at least part of these components can be assembled together in the plant, perhaps in modular sections, and then installed on site.

More particularly, the framework 200 comprises elongated stringers 208, each typically made of a metallic material or any other suitable material, e.g. composite plastic, capable of sustaining the loads to which it is subjected (including the steps 202 and standard loads to be supported by any staircase), and adjustable step supports 210 mounted inwardly of the stringer 208. The stringers 208 have the configuration of C-shaped channels (see, for instance, Figs. 16 and 19). The step supports 210 are also each typically made of a metallic material or any other suitable material, e.g. composite plastic, capable of sustaining the loads to
which it is subjected (including the steps 202 and standard loads to be supported by any staircase).

Fig. 10 shows a stringer 208a (i.e. a closed stringer) and four step supports 210 fixedly mounted thereto on one side thereof with the other side of the stringer 208a being secured to a wooden framework F of the dwelling where the staircase S' is being installed. Facing the stringer 208a, there is a stringer 208b (i.e. an open stringer) which extends at a location in the dwelling where there is no framework F, whereby the stringer 208b must itself be fixedly supported by other means than the framework F. For this purpose, there is provided a vertical post 212 and the stringer 208b is secured to a lower end of the post 212 by a link 214. More particularly, the link 214 defines a sleeve 216 at its upper end which is engaged around the post 212 and fixed thereto typically by welding, although these components could be bolted or otherwise attached together. As seen in Figs. 18 and 19, the link 214 is imprisoned at its lower end between a plate 218 and a web 220 of the stringer 208b by way of bolts 222 and nuts 224, the bolts extending through holes defined in the plate 218 and in the web 220 of the stringer 208. A foot member 215, similar to link 214 but with a support plate at is free end instead of sleeve 216, is mounted to the lower end of stringer 208b in a way similar to link 214.

Now returning to Fig. 10, above the stringers 208a and 208b which are to support four steps 202, the next steps negotiate a 90° turn (see Fig. 14) consisting of three triangular steps which are supported by elongated horizontal supports 226 (i.e. supports 226a, 226b, 226c and 226d) which resemble the stringers 208. The outside ends of these horizontal supports 226 are secured in position to the framework F with similarly configured plates 230 (best seen in Figs. 20 and 21) and their inside ends are secured to the post 212 using a series of similarly configured links 228 (best seen in Figs. 22 and 23).

More particularly, each link 228 includes at one end a sleeve 232 surrounding the post 212 and welded thereto, and at an opposite end a flat section 234 defining holes through which extend bolts 236 with the flat section 234 being retained to the horizontal support 226 by it being urged towards the inside of lips 238 of the horizontal support 226 by the bolts 236 which coact with nuts 240 and washers 242 which bear against the outside of the lips 238. It is noted that both the horizontal
supports 226c and 226d are mounted to the post 212 with a single link 228 which has one sleeve 232 and two flat sections 234, i.e. one for connection to each horizontal support 226c, 226d.

Each plate 230 has an inner end 243 secured to the inside of the horizontal support 226 (see Figs. 20 and 21) by way of bolts 244 and nuts 246, and an outer end 248 angled with respect to the inner end 243 such as to bear against the framework F and held thereto with screws, or the like, driven through holes defined in the outer end 248.

As best seen in Figs. 13 and 14, the two next steps are supported by stringers 208c and 208d and two step supports 210 are mounted to each of these stringers. Stringer 208c is mounted to the framework F, whereas stringer 208d is supported at its lower end by the post 212 (using a further link 228) and its upper end by a further post 250 which is similar in configuration and identical in function to the post 212.

A pair of further horizontal supports 226 (i.e. supports 226c and 226f) are mounted, as the earlier supports, at their outside ends to the framework F (using plates 230) and at their inside ends to post 250. The two supports 226c and 226f are at a same level such that the staircase S' defines therebetween a landing area.

Then, two stringers 208c and 208f extend parallelly upwardly from the horizontal support 226f and four step supports 210 are mounted to each of these two stringers 208c and 208f for providing four straight steps above the landing area which are similar to the steps supported by the bottom stringers 208a and 208b.

