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71 Applicant: LEWES DESIGN CONTRACTS LIMITED
The Mill
Glynde Sussex BN7 8SS(GB)

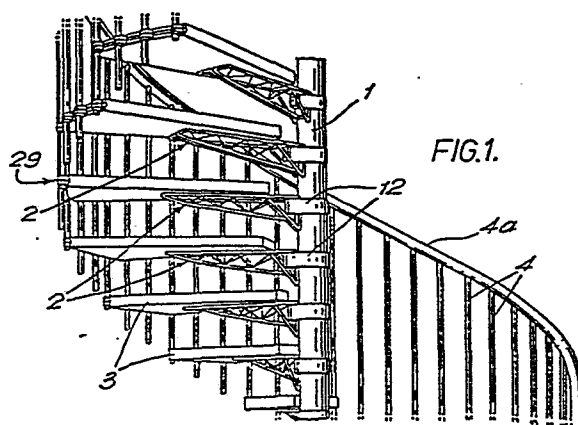
72 Inventor: Kennedy, Tyl O'Brien
Stables Little Dene
Glynde East Sussex(GB)

74 Representative: Boyes, Kenneth Aubrey et al,
Frank B. Dehn & Co. Imperial House 15-19 Kingsway
London WC2B 6UZ(GB)

54 Spiral staircase.

57 A spiral staircase is constructed using tread mounting brackets which secure the treads to the central support column (1) without the need for special mounting collars. Each tread bracket (2) is clamped to the support column (1) by means of a strap (12) which passes around the support column (1), the end of the strap engaging grooves (15, 16) in a mounting block (13). The mounting block (13) is provided with one or more bolts (14) threadedly mounted therein, which engage a back plate (11) of the mounting bracket (2). Thus, when the bolt or bolts are tightened, the block (13) is urged away from the back plate (11), the tension in the strap increases, and thus the bracket (2) is urged towards the column (1).

The baluster (4) is attached to the treads (3) by means of mounting brackets (29) which are adapted to be slidably mounted in channels or grooves provided in the outer edges of the treads. Each bracket has a collar which is slidably engageable with the baluster (4) and means for clamping the collar to the baluster. The baluster may extend through the collar to below the level of the tread (3), and therefore it does not have to be cut to any precise length.



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Spiral Staircase

This invention relates to spiral staircases.

Conventionally the mounting brackets for
5 the treads for a spiral staircase are formed with
a mounting collar which is a sliding fit on the
central support column of the staircase. The collars
are made of suitable axial length and/or suitable
spacer collars are provided between tread bracket
10 mounting collars to achieve the desired vertical
spacing of the treads, which spacing will vary
from staircase installation to installation. Thus
such spiral staircases have to be purpose made
for each installation and because of this and the
15 method of supporting the mounting brackets on the
support column, are expensive and not susceptible
to mass production.

According to the present invention a tread
mounting bracket or combined bracket and tread
20 is provided which is adapted at its inner end to
be clamped to a support column by means of a
strap engagable around the support column and
with the bracket or tread and bracket and tensionable
to urge the inner end of the bracket or combined
25 tread and bracket against the column thereby to
mount the bracket or bracket and tread to the column.

Thus, according to the present invention
the bracket is not formed with a mounting collar
and the height of the tread in the column is completely
30 adjustable rather than being determined by vertical
spacers constituted by other mounting collars alone
or in combination with separate spacer collars.
The manufacturing costs of the brackets or treads
and brackets themselves can thus be reduced and
35 moreover as such brackets or treads and brackets
are universally usable, the cost of individual

spiral staircase installations can be much reduced.

The clamping strap may be tensioned in various ways. Thus, for example a tensioning system may be used similar to that employed in the well known
5 'Jubilee' clip. However, in a preferred construction a U-shaped strap is provided which is connectable or engagable at its ends with a tensioning block having one or more bolts threadedly mounted therein and engagable with a back plate fixed to or forming
10 part of the mounting bracket. Thus as the bolts are screwed in towards the support column the tensioning block is forced away from the back plate and the strap thus tightened around the support column.

