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(11)

**EP 1 111 183 A2**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:

**27.06.2001 Bulletin 2001/26**

(51) Int Cl.7: **E06B 9/36**

(21) Application number: **00310846.1**

(22) Date of filing: **06.12.2000**

(84) Designated Contracting States:

**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE TR**

Designated Extension States:

**AL LT LV MK RO SI**

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(30) Priority: **14.12.1999 EP 99204291**

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(54) **Holder for a depending hollow vane**

(57) A holder for suspending a hollow vertical section of an architectural covering, such as a hollow, fabric or plastic louver (3) of a vertical venetian blind (1), from a carrier (11) of a horizontally-extending head rail (5), the holder (13) comprising a vertically-extending, generally cylindrical, male part (27) having an upper portion (25), connected to the carrier (11) and a lower portion (31) and a generally inverted U-shaped, female part (29) having a horizontal top member (43) with a pair of par-

allel, downwardly-extending legs (45) on opposite sides and a downwardly-extending hole (47) through it; the facing surfaces of the legs (45) each having a first detent (49) adjacent the bottom of the legs. The first detents (49) extend towards each other and are adapted to be inserted through apertures (9) in opposite sides of the hollow vertical section (3) and the lower portion (31) of the male part (27) is inserted in, and force fit within, the hole (47) of the female part (29).

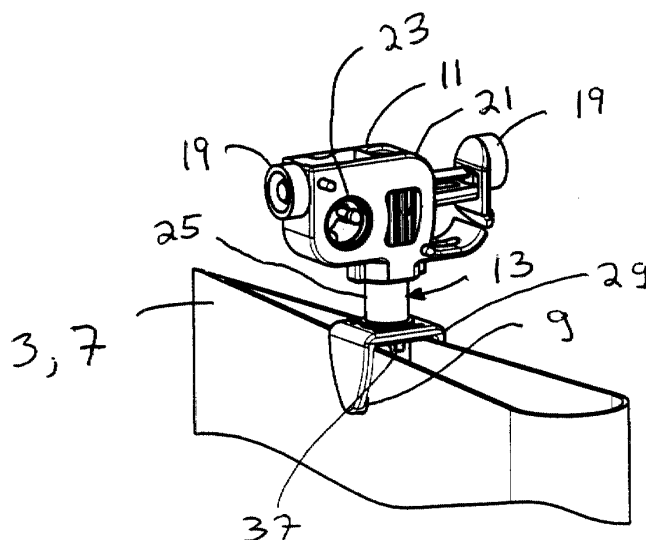


FIG. 2

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## Description

**[0001]** This invention relates to a holder for a hollow vertical section of an architectural covering, such as a tubular flexible material for covering an architectural opening, like a window or door. This invention particularly relates to a holder for vertically arranged, hollow fabric louvers of a vertical venetian blind.

**[0002]** Vertical venetian blinds have generally been provided with a longitudinally-and horizontally-extending head rail, in which there have been several carriers that can be moved along the length of the head rail. Each carrier has typically supported a vertically-extending louver in such a manner that the consumer could move the blind's louvers along the length of the head rail and also could rotate the louvers about their vertical axes. For example, carriers have each included a drive hub of a gear wheel driven by a worm gear, and the drive hub has supported a depending louver holder that has been adapted to support securely the top portions of a louver while the carrier has been moving and turning the holder and the louver. See US 4 267 875.

**[0003]** Different types of louver holders have been provided in carriers for vertical blinds with solid louvers. For example, holders have held upper marginal portions of louvers: between their pairs of downwardly-extending pinching fingers (DE-Y 85 23 104, DE-A1 27 15 018 and US 4 869 309); and also on hooks that are provided on their downwardly-extending fingers and that extend through apertures in the upper marginal portions of the louvers (US 4 335 775).