It is noted that, even though the present posts 212 and 250 have been herein illustrated with circular cross-sections, these posts may also be of different tubular shapes, e.g. of square cross-section. Also, the sleeves 216 and 232 respectively of links 214 and 228 can, aside from being welded to the posts 212 and 250, be secured alternatively be attached thereto on site by way, for instance, of set screws extending radially through the sleeves 216/232 and into the wall of the posts 212 and 250 thereby allowing for on site positioning and/or adjustment of the links 214/228 to the posts 212/250. In such a case, the posts 212/250 would define a series of threaded holes disposed vertically therealong for allowing the links 214/228 to be adjusted height-wise on site relative to the posts 212/250.
Therefore, the framework 200 generally consists, for straight runs, of stringers 208 provided with step supports 210; for angled runs, of horizontal supports 226a to 226d; and, for landing areas, of a pair of horizontal supports 226e and 226f. The stringers 208 and horizontal supports 226 are mounted at their closed end to the dwelling's framework F and at their open end to the posts 212 and 250 and the latter are maintained in position by their rigid connections to the horizontal supports 226 and to the stringers 208 which are themselves firmly and safely anchored to the framework F. The free ends of the stringers (i.e. lower ends of stringers 208a and 208b and upper ends of stringers 208e and 208f) may be secured to the dwelling's floor structure.

As seen in Figs. 15 to 17, the step supports 210 each have a rectangular shaped body 252 with perpendicular flanges 254 extending peripherally therefrom. The steps supports 210 may be welded to the stringers 208 or may secured thereto with a plate 256 (see Fig. 17) located inside the stringer 208 and bolt and nut arrangements 258 extending through the plate 256 and through the body 252, the lips 238 of the stringer 208 being sandwiched between the plate 256 and the body 252 such that the step support 210 is held firmly against the stringer 208. The step support 210 defines oblong holes 260 for allowing different relative positions between the step support 210 and the stringer 208 thereby allowing for steps of different tread depths and riser heights. Also, the step support 210 has a generally symmetric configuration (e.g. at the level of its oblong holes 260) such that it can be used on either left-hand or right-hand stringers, e.g. stringers 208b and 208a, respectively.

The steps 202 can be attached in different ways to the step supports 210 and horizontal supports 226. For instance, in Fig. 15, the flange 254 of the step support 210 is secured to the riser 206 of the step 202 by a wing nut 262 screwed to the riser 206 and engaging the flange 254 with one of its wings. Also, screws could be driven through openings 264 defined in the flanges 254 and into the back of the step 202. Glue could also be used to secure the step 202 to the flanges 254.

The steps 202 can be similarly secured to the horizontal supports 226 by using glue as in Figs. 15 and 16 where webs 265 of the supports 226 bear against the risers 206 of the steps 202. Screws can also be driven through openings 266 defined in the webs 265 and into the steps 202.
Conveniently, when temporary steps are installed in the staircase S', easily releasable means (such as wing nuts 262) are preferably used to mount the steps 202 to the framework 200. The permanent steps can then be mounted to the framework using these same releasable means and/or other means (e.g. glue, screws, etc.).

The above components are preferably all manufactured to size in the plant as opposed as on the site, and this can be done by having the dimensions of the staircase to be installed. The components can be all assembled on site as a kit, or can be assembled in one or more modular sections to finally assembled together on site. It is convenient to fixedly mount in plant the components which depend from the posts (212, 250); similarly, it is preferable to fix the step supports 210 to the stringers 208 in the plant. If possible, the whole assembled framework 200 is permanently produced in the plant such that only the connections thereto with the dwelling's framework F are effected on site.

The components of the framework 200 must be sufficiently rigid and strong to sustain the loads to which they are subjected, including the weight of some of the components of the framework 200 itself, the weight of the steps 202 and the weight that the staircase S' must be able to support.

If both the stringers 108a and 108b are of the closed type, they will both be secured to the framework F as stringer 108a of Figs. 10 to 12. Similarly, if both sides of the staircase S' are closed, the posts 212 and 250 may not be required as framework F will be present to support the stringers 208 as well the both ends of each horizontal support 226.

The present system offers a great economy in wood as the framework 200 is generally all made of metallic material (with rigid and strong plastics being also usable), and the use of such a metallic framework 200 provides generally more rigidity to the staircase S'. The present connections between the framework 200 and the steps most likely reduce squeaking in the staircase S'.

