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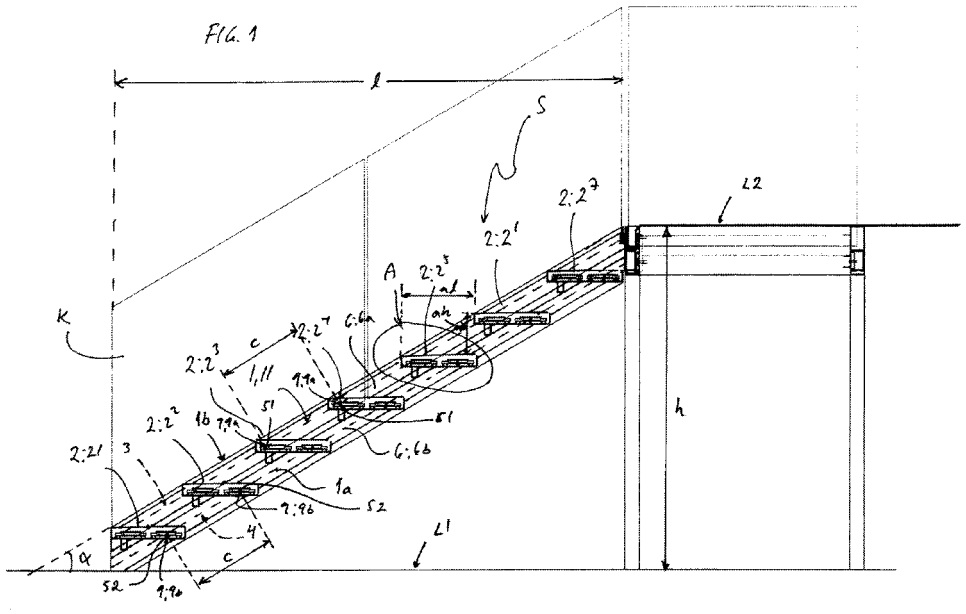
(54) **Staircase construction**

(57) The invention relates to a staircase (S), which comprises two stringers (1; 11, 12) between which is to be accommodated one or more treads (2; 2^1, 2^2, 2^3...) fixable at each end (21) to the stringer, and in which each stringer is provided with two channels (3, 4), which are parallel to each other and at the same time lengthwise of the stringer and which are at a distance (a) from each other, and that each end (21; 21 a, 21 b) of the tread (2) is provided with appropriate fixing means (5; 5a, 5b) for attaching the tread (2) to the parallel channels (3, 4) of each stringer (1; 11, 12), and that the fixing means (5; 5a, 5b) include two elongated fastening elements (51, 52), such as tenons or bolts, which are adapted to protrude from the end of the tread and to fit in the parallel channels (3, 4) for attachment. According to the invention, a distance (b) between the fastening elements (51, 52) is made adjustable in such a way that, at the installation stage as the staircase is being erected in its location, the distance (b) between the fastening elements (51, 52) is adjustable and settable to comply with a pitch angle (α) of the completed staircase and to match a horizontal distance between the stringers' channels (3, 4) in a way to enable setting the tread (2) in a horizontal plane and securing it firmly in its position. The invention relates also to a tread (2) for the staircase (S).



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Description

[0001] The invention relates to a staircase according to the preamble of claim 1.

[0002] The invention relates also to a staircase tread according to the preamble of claim 11.

[0003] The staircase refers in this context to a type of staircase and/or assembly composed of staircase elements, which primarily comprises prefabricated components, i.e. at least two stringers and one or more treads. The length of stringers and the number of treads are determined, among others, on the basis of the rising (vertical distance) and going (horizontal distance) available at the installation site. The pitch angle of a staircase (i.e. the angle defined by a stair/staircase to the horizontal) is usually determined by the features of a building or other such location marked for the installation of a staircase. Thus, the pitch angle of a staircase may vary according to the installation project. The staircase is usually made to measurements, having its pitch angle preset according to plan.

[0004] A problem with the staircase is a fixed pitch angle. A building or the like, in which a staircase composed of prefabricated components is to be installed, does not always match exactly the project drawings. Thus, for example, the installation site may have a rising which exceeds (or falls short of) that used in designing the staircase, necessitating e.g. that the installation site be remodeled or often even that the delivered staircase be discarded and a new one ordered. This complicates installation, increases installation time, and thereby adds to the costs.

[0005] From British patent application GB-2 338 002 A is prior known a staircase with a variable pitch. The staircase has its strings provided with a curved guide slot to which the treads are fixable in a horizontal position by bolts. The staircase pitch can be adjusted at an assembly stage and the treads can be appropriately pivoted in the curved guide slot for setting the same in a horizontal plane.

[0006] A problem with the above-cited staircase is, among others, that the distance between treads in a going direction cannot be varied, it is always constant. The curved guide slots in the strings are set at a predetermined distance from each other. When the staircase pitch is changed, the rise of a stair is also changed. Another problem is the awkward construction of strings: providing curved guide slots in the strings at prescribed locations and in a correct position is difficult from the standpoint of manufacturing technique.

[0007] From Australian patent application publication AU-4566979 A is prior known a staircase assembly, comprising two stringers between which are fitted a number of treads. The treads are fixable at each end to the stringer. Each stringer is provided with two sections which are parallel and thereby lengthwise of the stringer. Each end of the tread is provided with fixing means for fastening the tread to the parallel sections of each stringer.

[0008] A problem with the above-cited staircase is, among others, the fact that the tread fixing means are preset in fixed positions with a predetermined stair rising angle in mind. As a result, the staircase does not have sort of adjustment options that could be adopted in case the measurements of an installation site differ from those presented in the construction drawings.