**[0004]** However, such louver holders have been unsatisfactory for use with hollow vertical louvers as described in US 5 797 442. This is because such holders have tended to squeeze together the upper marginal portions of hollow vertical louvers and, for this reason, have not maintained the tubular shape of the hollow louvers over their entire height. For this reason, the use of a hanger plate, adhesively bonded to one side of the interior of such a hollow vane has been proposed in US 5 797 442, but this has not been an entirely satisfactory solution.

**[0005]** In accordance with this invention, a holder is provided for suspending a hollow vertical section of an architectural covering, such as a hollow, fabric or plastic louver of a vertical venetian blind, from a carrier of a horizontally-extending head rail; the holder comprising:

- a vertically-extending, generally cylindrical, male part having an upper portion, connected to the carrier, and a lower portion; and
- a generally inverted U-shaped, female part having a horizontal top member with a pair of parallel, downwardly-extending legs on opposite sides and a downwardly-extending hole through it; the facing surfaces of the legs each having a first detent adjacent the bottom of the legs; the first detents extending towards each other and being adapted to be in-

serted through apertures in opposite sides of the hollow vertical section; and

- wherein the lower portion of the male part is inserted in, and force fit within, the hole of the female part.

With this holder, the first detents of its female part securely hold the hollow vertical section by the apertures in the opposite sides thereof, and the male part of the holder securely holds the female part to a carrier of the head rail.

**[0006]** Advantageously, the top member of the female part is generally rectangular and generally planar, and it is especially advantageous that the hole in the top member is rectangular.

**[0007]** Also advantageously, the lower portion of the male part has:

- a radially-extending shoulder with a lower surface that extends circumferentially and horizontally around the top of the lower portion; and
- a pair of parallel planar vertical guide surfaces that are below the shoulder and on circumferentially opposite sides of the lower portion; each guide surface having, near its top, adjacent the shoulder and on circumferentially opposite sides of the lower portion, a radially-extending second detent; and upper surfaces of the second detents being horizontally coplanar.

In this regard, it is especially advantageous that the guide surfaces, on circumferentially opposite sides of the lower portion of the male part, are a pair of ramp surfaces which extend downwardly from between the upper surfaces of the second detents to the bottom of the lower portion and which curve inwardly of the lower portion as the ramp surfaces extend downwardly; and wherein the bottom portions of the ramp surfaces are parallel vertical surfaces. It is particularly advantageous that the distance between the free ends of the first detents of the female part is no more than about the distance between the bottom portions of the ramp surfaces and the bottom portions contact the free ends of the first detents when the lower portion of the male part is force fit within the hole of the female part, so as to prevent an aperture of the of the hollow vertical section from slipping off a first detent.

**[0008]** Further advantageously, the hole in the top member of the female part has:

- a width, measured between the legs, that is no less than the width, measured parallel to the guide surfaces, of a radially outer surface of the lower portion of the male part, below the lower surface of the shoulder; and
- a length, parallel to the legs, that is no more than the radial distance, measured transverse to the guide surfaces, between radially outer surfaces of the second detents.

In this regard, is particularly advantageous that the vertical thickness of the top member of the female part, about its hole, is no more than, advantageously approximately the same as, the vertical spacing between the lower surface of the shoulder and the upper surfaces of the first detents of the male part, whereby the lower portion of the male part can be urged downwardly into the hole in the top member, so that the top member is securely held, in the assembled holder, between the upper surfaces of the second detents and the lower surface of the shoulder.

**[0009]** It is still further advantageous that each first detent has a generally cylindrical configuration with: i) its axis being normal to the leg, to which it is attached; a smooth outer surface; and iii) its outer diameter being less than, advantageously slightly less than, the diameter of one of the apertures, whereby the opposite sides of the hollow vertical section can slide easily apart on the pair of first detents after the first detents have been inserted in the apertures.

**[0010]** It is yet further advantageous that the hollow vertical section of the architectural covering is a deformable, generally tubular vane, especially a vane having three-dimensional and torsional stability along its length, particularly a vane made of a fabric having diagonal dimensional stability.