Fig. 24 illustrates a further variant staircase S'' also in accordance with the present invention. The staircase S'' comprises basically a framework 300 and a series of steps 302 to be mounted to the framework 300. As for staircase S' of Fig.10, the framework 300 of the staircase S'' of Fig. 24 includes stringers 208a, 208b, 208c and 208d and a
series of step supports 210 mounted to these stringers. The framework for the corner steps is different in Fig. 24 than that of Fig. 10, although a similar pivot post 312 is used on the inside of the corner steps to link the stinger 208b to the stringer 208d and to provide supporting brackets or links 328 to support the inside ends of the corner steps. In Fig. 24, two such corner steps are shown at 302. Each corner step 302 includes at least a tread 304 and a riser (not shown in order not to hide the framework 300). In Fig. 10, various elongated horizontal supports 226 are used to support the steps 202, whereas in Fig. 24, L-shaped stringers 326a and 326b are used on the outside end of the corner steps to support these steps 302, including their treads 304 and risers. There is also provided L-shaped stringer 326c for a not shown further step 302. An elongated member 330 joins stringers 326b and 326c. In succession, stringers 326a and 326b, elongated member 330 and stringer 326c connect bottom stringer 208a to top stringer 208c and therefore the two straight runs of steps to upper and lower opposed ends of the corner steps structure.

The top end of stringer 208b is provided with a connecting plate 332 having at its free end a square sleeve 334 to which the lower end of the pivot post 312 extends and is secured by way of bolts or screws 336. The upper end of the post 312 is mounted by way of connecting plate 338 to the lower end of stringer 308d. The elongated horizontal support 226c extends horizontally between the upper end of the pivot post 312 and the horizontal section of L-shaped stringer 326c.

As seen in Fig. 25, the L-shaped stringer 326 and/or the elongated member 330 are mounted to the framework F of the dwelling using any suitable fastener, including that illustrated at 340. Additional connecting plates 342 are mounted to the horizontal section of L-shaped stringer 326a and to the elongated member 330 such as to extend vertically such that the risers can be mounted at their outside ends to these connecting plates 42 and at their inside ends to the connecting plates 328.

Figs. 26 to 30 show various finishing wooden elements which can be mounted to the staircase S" and conceal the same. Figs. 26A and 26B illustrate a first moulding 344; Figs. 27A and 27B illustrate a first "false" stringer 346; Figs. 28A and 28B illustrate a second moulding 348; Figs. 29A and 29B illustrate a second "false" stringers 350; and Fig. 30A illustrate a third "false" stringer 352. In Fig. 31, some of these wooden components are shown mounted to the staircase framework 300.
In addition to the stringer 208b and the step supports 210, there is shown a hidden elongated wooden structural member 354, mounted parallel and below to the stringer 308b, as well as a gypsum panel 356. Two treads 304 and one riser 306 are shown mounted to the step supports 210. The first moulding 344 is mounted to the gypsum panel 356, whereas the first false stringer 346 is mounted to the stringer 308b and/or to the wooden structural member 354 with an appropriate one of the second and third false stringers 350 and 352 being mounted opposite a respective step support 210 and above the first false stringer 346. The second moulding 348 is mounted between the first false stringer 346 and the second or third false stringer 350, 352 with the latter being mounted against the riser 306 and under the tread 304.

In Fig. 32, the positioning of the second moulding 348 between the first false stringer 346 and one of the second and third false stringers 350 and 352 is better shown.

In Fig. 33, a gypsum panel 358 is shown mounted to the framework F of the dwelling. In Fig. 34, a "false" stringer 360 is shown mounted against the riser 306 and the tread 304 with Fig. 34 also showing a moulding 362 for the false stringer 360. In Fig. 35, various steps 302 are shown mounted to the framework 300 and a false stringer 360 is mounted to each step. Fig. 36 is an enlarged view of Fig. 35 but further provided with the aforementioned moulding 362.