The mounting bracket may be variously constructed,
15 as from sheet, rod or tube material. If the treads and brackets are combined then sheet material is preferred. If a separate mounting bracket is provided to which the tread is to be attached, then the bracket can conveniently be constructed as a lattice
20 beam formed of metal tube and/or rod suitably bent and welded together.

The attachment of the vertical balusters to the outer ends of the stair treads in known spiral staircase systems is often time consuming
25 and difficult, involving the need to cut balusters to precise lengths. Another disadvantage is that it is necessary to provide drilled or preformed holes in the treads to receive the balusters, and thus the spacing between the balusters is fixed. It is thus an
30 object of the present invention to provide a simple and flexible system of attaching the balusters to stair treads.

Thus according to a further aspect of the invention a baluster/tread attachment system is
35 provided including a baluster mounting bracket which is adapted to be slidably mounted in a channel or groove provided in the outer edge of a stair

tread, said bracket having a collar slidably engagable with the baluster which may then extend through the collar to below the level of the tread and means for clamping the collar to the baluster.

5 Thus any required number of baluster mounting brackets may be provided for each tread and the position of each is adjustable along the edge of the tread. Moreover the length of the baluster is not critical as it can extend down past the
10 end of the tread.

 To clamp the baluster mounting bracket to the baluster various means are possible, one being a simple grub screw. Such an arrangement however will require access to the grub screw from the side which may not
15 always be convenient or even possible, as where a staircase is being installed close to an adjoining wall. Thus it is preferred that the clamping arrangement be such as to be operable from above or below and to this end in a preferred embodiment a two part baluster
20 clamping bracket is provided, said parts being slidably mountable in said channel or groove when positioned one above the other, each part having a collar slidably engageable with the baluster and means are provided such as a vertically disposed grub screw for forcing said collars
25 apart at a slight angle to one another thereby to cause them to wedge on the baluster and thus support it vertically.

 A preferred embodiment of the invention will now be described by way of example only with reference
30 to the accompanying drawings in which:

 Fig. 1 is a perspective view of a portion of a spiral staircase,

 Fig. 2 is a partial side elevation of a tread mounting bracket,

35 Fig. 3 is a plan view of the bracket of Fig. 2 additionally showing the means of attachment to a support column,

- 4 -

Fig. 4 is a scrap side elevation partially in section showing a baluster mounting bracket supporting a baluster, and

Fig. 5 is a plan view to an enlarged scale of part of the baluster mounting bracket.

Referring firstly to Figure 1, a spiral staircase comprises a central support column 1 to which tread mounting brackets 2 are clamped and to which brackets treads 3 are screwed. Vertical balusters 4 which support a handrail 4a in any conventional manner are attached to the outer edges of the treads 2, i.e. the edges of the treads remote from the central support column 1 in a manner to be described hereafter.

A tread bracket 2 is shown in more detail in Figures 2 and 3 and can be seen to comprise an open lattice work generally wedge-shaped cantilever bracket or beam. This bracket is fabricated from metal rod, suitably bent and welded to form the required shape. The lattice work bracket includes two lengths of metal rod which are each bent into a generally U-shape to form side members 5, 5a and end members 6. The side members 5a are arranged side-by-side and extend downwardly and inwardly from the end members 6, the end members 6 and the side members 5 lying in a horizontal plane and serving to support the lower surface of a tread 3. To secure the tread to the support, four metal lugs 7 are welded to side members 5, one mid way along each side member 5 and one at the angle between each side member 5 and end member 6, and a metal plate 9 is welded between side members 5 so as to bridge the gap therebetween. The metal lugs 7 and plate 9 have holes 10 drilled therethrough to retain screws whereby the tread 3 may be screwed to the tread bracket.

The inner ends of the side members 5 terminate in downwardly extending vertical end members 6a

- 5 -

which are interconnected by a back plate 11. Extensions 8 of the end members 6a, are angled upwardly and rearwardly and are welded at their free ends to the side members 5. A further length of rod of narrower cross section is bent and welded to side members 5 and 5a to form cross members 8a. End members 6a abut and are clamped to the support column 1.