**[0011]** It is also advantageous that the apertures in the hollow vertical section are in opposite sides of an upper marginal portion of the hollow vertical section.

**[0012]** In accordance with other aspects of the invention, a head rail for an architectural covering, such as a vertical blind, and an architectural covering are provided, comprising the holder, just described.

**[0013]** Further aspects of the invention will be apparent from the detailed description below of a particular embodiment and the drawings thereof, in which:

- Figure 1 is a perspective view of a vertical venetian blind with a head rail that supports a plurality of hollow vertical louvers by means of a plurality of holders of this invention;
- Figure 2 is a perspective view of a carrier of the head rail of Figure 1, supporting a single louver with a two-part holder of the invention;
- Figure 3 is a perspective, partially exploded view of the carrier, holder and louver of Figure 2 with the parts of the holder disengaged from each other and from the louver;
- Figure 4 is a longitudinal end view of the carrier, holder and louver of Figure 2, with portions of the louver and holder cut away to show how the holder is secured to the louver, so that the louver maintains its tubular shape; and
- Figure 5 is a lateral view of the carrier, holder and louver of Figure 2, with portions of the louver and holder cut away to show how the holder is secured to the louver.

**[0014]** Figure 1 shows a vertical blind 1 having a plurality of hollow vertically-extending louvers 3 suspended from its longitudinally- and horizontally-extending head rail 5. The louvers 3, are deformable, generally tubular, plastic or fabric vanes, preferably vanes such as are disclosed in US 5 797 442. In this regard, each louver 3 preferably has three-dimensional and torsional stability along its length and is preferably made of a fabric having diagonal dimensional stability.

**[0015]** In opposite lateral sides of the upper marginal portion 7 of each louver 3, as shown in Figure 2, is a pair of apertures 9 which can be reinforced in a conventional manner against tearing. In this regard, the apertures are preferably reinforced by a thin (e.g., 0.25mm) strip (not shown) of plastic, such as polyvinyl chloride, adhesively attached to the interior of the upper marginal portion 7 of each louver 3. As described in detail below, each louver 3 is securely suspended vertically from one of a plurality of conventional carriers, generally 11, within the head rail 5, by means of a vertically-extending two-part holder, generally 13, of this invention. The holder 13 is attached to the carrier 11 and to the apertures 9 of the louver 3 as shown in Figures 2-5.

**[0016]** The head rail 5, shown in Figure 1, can be any conventional head rail for a vertical blind, such as the head rail generally described in US patent 4 267 875. In this regard, the head rail 5 provides controlled longitudinal movement of the carriers 11 and the hollow vertical louvers 3 along the length of the head rail and controlled rotation of the louvers 3 about their vertical axes. One longitudinal side of the head rail is provided with a conventional pull cord 15 that is connected in a conventional manner to the carriers 11 for moving them longitudinally along the length of the head rail 5. The one longitudinal side of the head rail 5 is also provided with a conventional bead chain 17 for rotating a conventional, longitudinally-extending drive shaft (not shown) of the head rail which can rotate a conventional worm gear and its worm (not shown) within each carrier 11 so as to rotate the holders 13 and the louvers 3.

**[0017]** As shown in Figures 2-5, each carrier 11 in the head rail 5 carries a pair of rollers 19 on opposite lateral sides of its housing 21, so that the carriers can roll on longitudinally-extending tracks (not shown) on laterally opposite sides of the interior of the head rail 5, along its length, in response to movement of the pull cord 15. The housing 21 of each carrier 11 has a pair of openings 23 on its longitudinally opposite sides, through which the drive shaft (not shown) of the head rail 5 passes to drivingly engage the worm gear (not shown) within the housing 21, so that rotation of the drive shaft causes rotation of the worm gear and thereby rotation of a conventional drive gear (not shown) within the housing. A lower portion of the drive gear includes a hollow vertically-extending hub (not shown), into which an upper portion 25 of a vertically-extending, generally cylindrical, male part, generally 27, of the two-part holder 13 of this invention can be inserted, so that the carrier 11 supports the hold-

er 13. The upper portion 25 of the male part 27 is a conventional upper part of a vane holder for a vertical blind as described, for example in US 4 335 775.