[0009] It is an object of the invention to eliminate the problems relevant to e.g. the above-cited prior known staircases. Another object of the invention is to provide a novel staircase, which is simple in construction, easy and quick to install, and which is furthermore adjustable at the installation site in terms of its pitch angle and adaptable in its position regardless of possible dimensional errors.

[0010] A staircase according to the invention is characterized by what is presented in claim 1.

[0011] A staircase tread according to the invention is characterized by what is presented in claim 11.

[0012] The dependent claims disclose preferred embodiments of the invention.

[0013] The invention provides a staircase, which comprises two stringers between which is to be accommodated one or more treads fixable at each end to the stringer, and each stringer, particularly one side thereof, is provided with two channels which are parallel to each other and at the same time lengthwise of the stringer, i.e. first and second channels, at a distance from each other, and that the tread has its ends provided with appropriate fixing means for attaching the tread to the parallel channels of each stringer, and that the fixing means include two elongated fastening elements, such as tenons or bolts, which are adapted to protrude from the end of the tread and to fit in the parallel channels for attachment. According to the invention, a distance between the fastening elements is made adjustable in such a way that, at the installation stage as the staircase is being erected in its location, the distance between the fastening elements is adjustable and settable to comply with a pitch angle of the completed staircase and to match a horizontal distance between the stringers' channels in a way to enable setting the tread in a horizontal plane and securing it firmly in its position.

[0014] The invention provides also a tread for a staircase, having its ends provided with fixing means for attaching the tread to stringers, said fixing means including two elongated fastening elements, such as tenons or bolts, which are adapted to protrude from an end of the tread and to fit in parallel channels provided side by side on the stringer for attachment. According to the invention, a distance between the fastening elements is made adjustable in such a way that, at the installation stage as the staircase is being erected in its location, the distance between the fastening elements is adjustable and settable to comply with a pitch angle of the completed staircase and to match a horizontal distance between the stringers' channels and in a way to enable setting the tread in a horizontal plane and securing it firmly in its position.

[0015] An advantage offered by the invention is that a desired type staircase can be assembled on site from components included in the staircase. This represents a remarkable saving in installation costs.

[0016] A particular advantage of the invention is that the pitch angle of a staircase can be set appropriately without modifications to staircase components. The advantage of the invention is the versatility and straightforward adaptability of the staircase to various projects, in which fluctuation may occur in the rising and going of an installation site.

[0017] A second particular advantage of the invention is that the pitch angle of a staircase is readily settable appropriately regardless of possible inaccuracies or even dimensional errors in the rising and/or going of an installation site.

[0018] A benefit of the invention is that, at the installation stage as the pitch angle changes, the rising and going of a staircase are also changing and most preferably at the same time and in the same amount.

[0019] Another benefit of the invention is its adaptability to diverse installation projects, such as e.g. one-family houses and public spaces.

[0020] In a preferred embodiment of the invention, the fixing means comprise at least one attachment unit, comprising a body provided with an elongated slot, which is lengthwise of the tread end and through which is adapted to extend an elongated fastening element, such as a tenon or a bolt. The advantage is that the position of the fastening element in the body's elongated slot and in the direction of a tread's end is arbitrarily adjustable and so is also the relative distance between two parallel fastening elements for the tread's end. Thus, the tread can be attached to the stringers always in a horizontal position by adjusting the position of the fastening elements, specifically at the staircase installation site. This enables, regardless of dimensional errors of a construction or installation site, the mounting and setting of a staircase in its position with treads in a horizontal plane.

[0021] The invention and its other benefits will now be described in more detail with reference to the accompanying drawing, in which

fig. 1 shows an installed staircase from the side in a vertical lengthwise cross-section;

fig. 2 shows an enlarged detail A in the installed staircase of fig. 1;

fig. 3 shows from above a staircase tread body in the staircase of fig. 1; and

fig. 4 shows a view in cross-section of a stringer and a tread attached thereto.

[0022] Like reference numerals refer to like components in the figures.

[0023] A staircase S according to the invention comprises two stringers 1; 11, 12, between which is to be accommodated one or more treads 2; 2^1, 2^2,..., 2^n (n = integer). The tread 2 is fixable at each end 21; 21a, 21b to the stringer 1; 11, 12. The site-installed staircase S depicted in fig. 1 comprises, by way of example, seven equally spaced treads 2; 2^1, 2^2,..., 2^7, which are attached to the stringers 1; 11, 12. The staircase S is installed between two floor levels L1, L2 of a building, having a height difference or vertical distance h which determines the rising of an installation project. Respectively, the staircase has a going l which matches the entire length of the staircase in horizontal direction. A pitch angle α of the staircase can be determined on the basis of a formula $\tan \alpha = h/l$. The length of the stringers 1; 11, 12 and the number of the treads 2 are determined on the basis of said rising h and going l, as well as on the basis of a rising ah and going al (the ratio of which can also be used for determining the pitch angle α) defined for a single tread 2.

[0024] The stringer 1; 11, 12 is a load-bearing component of the staircase S. The stringer 1 has at least one rectilinear side 1a. The stringer is a beam most preferably rectangular in cross-section, which is to be accommodated in a staircase with its broad sides in vertical orientation. In a preferred embodiment of the invention, the stringer 1; 11, 12 is constructed from aluminum section.

[0025] Each stringer 1; 11, 12, especially one or the first 1 a of its sides, is provided with two channels which are parallel to each other and at the same time lengthwise of the stringer, i.e. a first and a second channel 3, 4. The channels are rectilinear and spaced from each other by a distance a. With regard to its surface, the side 1 a of the stringer 1; 11, 12 is most preferably a level plane and moreover relatively wide in cross direction. The stringers 1; 11, 12 are mirror images of each other, such that, when mounted on the staircase S, the sides 1a are facing each other. The staircase S has each opposite end 21; 21a, 21b of its tread 2 provided with appropriate fixing means 5; 5a, 5b, by which the tread 2 is attached to the parallel channels 3, 4 on the sides 1a of each stringer 1; 11, 12.