The back plate 11 is slightly concave towards the column 7 as can be seen most clearly in Fig. 3. A slight recess 19, provided in the surface of the bracket serves to locate a bolt 14 whose function is described below.

The clamping of a tread bracket 2 to the central support column 1 will now be described in detail. The means for attachment comprises a flexible strap 12 preferably made from spring steel, a block 13 and the bolt 14. The shape of the steel strap is generally U-shaped as can be seen in Fig. 3 and comprises a generally arcuate portion 12a, straight side portions 12b and folded-back end portions 12c.

The block 13 has tapering sides which generally correspond in angle to the straight side portions 12b of the strap and has two vertical slots or grooves 15, 16 cut in it which receive respective end portions 12c of the strap 12. The end portions of the strap 12c are folded back such that they extend towards the central column 1 in use, and the vertical slots 15, 16 are similarly angled towards the central support column 1. A horizontal threaded hole passes through the block 13 to receive the bolt 14.

A tread bracket is clamped to the support column 1 as follows. Firstly, the tread bracket 3 is offered up to the support column 1 and held in position e.g. manually, at the desired height at which

- 6 -

it is to be secured. The strap 12 is pushed around the central support column 1, the end portions 12c of the strap being forced apart as they travel over the surface of the column 7. At this stage, 5 the strap will fit loosely around the column 1, and back plate 11. The block 13 is then inserted from above between the straight side portions 12b of the strap 12, with the folded back end portions 12c sliding in the slots 15, 16 in the block 13, 10 and pushed downwardly until the top and bottom surfaces of the block 13 are substantially level with the upper and lower edges of the strap 12. The bolt 14 is then located in recess 19 and then tightened causing the block 13 to be forced away 15 from the back plate 11, and the strap 12 to be tensioned. The tension in the strap 12 will increase as the block 13 and bracket 11 are moved apart. This tension will cause the folded back portions of the strap 12c to jam in the slots and because 20 the slots are angled towards the central support column 1 and the strap 12 is fabricated from very stiff material, clearly it will not be possible for continued tensioning of the strap to cause the folded back end portions 12c to be pulled out of the slots. 25 When sufficient tension has been placed on the strap 12 it will be friction-held on the supporting column 1 and thus prevented from vertical movement. A tread 2 may be attached to the tread bracket 3 either before or after the tread bracket has been secured 30 to the central support column 1.

Clearly, by attaching the tread supports to the central supporting column in this way, the tread supports may be secured to the supporting column at any desired height, and thus the rise 35 between adjacent treads can be selected to suit the dimensions of the building in which the spiral staircase is installed. Further, since there is

no need to pass any of the components of the system over the top of the central supporting column 1, a spiral staircase could be constructed around any supporting column already existing as a part
5 of the structure of a building.

The connection between the tread bracket and the central supporting column 1 should be sufficiently strong to withstand a bending moment of 370 kg at 900 mm as measured from the centre of the supporting
10 column. The extent a of the tread bracket along the underside of the tread may suitably be 547 mm. The plate 11 may suitably be 90 mm deep and constructed from 15 mm thick metal. The block 13 may suitably have a length b of 30 mm and a depth c of 50 mm.
15 The diameter of the central supporting column may be 114 mm. The strap may suitably be equal in width to the depth of the block and have a thickness of 1.625 mm (16 gauge).

In the embodiment described herein, one large
20 bolt is used to force the block 13 away from the plate 11. However, if desired, two smaller bolts may be used, disposed one above the other.

It is not essential that the strap 12 has folded back end portions which are received in
25 grooves in the block 13. The strap may for example be attached to the blocks by means of rivets with or without a key hole fitting.

The block described in the present invention is a one-piece block, having grooves formed therein.
30 However, two blocks may be used which have suitably shaped mating surfaces such that the blocks may be screwed together to engage the folded back end portions 12c of the strap.