**[0018]** As also shown in Figures 2-5, the holder 13 has a generally inverted U-shaped, female part, generally 29, into which a vertically-extending, lower portion 31 of the male part 27 can be inserted to hold securely a louver 3.

**[0019]** The lower portion 31 of the male part 27 has a radially-extending shoulder 33 with a lower surface that extends circumferentially and horizontally around the top of the lower portion 31. A pair of parallel planar vertical guide surfaces 35 are below the shoulder 33, on circumferentially opposite sides of the lower portion 31 of the male part 27. On each guide surface 35, near its top, adjacent the shoulder 33 and on circumferentially opposite sides of the lower male part portion 31, is a radially-extending first detent 37, and upper surfaces of the first detents 37 are horizontally coplanar. Between the guide surfaces 35, on circumferentially opposite sides of the lower male part portion 31, are a pair of ramp surfaces 39 which curve inwardly of the lower male part portion as the ramp surfaces extend downwardly from between the upper surfaces of the first detents 37 towards the bottom of the lower male part portion 31. Near their bottom, the ramp surfaces 39 become parallel vertical surfaces 41.

**[0020]** The female part 29 of the holder 13 has a generally rectangular, horizontal, generally planar, top member 43 and a pair of parallel, downwardly-extending legs 45 on opposite sides of the top member. The top member 43 has a downwardly-extending, preferably rectangular, hole 47 through it. The hole 47 has a width (measured between the legs 45) that is no less than, and preferably is greater than, the diameter (measured parallel to the guide surfaces 35) of the radially outer surface of the lower portion 31 of the male part 27, below the lower surface of the shoulder 33. The hole 47 also has a length that is about the same as, or slightly less than, the radial distance (measured transverse to the guide surfaces 35) between the radially outer surfaces of the first detents 37 on the male part. Furthermore, the vertical thickness of the top member 43, about its hole 47, is no more than, and is preferably approximately the same as, the vertical spacing between the lower surface of the shoulder 33 and the upper surfaces of the detents 37. As a result, the lower portion 31 of the male part 27 can be urged downwardly into, and thereby force fit within, the hole 47 in the top member 43 of the female part 29, so that the top member 43 of the female part is securely held, in the assembled holder 13 of this invention, between the upper surfaces of the first detents 37 and the lower surface of the shoulder 33 of the male part.

**[0021]** The facing surfaces of the legs 45 of the female part 29 each have a second detent 49, adjacent the bottom of the legs. The second detents 49 extend horizontally towards each other and are adapted to be inserted through the apertures 9 in one of the louvers 3, into the

louver's hollow interior, to hold the louver on the holder 13 and thereby on a carrier 11 and the head rail 5. Preferably, each second detent 49 has a generally cylindrical configuration, with: i) its axis normal to the leg 45, to which it is attached; ii) a smooth outer surface; and iii) its outer diameter less than, preferably only slightly less than, the diameter of one of the apertures 9. Thereby, the opposite sides of the upper marginal portion 7 of each louver 3 can slide easily apart on the pair of second detents 49 of the female part 29 of each holder 13 after the second detents have been inserted in the apertures. In this regard, the distance between the facing free ends of the second detents 49 is sufficient to allow opposite sides of the upper marginal portion 7 of a louver 3, with its pair of apertures 9, to be pressed together, so that such opposite sides of the louver 3 can then be inserted between the free ends of the second detents until such free ends can pass freely through the apertures 9 into the hollow interior of the louver and such opposite sides of the louver 3 can then be released and allowed to return resiliently to their inherent, generally tubular configuration. However, the distance between the free ends of the second detents 49 is preferably no more than about the distance between the parallel vertical surfaces 41 at the bottom of the ramp surfaces 39 of the male part 27. This allows the parallel vertical surfaces to pass downwardly between the free ends of the second detents 49 when the lower portion 31 of the male part 27 is urged downwardly into, and thereby force fit within, the hole 47 in the top member 43 of the female part 29. As a result, the parallel vertical surfaces 41 will fill the space between the free ends of the second detents 49 to prevent one or both of the apertures 9 of a louver 3 from becoming accidentally disengaged from the second detents of the assembled holder 13.