[0026] In the most preferred staircase embodiment, the stringer 1; 11, 12 has its longitudinal channels 3, 4 extending over the entire length of a stringer.

[0027] In another preferred staircase embodiment, the stringer 1; 11, 12 has its first and second channels 3, 4 identical in cross-section and preferably equal in dimensions.

[0028] In one preferred staircase embodiment, the fixing means 5; 5a, 5b include two elongated fastening elements 51, 52, such as tenons or bolts, which are spaced from each other by a distance b which is adjustable especially after the fixing means 5 are set, specifically secured, in engagement with the tread 2, particularly with its end 21; 21a, 21b. In addition, the fastening elements 51, 52 are adapted to protrude from the end 21; 21a, 21 b of the tread 2, and most preferably to extend lengthwise of the tread 2. The fastening elements 51, 52 are adapted to fit in the parallel first and second channels 3, 4 for

attachment therewith. At the installation stage as the staircase S is being assembled, the distance b between the fastening elements 51, 52 presently in engagement with the tread 2 is settable in a horizontal plane of the tread 2 to match the distance between the channels 3, 4, while bringing said elements to bear against the discussed channels for enabling the attachment.

[0029] In a preferred staircase embodiment, the first and second channels 3, 4 are similar in cross-section and most preferably identical, especially in the sense that a mouth section 3a, 4a of the channel is narrower than its bottom section 3b, 4b. It is further preferred that the channel 3, 4 has its bottom section 3b, 4b in the form of a rectangle and its mouth section 3a, 4a of a uniform width.

[0030] The fastening element 51, 52 is preferably a tenon or a bolt, which is provided with a head portion 51 a, 52a and a stem portion 51 b, 52b. The stem portion 51 b, 52b is clearly longer than the head portion 51 a, 52a, yet smaller in cross diameter. At the installation stage as the staircase is being assembled, the fastening element 51, 52 is to be placed in the first and respectively in the second channel 3, 4, such that the fastening element has its head portion 51 a, 52a within the bottom section 3b, 4b of the channel and the fastening element has its stem portion 51b, 52b adapted to extend through the mouth section 3a, 4a out of the channel 3, 4 and further to an engagement with the tread 2. In the attachment process, the fastening element 51, 52 has its wide head portion 51 a, 52a bearing against the surfaces of the channel's bottom section 3b, 4b in the vicinity of the mouth section 3a, 4a, and the opposite end of the fastening element 51, 52, i.e. a second free end of the stem portion 51 b, 52b, is attached for engagement with the tread 2.

[0031] In a preferred embodiment of the invention, the fixing means 5; 5a, 5b comprise two parallel attachment units 50 which are disposed, especially attached, in the engagement with the tread 2, especially with the end 21; 21a, 21b thereof. The attachment units 50 are spaced from each other most preferably in such a way that one attachment unit lies adjacent to a leading edge 21 c of the tread 2 and the other adjacent to a trailing edge 21d of the tread. Each attachment unit 50 comprises a body 53, which in this embodiment is provided with an elongated slot 54 transverse (or crosswise) to the longitudinal direction of the tread 2 and, in this case, co-directional with the end. The elongated fastening element 51, 52, such as a tenon or a bolt, is adapted to extend at the installation stage through this slot 54. The slot 54 has a width in the direction of the end 21 of the tread 2 which is e.g. 10-30% of the breadth of the tread. In any event, the slot 54 has a width which is several times more than the diameter of the fastening element 51, 52. The height of the slot 54, perpendicular to the tread plane, is equal to the diameter of the fastening element 51, 52 augmented by a suitable clearance.

[0032] The fastening element 51, 52 can have its position in the slot 54 changed crosswise of the tread 2 and at the same time the relative distance b between the fastening elements 51, 52 can be changed, depending on the distance between the first and the second channel 3, 4, especially in horizontal direction and thus in the direction of the plane of the tread 2 (which depends on the pitch angle α of a staircase to be installed). At this point, the fastening element 51, 52 has its wide head portion 51 a, 52a fitted within the bottom section 3b, 4b of the channel 3, 4 and the fastening element has its stem portion 51 b, 52b adapted to extend out by way of the channel's mouth section 3a, 4a and further to the attachment unit 50 mounted on the tread 2 and, especially in this case, through its elongated slot 54. A clamp 51 c, 52c, such as a nut, is mounted on one free end of the fastening element 51, 52, and particularly of its stem portion 51b, 52b, which end is adapted to extend onto the side of the slot 54 opposite to the tread's end 21; 21a, 21 b and at the same time to the stringer 1; 11, 12. In the attachment process, the clamp 51 c, 52c is tightened from a rest position to a working position, such as by aptly rotating a nut along a bolt threading, whereby it presses the fastening element 51, 52 into the channel 3, 4 and at the same time, through the intermediary of the attachment unit 50, particularly its body 53, the end 21, 21 a, 21 b of the tread 2 against the stringer 1; 11, 12.

[0033] In an alternative embodiment of the invention, the fixing means 5; 5a, 5b comprise just one as-described or first attachment unit 50, which is set in engagement with the tread 2, e.g. in engagement with its trailing edge 21d. A second attachment unit, which is respectively mounted in engagement with the leading edge 21 c of the tread 2, comprises also in this case a body similar to that of the first attachment unit, said body being provided with a slot for the elongated fastening element 51 (or 52). However, in the second attachment unit, the slot has such a configuration that the fastening element 51, such as a tenon or a bolt, is adapted to extend with a small clearance through the slot, in which the tenon or bolt cannot be adjusted in terms of its position laterally relative to the slot, nor in the direction of the tread's end. Hence, the relative distance b between the fastening elements 51, 52 is adjusted solely by means of its first attachment unit 50, wherein a position of the fastening element 52 (or 51) in the direction of the end 21 of the tread 2 can be adjusted in the elongated slot 54 of the first attachment unit 50.