Referring now to Figs. 4 and 5, the interconnection
35 between the balusters 4 and the treads 2 will be described. Each tread 3 is provided with nosing or lipping 25 which extends around the entire perimeter

thereof. This lipping has a generally T-shaped channel formed therein as is clearly visible in Fig. 4. The tread may be fabricated from medium density fibre board or plywood, and the lipping
5 may be formed from extruded aluminium. The lipping 25 includes a projecting rib 26 which engages a mating slot cut in the tread whereby the lipping 25 can be firmly secured to the tread 2. A mounting bracket 29 for attaching each baluster 4 to a tread
10 5 comprises two parts 31, 32 cut from an extruded profile and a grub screw 33. A plan view of one of the parts is shown in Fig. 5. Each part has the shape of an elongate "D", in plan, having a semicircular portion merging with a rectangular
15 portion. A circular hole 34 is formed in each of the parts 31, 32 to provide collars which are a sliding fit with the end of a baluster 4. Each mounting bracket part 31, 32 is also provided with a machined slot 35 which is formed in the rectangular
20 portion thereof so that with the parts positioned one above the other the slots, in use, respectively receive one of two engaging portions 36, 37 of the T-shaped channel in the lipping 25 and are then slidable together in the channel. The part
25 31 which is to be disposed uppermost in use is also provided with a tapped hole 38 which receives the grub screw 33.

In order to secure a baluster 4 to a tread 3, the two metal parts 31, 32 are placed one above
30 the other with their respective holes 34 aligned and their respective machined slots 35 facing oppositely. The baluster 4 extends through both collars. The grub screw 33 is partially screwed into the hole in the upper part 31, but not sufficiently
35 for it to extend completely therethrough. The slotted ends of the parts 31, 32 when overlying one another are trapped within the channel of the

lipping 25 but can be slid along the channel.
The grub screw 33 is then turned to force the two
parts 31, 32 apart.

The movement apart of the rectangular portions
5 of the parts 31, 32 will be limited by the channel
in the liping 7, and continued tightening of the
grub screw will cause the collars to diverge and thus
wedge on the baluster 4. Sufficient tightening of the
grub screw will cause the baluster to be friction
10 held in collars of the parts 31, 32 and thus prevented
from vertical movement.

In the embodiment of the invention described
above, the tread and the liping are formed seperately.
However, a tread or combined tread and bracket
15 could be formed having the liping integral therewith.

In the embodiment of the invention shown
in Fig. 4, portions of the liping 27, 28 extend
upwardly and downwardly respectively beyond the
thickness of the tread itself. These extending
20 portions provide a suitable border within which
tread covering material may be placed. For example,
carpet might cover the upper surfaces of the treads,
and some other suitable material such as decorative
hardboard might be used to finish off the lower
25 surfaces.

In addition the surfaces of the extending
portions 27, 28 are specially adapted to provide
an anti-slip edge around the treads making the
staircase safer for persons using it, which edge
30 also prevents wear on the edges of the material
of the tread.

In the embodiment shown in Figure 4 the upwardly
extending portion 27 of the lapping 25 is slightly
deeper than the downwardly extending portion 28.
35 The portion 27 may have a depth of 6 mm and the
portion 28 may have a depth of 4 mm. If it is
desired to use a thinner material on the upper

surfaces of the treads, the treads 3 may be secured to the brackets the other way up, such that the deeper portion 27 extends downwardly. Then the upper surfaces of the treads might be covered with
5 rubber matting, for example, and some suitable finishing material used on the undersides of the treads. Thus, the use of this lipping also adds to the flexibility of the system.

The parts 31, 32 are formed from a continuous
10 length of extruded aluminium cut into suitable lengths, e.g. 10 mm. The slots 35 may then be machined in the cut surfaces thereof and the tapped hole 38 drilled in the parts 31 which are to be disposed uppermost.

15 The parts 31, 32 may suitably have a width d of 30 mm and a lateral extent e of 49 mm. The holes 34 may have a diameter of 22 mm, the outer diameter of the balusters being slightly less than this. The depth f of the T-shaped channel formed
20 in the lipping may be 24 mm.