**[0022]** The carriers 11 and holders 13 can be made of conventional (e.g., plastic) materials. However, it is essential that the plastic of the male part 27 and/or female part 29 of the holder 13 be sufficiently flexible and resilient, so that the lower portion 31 of the male part can be force fit within the hole 47 in the top member 43 of the female part to hold securely the top member between the first detents 37 and the shoulder 33 of the male part and thereby keep the two-part holder 13 together when, in use, it holds a depending louver 3.

**[0023]** The holder 13 can be used to hold securely a hollow louver 3 from a carrier 11 of the head rail 5 in a relatively simple manner. The upper marginal portion 7 of the louver 3 can be squeezed together (against the inherent resilience of the louver), so that its apertures 9 are brought together. The free ends of the second detents 49 of the female part 29 can then be inserted through the apertures 9. Then, the upper marginal portion 7 of the louver 3 can be released, so that it elastically becomes generally tubular again and its apertures 9 can slide away from each other on the second detents 49. The lower portion 31 of the male part 27 can then be pushed downwardly into the hole 47 of the top member

43 of the female part 29 to force fit the two parts together in the assembled holder 13. As a result, the parallel vertical surfaces 41 of the male part 27 contact the free ends of the second detents 49 of the female part 29 and thereby prevent the apertures 9 of the louver 3 from slipping off the second detents of the female part.

**[0024]** This invention is, of course, not limited to the above-described embodiments which may be modified without departing from the scope of the invention or sacrificing all of its advantages. In this regard, the terms in the foregoing description and the following claims, such as "longitudinal", "lateral", "above", "below", "top", "bottom", "width", "length", "vertical", "horizontal", "upwardly" and "downwardly", have been used only as relative terms to describe the relationships of the various elements of the holder of the invention for a hollow vertical section of an architectural covering. For example, the continuous radially-extending shoulder 33 could be replaced by a plurality of segments of the shoulder, circumferentially spaced apart around the top of the lower portion 31 of the male part 27 of the holder 13.

## Claims

1. A holder for suspending a hollow vertical section of an architectural covering, such as a hollow, fabric or plastic louver (3) of a vertical venetian blind (1), from a carrier (11) of a horizontally-extending head rail (5); the holder (13) comprising:

- a vertically-extending, generally cylindrical, male part (27) having an upper portion (25), connected to the carrier (11), and a lower portion (31); and
- a generally inverted U-shaped, female part (29) having a horizontal top member (43) with a pair of parallel, downwardly-extending legs (45) on opposite sides and a downwardly-extending hole (47) through it; the facing surfaces of the legs (45) each having a first detent (49) adjacent the bottom of the legs; the first detents (49) extending towards each other and being adapted to be inserted through apertures (9) in opposite sides of the hollow vertical section (3); and
- wherein the lower portion (31) of the male part (27) is inserted in, and force fit within, the hole (47) of the female part (29).

2. The holder of claim 1 wherein the top member (43) of the female part (29) is generally rectangular and generally planar.

3. The holder of claim 1 wherein the hole (47) in the top member (43) is rectangular.

4. The holder of any one of claims 1-3 wherein the low-

er portion (31) of the male part (27) has:

- a radially-extending shoulder (33) with a lower surface that extends circumferentially and horizontally around the top of the lower portion; and
- a pair of parallel planar vertical guide surfaces (35) that are below the shoulder (33) and on circumferentially opposite sides of the lower portion (31); each guide surface (35) having, near its top, adjacent the shoulder (33) and on circumferentially opposite sides of the lower portion (31), a radially-extending second detent (37); and upper surfaces of the second detents (37) being horizontally coplanar.