[0034] Attachment units, such as a first and a second attachment unit, included in the fixing means 5; 5a, 5b, are attached to the tread 2 with suitable fastening elements, such as e.g. screws or bolts.

[0035] In a preferred embodiment of the invention, the tread 2 comprises a tread body 2a and a step portion 2b set in engagement with the tread body 2a, most preferably on top of it. The step portion 2b must be made in an appropriate durable material, such as wood or metal, and match the rest of the building environment in terms of its appearance. The tread body 2a, i.e. its interior, is provided with retainers 16; 16a, 16b for fastening elements 17;

17a, 17b of the fixing means 5; 5a, 5b, especially those of the attachment units 50. The fastening elements 17; 17a, 17b are preferably bolts or tenons and the retainers are e.g. apertures provided with screw threads mating with the bolts or tenons. The tread body 2a is constructed, for example, from U-section or the like, preferably of aluminum.

[0036] In a preferred embodiment of the invention, the retainers 16; 16a, 16b, in this case for the fastening elements 17; 17a, 17b of each attachment unit 50, are implemented as channels 160 lengthwise of the tread 2 and moreover most preferably in such a way that the channels cover the tread over its entire length. The fastening elements 17 are provided on each end of the body 53 of the attachment unit 50 and at the same time on the outside of the ends of the elongated slot 54. Thus, two appropriately spaced channels 160 are provided for one attachment unit 50. The channels 160 of a tread are preferably of such a cross-section that a bottom section 161 of the channel is wider than a mouth section 162 of the channel. The fastening element 17; 17a, 17b, such as a bolt or the like, is fitted in the channel in such a way that its wide head portion is placed in the channel's bottom section and its narrow stem portion extends through the mouth section out of the channel. The fixing means 5; 5a, 5b, especially the attachment unit 50, are respectively provided with an aperture 19; 19a, 19b for one, preferably two fastening elements 17; 17a, 17b, through which the fastening element 17 is to be adapted to extend in the process of attaching the fixing means 5; 5a, 5b, especially an attachment unit, to the tread 2. A location of the fastening elements 17; 17a, 17b can be changed by moving the same in the channels 160 and thereby the attachment unit 50 can be fixed at a suitable distance from the end 21, 21 a, 21 b of the tread 2. For the actual engagement of the attachment unit 50 or the like with the tread 2, the fastening elements 17; 17a, 17b are capable of being fitted with clamping elements 18; 18a, 18b, such as nuts, which are disposed on the opposite side of the attachment unit aperture and by means of which the attachment unit is clamped to its position on the tread 2.

[0037] A benefit offered by such a tread 2, in which the retainers 16; 16a, 16b are implemented as the channels 160 lengthwise of the tread, is that the tread preform can be manufactured in the form of a lengthy, such as e.g. a 5- to 6-meter long element. From such a tread perform can be cut treads of an appropriate length, which are delivered to the site as ordered. The delivery of extra treads is also simple.

[0038] In a preferred embodiment of the invention, the staircase further comprises one or more elongated cover panels 6; 6a, 6b to be mounted along the side 1 a of the stringer 1; 11, 12 on top of the channel 3, 4 for concealing the channel. The concealment is provided at least on the outside of the ends 21 of the tread 2 and the attachment points, i.e. the fastening elements 51, 52.

[0039] The cover panel 6; 6a, 6b has a width which exceeds the crosswise width of the channel 3, 4, especially that of the channel mouth section 3a, 4a. Along the sides 1a of the stringers 1; 11, 12 on the sides of each channel 3, 4 or outside the channel are provided suitable fastening elements, preferably fastening recesses, most preferably fastening grooves 7; 7a, 7b; 8, 8a, 8b for the cover panels 6; 6a, 6b. The opposite long sides of the cover panels 6; 6a, 6b (or corresponding separate extensions) are pressed into the fastening recesses, such as the fastening grooves 7; 7a, 7b; 8, 8a, 8b, whereby the cover panels retain, without disengaging, their position along the sides 1a of the stringers. The cover panels 6; 6a, 6b are fitted e.g. between the treads 2 on the stringers 1; 11, 12.

[0040] In a most preferred embodiment of the invention, the cover panels 6; 6a, 6b are substantially equal in length to the stringers 1; 11, 12 of the staircase S. In addition, the cover panels 6; 6a, 6b are provided with holes 9; 9a, 9b which, in the longitudinal direction of the cover panel, are disposed at regular distances c from each other. The holes 9; 9a, 9b have a diameter which substantially matches that of the stem portions 51 b, 52b of the fastening elements 51, 52. Through these holes 9; 9a, 9b are to be extended the fastening elements 51, 52 of the tread 2 in the process of assembling and installing the staircase in its place.

[0041] It should be noted that the distance c between the holes 9; 9a, 9b of the cover panel 6; 6a, 6b is substantially equal to a spacing between the treads 2; 2^1, 2^2,...,2^7 lengthwise of the stringers 1; 11, 12. A major benefit gained by this arrangement is that, by means of the cover panels 6; 6a, 6b, the treads 2 can be effortlessly set at a prescribed distance from each other and thereby the risings ah and goings al of the treads 2 remain under control and in a desired range.