Clearly, by fixing the balusters 4 to the treads 2 in this way, the length of the baluster is not critical since it may extend below the level of the tread. This is particularly advantageous
25 since it is possible to use balusters which are all identical in length, as shown in Fig. 1. In previous spiral staircases it has been necessary to cut each baluster to the required size, and since there may be two or three balusters attached
30 to the same tread which support a sloping handrail, the configuration of the staircase required a number of different lengths of baluster corresponding to the number of balusters per tread. Of course if the portion of any baluster extending below
35 the tread to which it is attached is likely to be in a dangerous position, for example at head height, where it is possible that someone may walk

into it, the end of the baluster may be trimmed off, either before or after fixing. A plastic cap may be inserted in or over the lower end of each of the balusters which is shaped so as to

5 cover the cut surface thereof, and provide a smooth finish. Depending on the dimensions of the staircase, some of the balusters may be so positioned that the portion extending below one tread is equal

10 so that with treads overlapping the baluster may be attached to two treads. By the method of attachment described, this is easily done.

CLAIMS:

1. A tread mounting bracket or combined mounting bracket and tread for a spiral staircase which is adapted at its inner end to be clamped to a support column by means of a strap engageable around
5 the support column and with the bracket or tread and bracket and tensionable to urge the inner end of the bracket against the column thereby to mount the bracket or bracket and tread to the column.
2. A tread mounting bracket or combined mounting
10 bracket and tread as claimed in claim 1, said strap being U-shaped and connectable to or engageable at its ends with a tensioning block having one or more bolts threadedly mounted therein and engageable with a back plate fixed to or forming part of the
15 mounting bracket.
3. A tread mounting bracket or combined mounting bracket and tread as claimed in claim 2, said strap having folded back end portions adapted to slidably engage grooves in said tensioning block.
- 20 4. A tread mounting bracket as claimed in any preceding claim constructed as a lattice beam formed of metal tube and/or rod suitably bent and welded together and adapted for a tread to be attached thereto.
- 25 5. A combined mounting bracket and tread as claimed in any of claims 1 to 3 constructed from sheet material.
6. A baluster mounting bracket which is adapted to be slidably mounted in a channel or groove provided
30 in the outer edge of a stair tread; said bracket having a collar slidably engageable with a vertical baluster which may then extend through the collar to below the level of the tread, and clamping means for clamping the collar to the baluster.
- 35 7. A baluster mounting bracket as claimed in

claim 6 wherein said bracket includes two parts,
said parts being slidably mountable in said channel
or groove when positioned one above the other,
each part having a collar slidably engageable with
5 the baluster.