Figs. 37 to 42 illustrate various assembly stages of the present staircase. For instance, the stringers 208a and 208c which are C-shaped and on the outside of the staircase are securely mounted to the wooden framework F by way of screws, e.g. using number 10 screws of 1.5" disposed at each linear foot with two screws at each extremity of the stringer. In some instances, additional wooden framework may have to be added to the dwelling's framework F to receive the screws. At the top of the stringers 208a and 208b, there horizontally extends a reinforcing member 364 (see Figs. 24, 25, 41 and 42). Additionally, elongated horizontal support 226c also acts as a reinforcing member between the lower ends of stringers 208c and 208d.
CLAIMS:

1. A modular framework for a staircase, comprising at least two non-wooden stringers and a series of non-wooden step supports adapted to be mounted to the stringers for supporting a number of steps when the stringers are installed in a dwelling, wherein said step supports are adjustably installed to said stringers at predetermined locations therealong such that the steps can be directly mounted to said step supports and into proper position thereof for the staircase, wherein an upper end of at least one of said stringers is supported by at least one vertical support located on one side of the framework, said vertical support being retained in position at least by at least one horizontal support, said horizontal support being secured at opposed end sections thereof to said vertical support and to outside elements of said framework located on an other side of the framework located opposite said one side and anchored to the dwelling, wherein said vertical support comprises, on said one side, at least one post and at least one bracket secured thereto and, on said other side, at least one of said outside elements of said framework, whereby a riser and a tread of a step can be secured to said vertical support.

2. A framework as defined in Claim 1, wherein said outside elements comprise at least one L-shaped stringer provided at said other side of said framework, said post and said at least one L-shaped stringer being adapted for supporting at least one corner step of the staircase.

3. A framework as defined in Claim 2, wherein a number of said brackets mounted to said post and a number of said L-shaped stringers mounted to the dwelling are provided at various elevations for supporting a number of corner steps of the staircase.

4. A framework as defined in Claim 3, wherein at least one of said brackets includes a tubular first end engaged around said post and secured thereto, and a plate-shaped second end mounted to at least one of the tread of a step, the riser of a step, said horizontal support, and said stringer.

5. A framework as defined in Claim 4, wherein said plate-shaped end defines openings such that fasteners, including at least one of screws and
bolts, can be extended therethrough for securing to said bracket said at least one of the tread of a step, the riser of a step, said horizontal support, and said stringer.

6. A framework as defined in Claim 1, wherein at least one connecting plate extends from said outside elements for attachment to the riser of the step.

7. A framework as defined in Claim 1, wherein said horizontal support comprises a metallic channel.

8. A vertical support for a modular framework for a staircase, the framework being of the type comprising at least two non-wooden stringers and a series of non-wooden step supports adapted to be mounted to the stringers for supporting a number of steps when the stringers are installed in a dwelling, said vertical support comprising, on one side of the framework, at least one post and at least one bracket secured thereto, said vertical support being adapted to be retained in position at least by one horizontal support that is secured at opposed ends thereof to said vertical support and to outside elements of the framework located on an other side of the framework located opposite said one side and anchored to the dwelling, wherein an upper end of at least one of the stringers is supported by said vertical support, whereby a riser and a tread of a step can be secured on said one side to said vertical support, and on said other side to the outside elements.

9. A modular framework for a staircase, comprising at least two hidden structural stringers and a series of step supports adapted to be mounted to the hidden stringers for supporting a number of steps when the hidden stringers are installed in a dwelling, wherein said step supports are installed to said hidden stringers at predetermined locations therealong such that the steps can be directly mounted to said step supports and into proper position thereof for the staircase, a number of steps, each including a tread and a riser, being mounted to said framework, at least one decorative stringer being provided for mounting to said framework, including to at least one of said hidden stringers, for concealing said hidden stringers and said step supports.
10. A framework as defined in Claim 9, wherein said tread, said riser and said decorative stringer are made of wooden material.

11. A framework as defined in Claim 9, further including at least one decorative molding for positioning adjacent to said decorative stringer.

12. A framework as defined in Claim 11, wherein decorative molding is made of wooden material.

13. A framework as defined in Claim 11, wherein said decorative stringer comprises a first decorative stringer extending substantially opposite said hidden stringer and a second decorative stringer extending substantially opposite at least one of one of said step supports, said decorative molding extending between said first and second decorative stringers.