[0042] When the staircase S is assembled in the process of its installation, the fastening elements 51, 52 for each tread 2, especially for its end 21; 21 a, 21 b, are accommodated in the first and, respectively, in the second channel 3, 4 of the stringer 1; 11, 12 and through the holes 9; 9a, 9b of the respective cover panels 6; 6a, 6b, while at the same time the cover panels 6; 6a, 6b are installed in place for protecting and concealing the channels 3, 4. The process of installing the first tread 2 in place includes checking that the fastening elements 52 (51) placed in the second (or first) channel 4 (3) are in such a position relative to the staircase pitch angle α that the tread 2 shall certainly end up in a horizontal plane. Should the tread 2 not be in a horizontal plane as yet, the cover panel 6, 6b (6a) of the second channel 4 (resp. the first channel 3) can be displaced lengthwise of the stringer 1; 11, 12 over such a distance in a relevant (obliquely upward/downward) direction that the horizontal plane requirement of the tread is satisfied. After this, all fastening elements 51, 52 for each, not yet installed tread 2 are exactly in the right position. When the treads 2 are secured in place by tightening the fastening elements 51, 52 (such as the bolt nuts 51 c, 52c), the cover panels 6; 6a, 6b are also clamped in position between the ends

21; 21a, 21 b of the treads 2 and the sides 1a of the stringers 1; 11, 12. Alternatively, the staircase is completely assemblable from the stringers 1; 11, 12 and the treads 2, followed by checking the treads for horizontality, performing a possible adjustment, and clamping the treads in place. It should be noted that the staircase S is also readily dismountable by proceeding in reverse order.

[0043] In a staircase according to the invention, the risings ah and respectively goings al of the treads 2 may vary for example in one and the same assembly over the following range ah = 190-160 cm and al = 250-300 cm and, respectively, the staircase pitch angles α = 28-37 degrees.

[0044] The staircase S according to the invention has its stringers 1; 11, 12 preferably also provided with fixing means for a railing unit K. These fixing means include a number of recesses or most preferably a continuous long groove 13, provided on an upward opening side 1b of the stringers 1, and a wedge element 14. The railing unit itself comprises in this case a panel type element 15, such as a glass panel, which is fitted in the groove 13 at the installation stage and secured in the groove 13 by means of the wedge element 14.

[0045] The invention is not limited to concern just the above-described working example, but many modifications are possible while remaining within the scope of the inventive concept defined in the claims.

Claims

1. A staircase, which comprises two stringers (1; 11, 12) between which is to be accommodated one or more treads (2; 2^1, 2^2, 2^3...) fixable at each end (21; 21a, 21 b) to the stringer (1; 11, 12), and in which each stringer (1; 11, 12), particularly one side (1a) thereof, is provided with two channels (3, 4) which are parallel to each other and at the same time lengthwise of the stringer, i.e. first and second channels, at a distance (a) from each other, and that each end (21; 21 a, 21 b) of the tread (2) is provided with appropriate fixing means (5; 5a, 5b) for attaching the tread (2) to the parallel channels (3, 4) of each stringer (1; 11, 12), and that
   the fixing means (5; 5a, 5b) include two elongated fastening elements (51, 52), such as tenons or bolts, which are adapted to protrude from the end of the tread and to fit in the parallel channels (3, 4) for attachment, **characterized in that** a distance (b) between the fastening elements (51, 52) is made adjustable in such a way that, at the installation stage as the staircase is being erected in its location, the distance (b) between the fastening elements (51, 52) is adjustable and settable to comply with a pitch angle (α) of the completed staircase and to match a horizontal distance between the stringers' channels (3, 4) in a way to enable setting the tread (2) in a horizontal plane and securing it firmly in its position.

2. A staircase as set forth in claim 1, **characterized in that** the fixing means (5; 5a, 5b) comprise at least one attachment unit (50), comprising a body (53) provided with an elongated slot (54), which is co-directional with the tread end (21; 21 a, 21 b) and through which is adapted to extend an elongated fastening element, such as the tenon or bolt (51, 52).

3. A staircase as set forth in claim 1 or 2, **characterized in that** the tread (2) comprises a tread body (2a), which is provided with retainers (16; 16a, 16b) for fastening elements (17; 17a, 17b) of the fixing means (5; 5a, 5b), said retainers (16; 16a, 16b) being implemented as parallel channels extending lengthwise of the tread (2).

4. A staircase as set forth in claim 3, **characterized in that** the channels cover the tread (2) over its entire length.

5. A staircase as set forth in any of the preceding claims 1-4, **characterized in that** the tread (2) comprises a step portion (2b) capable of being applied and fixed to the tread body (2a) during the course of installation.

6. A staircase as set forth in any of the preceding claims, **characterized in that** the lengthwise channel (3, 4) of each stringer (1; 11, 12) covers the stringer over its entire length.

7. A staircase as set forth in any of the preceding claims, **characterized in that** the first and second channels (3, 4) are similar in cross-section, such that a mouth section (3a, 4a) of the channel is narrower than its bottom section (3b, 4b).

8. A staircase as set forth in any of the preceding claims, **characterized in that** the stringer (1; 11, 12) is constructed from aluminum section.

9. A staircase as set forth in any of the preceding claims, **characterized in that** the staircase further comprises one or more elongated cover panels (6; 6a, 6b) to be used for concealing the channel (3, 4) of the stringer (1; 11, 12) at least on the outside of the tread (2).

10. A staircase as set forth in claim 9, **characterized in that** the cover panel (6; 6a, 6b) is provided with holes (9), which, in the longitudinal direction of the cover panel, are disposed at regular distances (b) from each other, and through which the fastening elements (51, 52) for the tread (2) are to be adapted to extend.