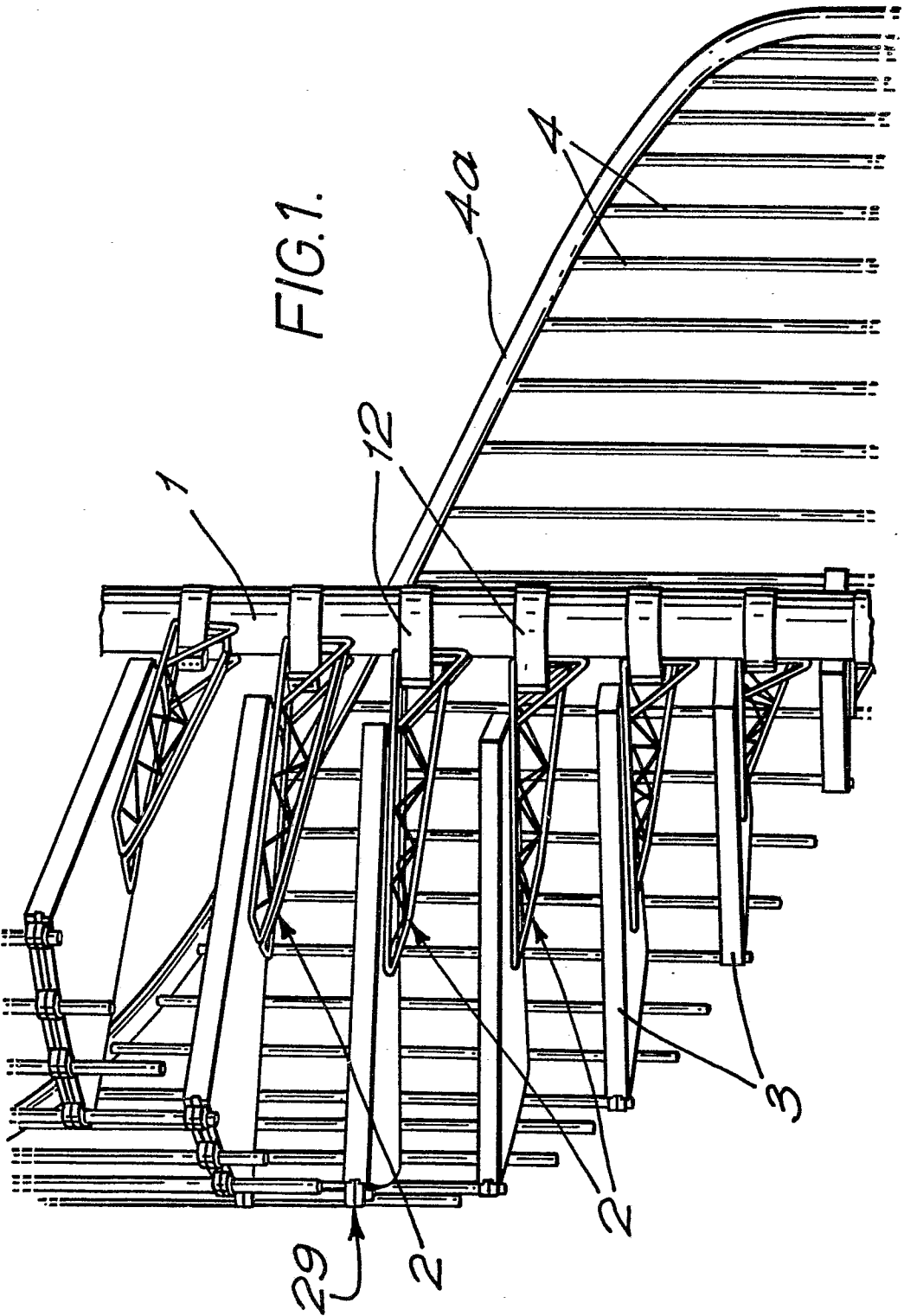
8. A baluster mounting bracket as claimed in
claim 7 wherein said clamping means serves for
forcing said collars apart at a slight angle to
one another thereby to cause them to wedge on the
10 baluster and thus support it vertically.