5. The holder of claim 4 wherein, between the guide surfaces (35), on circumferentially opposite sides of the lower portion (31) of the male part (27), are a pair of ramp surfaces (39) which extend downwardly from between the upper surfaces of the second detents (37) to the bottom of the lower portion (31) and which curve inwardly of the lower portion as the ramp surfaces extend downwardly; and wherein the bottom portions (41) of the ramp surfaces (39) are parallel vertical surfaces.

6. The holder of claim 5 wherein the distance between the free ends of the first detents (49) of the female part (29) is no more than about the distance between the bottom portions (41) of the ramp surfaces (39) and the bottom portions (41) contact the free ends of the first detents when the lower portion (31) of the male part (27) is force fit within the hole (47) of the female part (29), so as to prevent an aperture (9) of the hollow vertical section (3) from slipping off a first detent.

7. The holder of any one of claim 4-6 wherein the hole (47) in the top member (43) of the female part (29) has:

- a width, measured between the legs (45), that is that is no less than the diameter, measured parallel to the guide surfaces (35), of a radially outer surface of the lower portion (31) of the male part (27), below the lower surface of the shoulder (33); and
- a length that is no more than the radial distance, measured transverse to the guide surfaces (35), between radially outer surfaces of the second detents (37).

8. The holder of claim 7 wherein the vertical thickness of the top member (43) of the female part (29), about its hole (47), is no more than the vertical spacing between the lower surface of the shoulder (33) and the upper surfaces of the second detents (37) of the

male part (27), whereby the lower portion (31) of the male part can be urged downwardly into the hole in the top member, so that the top member is securely held, in the assembled holder (13), between the upper surfaces of the second detents (37) and the lower surface of the shoulder (33). 5

9. The holder of claim 8 wherein the vertical thickness of the top member (43), about its hole (47), is approximately the same as the vertical spacing between the lower surface of the shoulder (33) and the upper surfaces of the second detents (37). 10

10. The holder of any one of claim 1-9 wherein each first detent (49) has a generally cylindrical configuration with: i) its axis being normal to the leg (45), to which it is attached; ii) a smooth outer surface; and iii) its outer diameter being less, preferably only slightly less, than the diameter of one of the apertures (9), whereby the opposite sides of the hollow vertical section (3) can slide easily apart on the pair of first detents (49) after the first detents have been inserted in the apertures (9). 15 20

11. The holder of any one of claim 1-10 wherein the hollow vertical section (3) of the architectural covering (1) is a deformable, generally tubular vane 25