11. A tread (2) for a staircase (S), having its ends (21; 21a, 21b) provided with fixing means (5; 5a, 5b) for

attaching the tread to stringers (1; 11, 12), said fixing means (5; 5a, 5b) including two elongated fastening elements (51, 52), such as tenons or bolts, which are adapted to protrude from the end (21; 21a, 21b) of the tread (2) and to fit in parallel channels (3, 4) provided side by side on the staircase stringers for attachment, **characterized in that** a distance (b) between the fastening elements (51, 52) is made adjustable in such a way that, at the installation stage as the staircase is being erected in its location, the distance (b) between the fastening elements (51, 52) is adjustable and settable to comply with a pitch angle (α) of the completed staircase and to match a horizontal distance between the stringers' channels (3, 4) and in a way to enable setting the tread (2) in a horizontal plane and securing it firmly in its position.

12. A tread (2) as set forth in claim 11 for the staircase (S), **characterized in that** the fixing means (5; 5a, 5b) comprise at least one attachment unit (50), comprising a body (53) provided with an elongated slot (54), which is co-directional with the tread end (21; 21a, 21b) and through which is adapted to extend the elongated fastening element (51, 52), such as a tenon or a bolt.

13. A tread (2) as set forth in claim 11 or 12 for the staircase (S), **characterized in that** the tread (2) comprises a tread body (2a), which is provided with retainers (16; 16a, 16b) for fastening elements (17; 17a, 17b) of the fixing means (5; 5a, 5b), said retainers (16; 16a, 16b) being implemented as parallel channels extending lengthwise of the tread (2).

14. A tread (2) as set forth in claim 13 for the staircase (S), **characterized in that** the channels cover the tread over its entire length.

15. A tread (2) as set forth in any of the preceding claims 11-14 for the staircase (S), **characterized in that** the tread (2) comprises a step portion (2b) capable of being applied and fixed to the tread body (2a) during the course of installation.