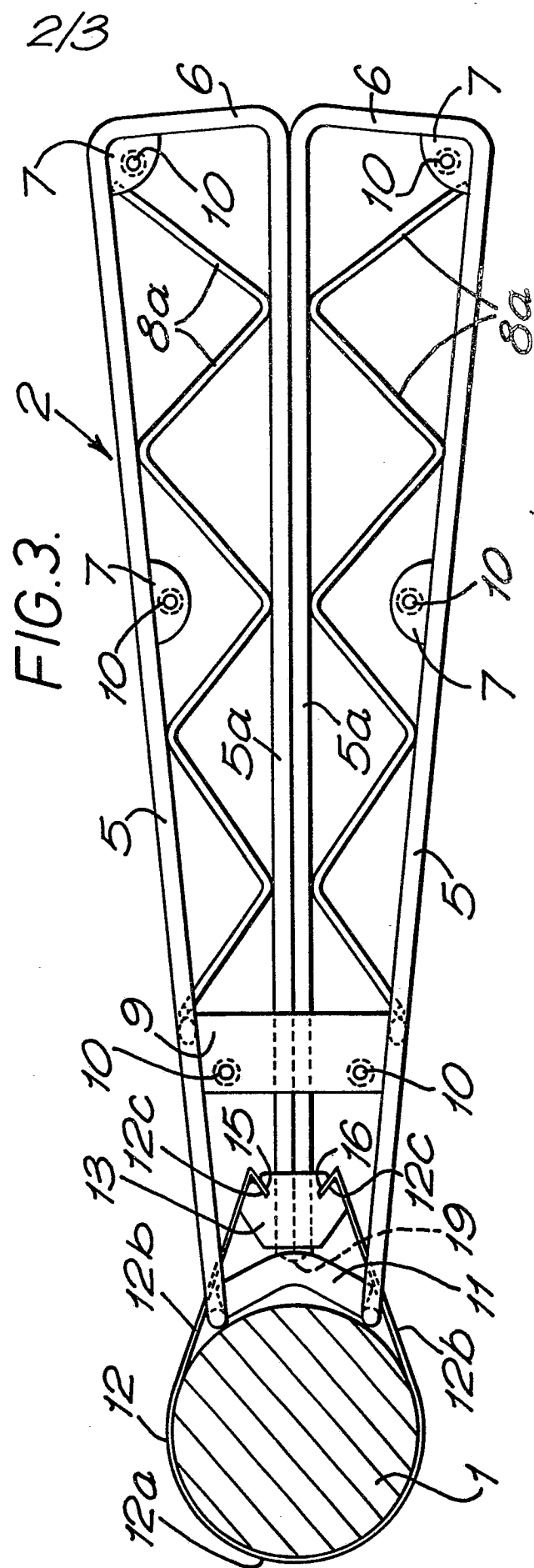
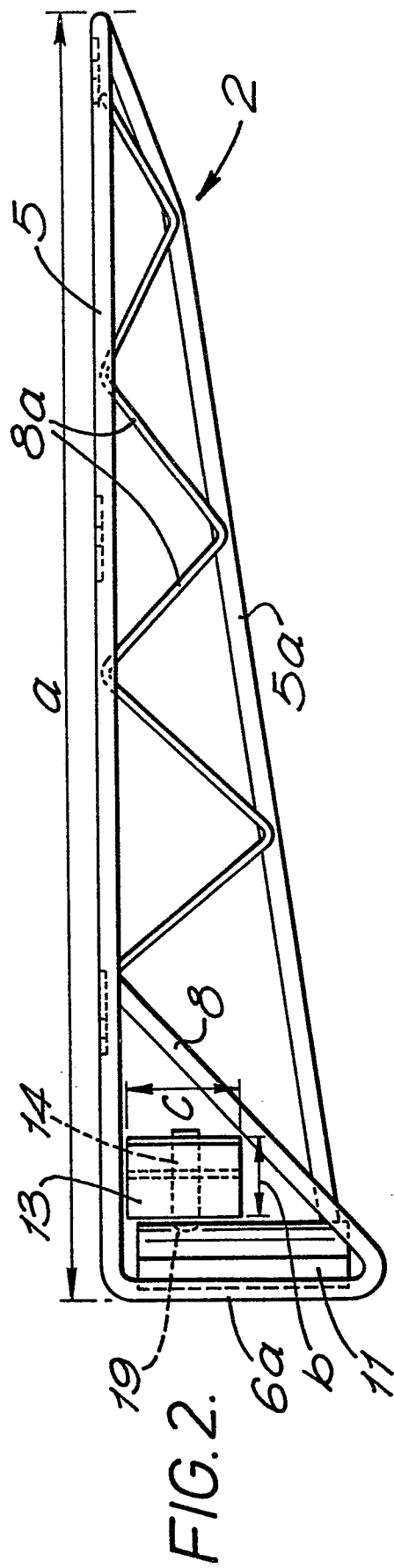
9. A baluster mounting bracket as claimed in
claim 8 wherein said clamping means comprises a
vertically disposed grub screw.

10. A tread/baluster attachment system including
15 a baluster mounting bracket as claimed in any of
claims 6 to 9 and a stair tread provided with a
channel or groove in the outer edge thereof.

11. A tread/baluster attachment system as claimed
in claim 10 wherein said channel or groove is provided
20 in a lip fixed to said tread.

12. A spiral staircase wherein the treads are
mounted to a support column by tread mounting brackets
as claimed in any of claims 1 to 5 and said treads
are connected with vertical balusters by a tread/baluster
25 attachment system as claimed in claim 10 or 11.