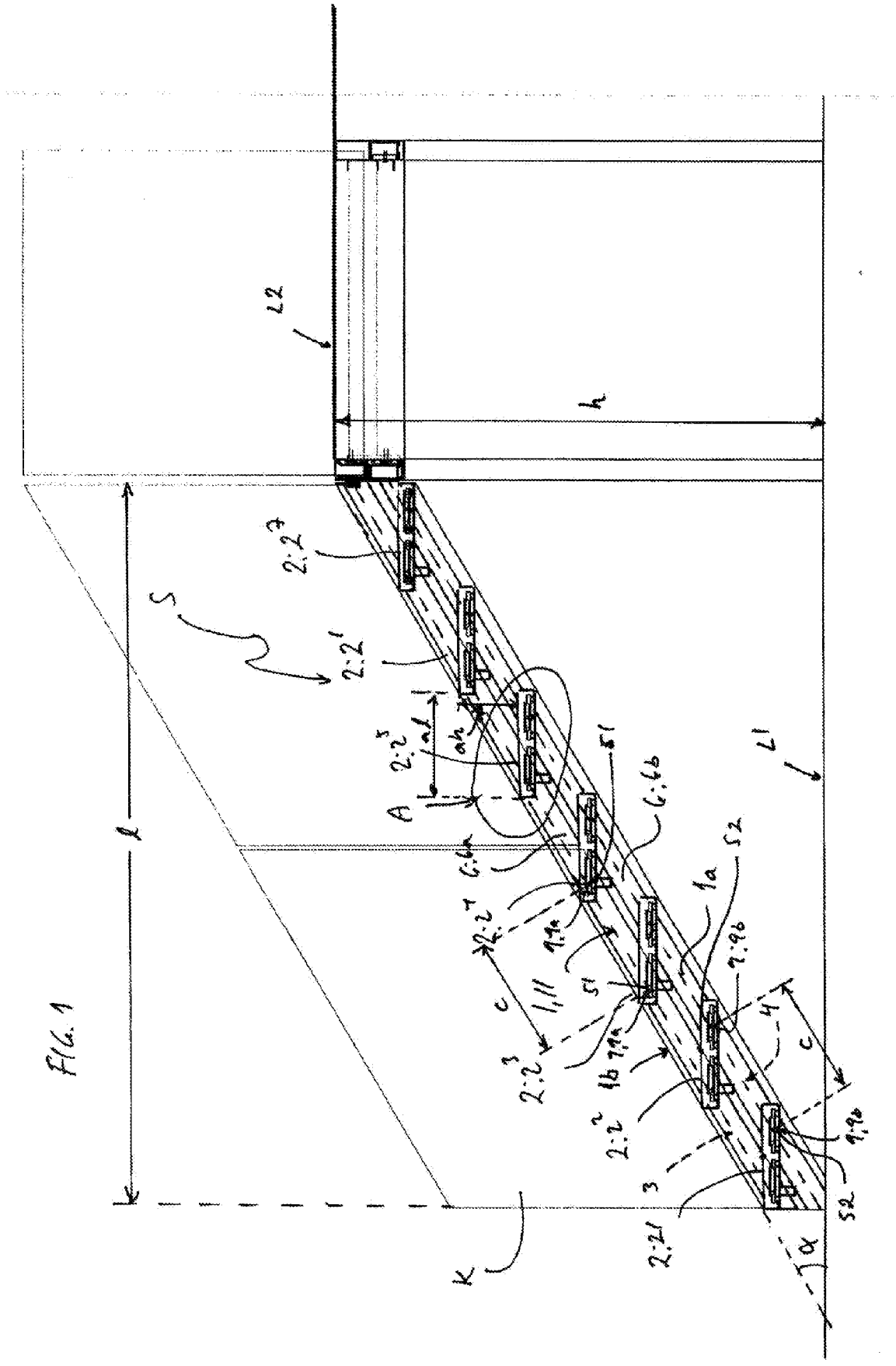

FIG. 1

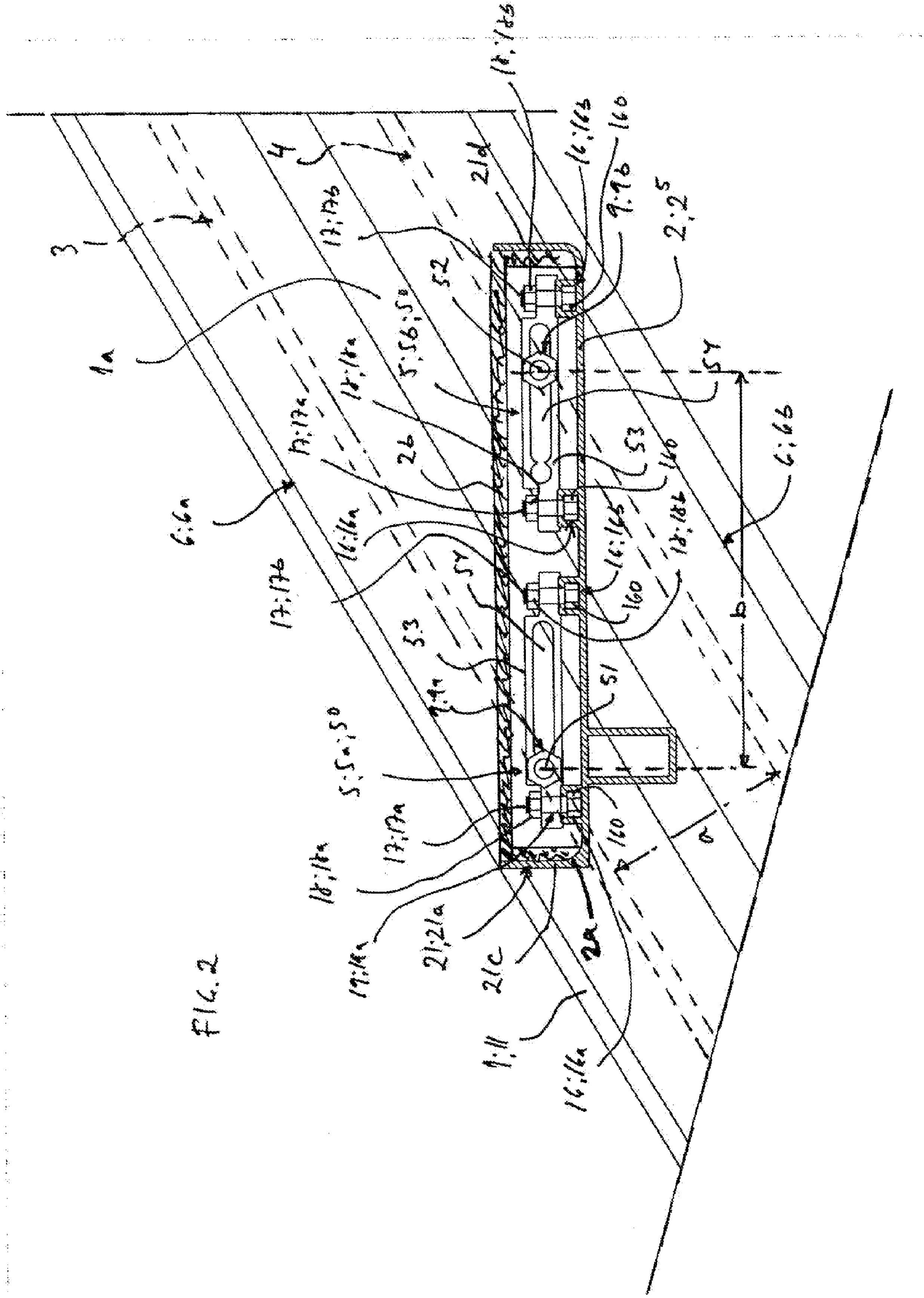

FIG. 2

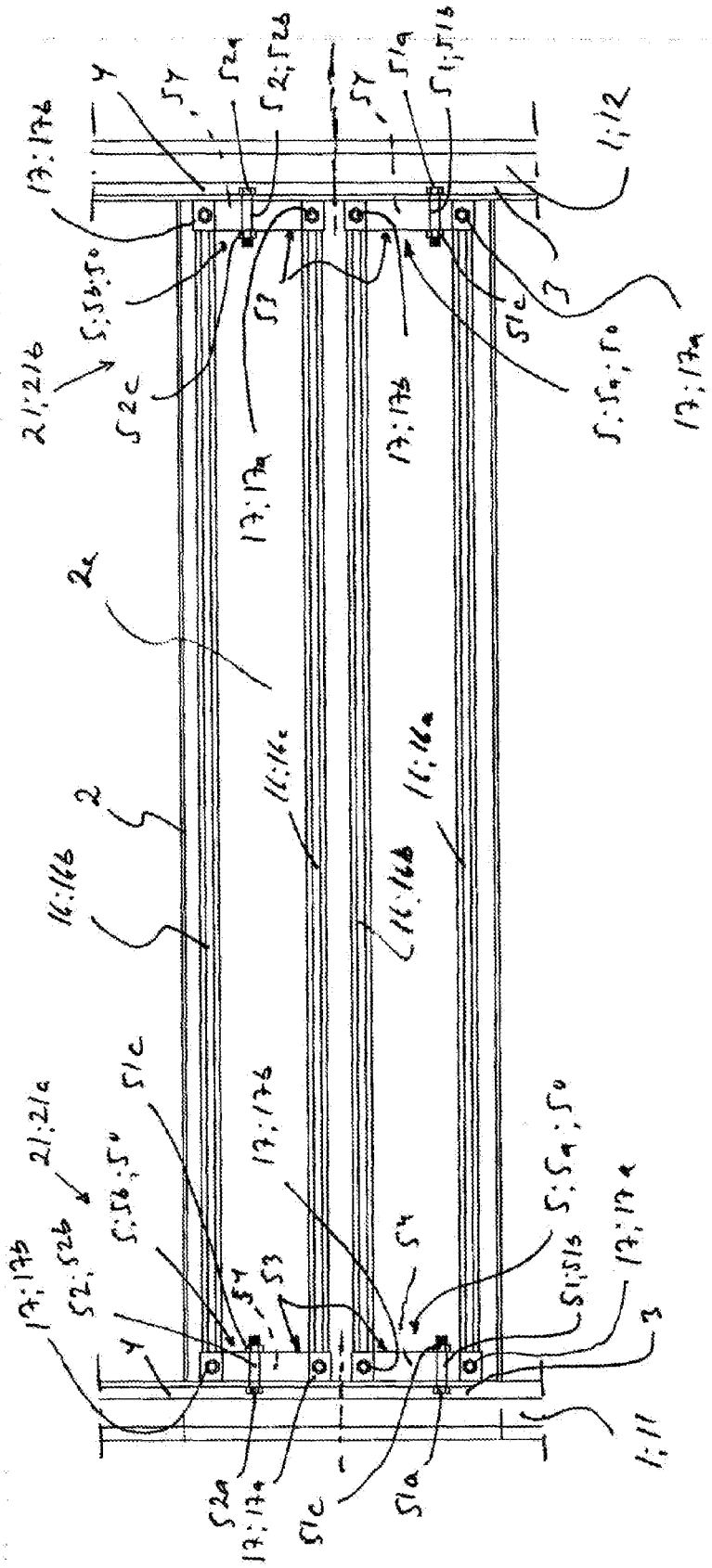

FIG. 3

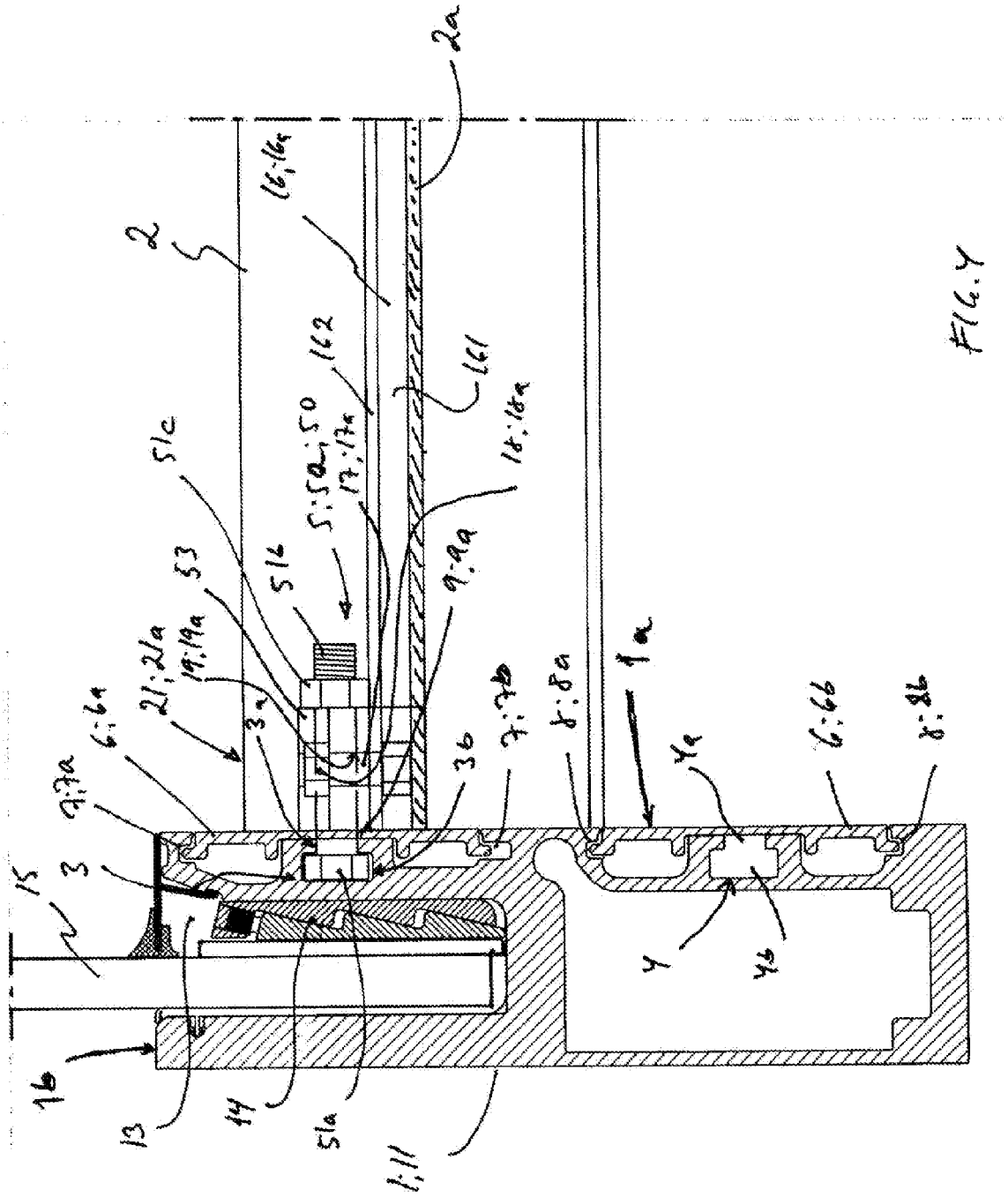
2a
2
16;16a
162
161
51c
51;51a;50
17;17a
18;18a
53
51d
9;9a
21;21a
19;19a
3a
6;6a
9;7a
3
15
3b
7;7b
8;8a
1a
4a
6;6b
8;8b
4
4b
16
13
14
51a
1;11

FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- AU 4566979 A **[0007]**