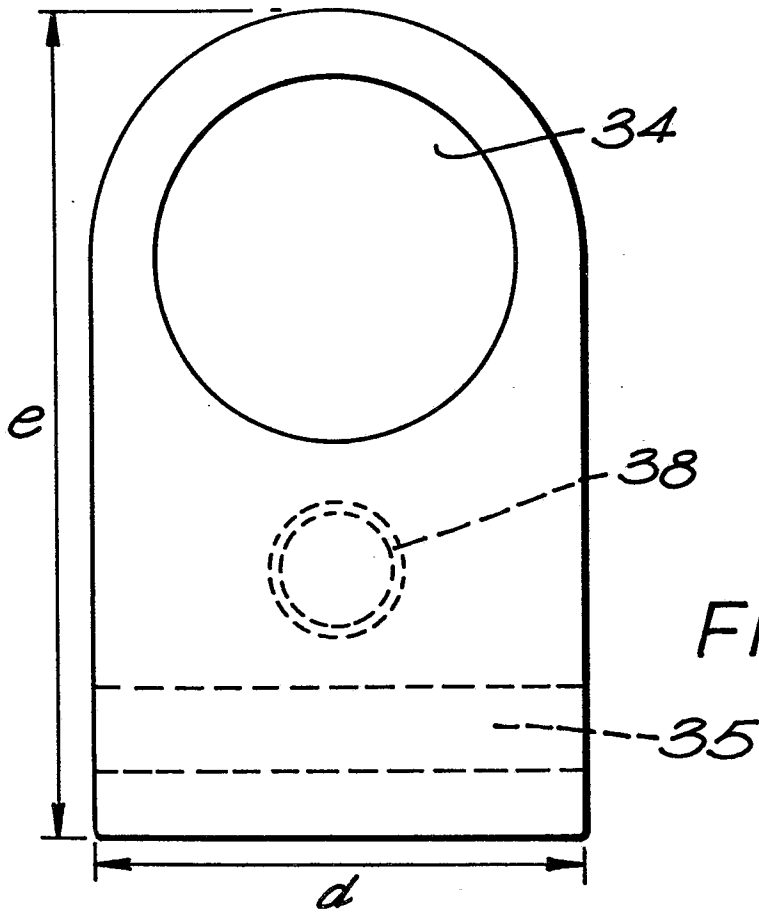
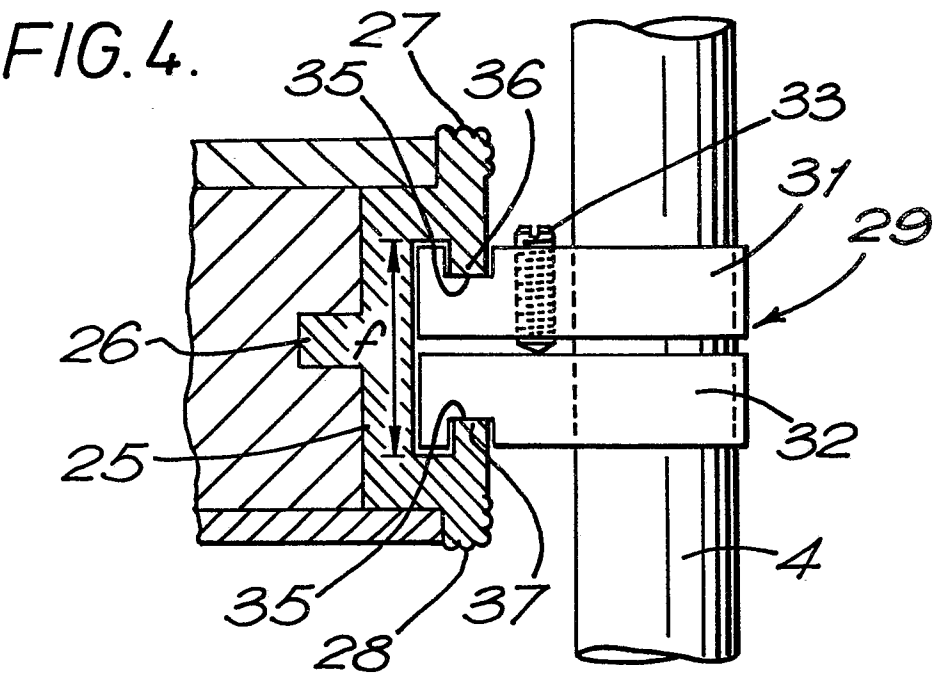


FIG. 5.