12. The holder of claim 11 wherein the vane has three-dimensional and torsional stability along its length. 30

13. The holder of claim 12 wherein the vane is made of a fabric having diagonal dimensional stability.

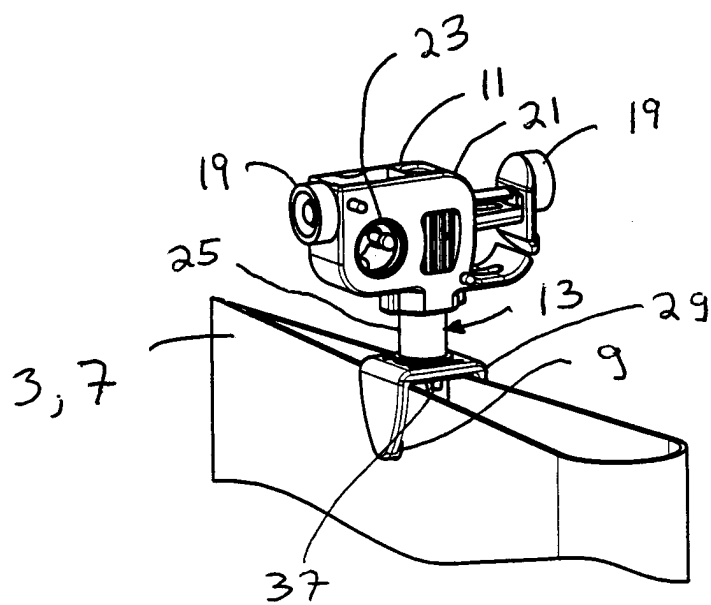
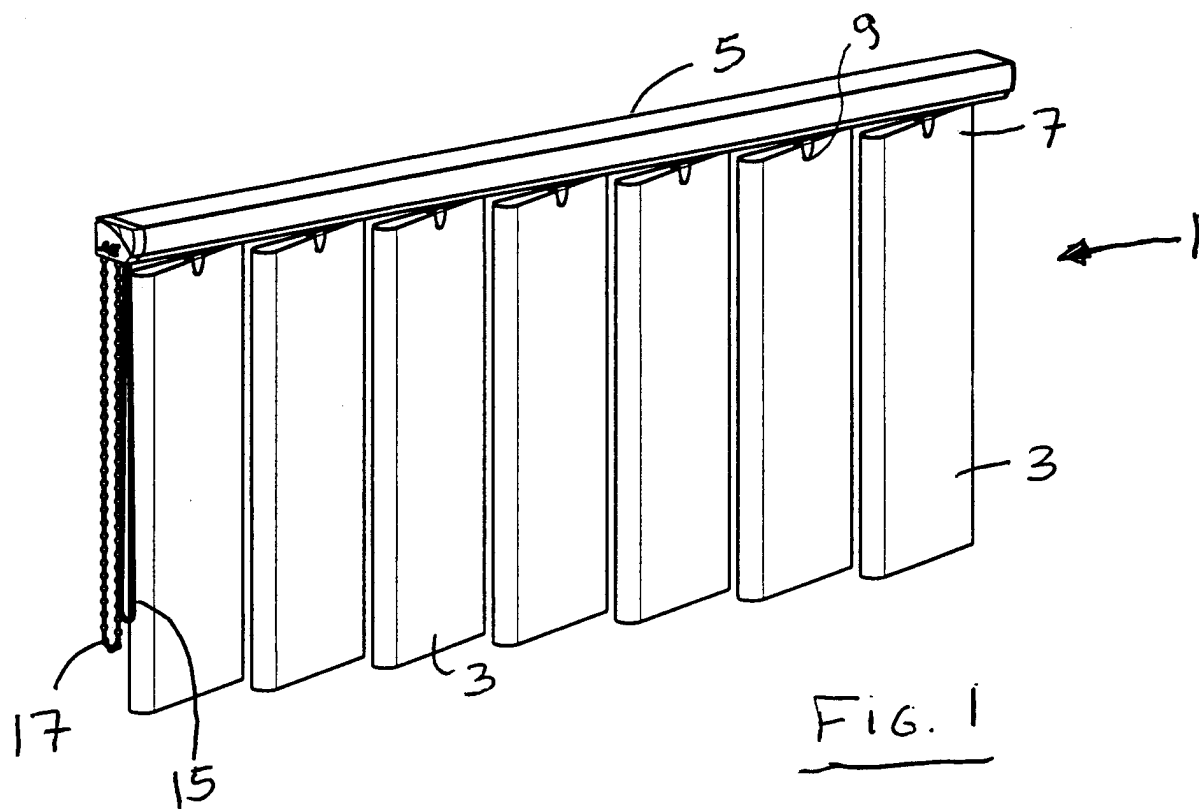
14. The holder of any one of claim 1-13 wherein the apertures (9) are in opposite sides of an upper marginal portion (7) of the hollow vertical section (3). 35

15. A head rail for an architectural covering, such as a vertical blind, comprising the holder (13) of any one of claims 1-14. 40

16. An architectural covering, such as a vertical blind, comprising the holder (13) of any one of claims 1-14. 45

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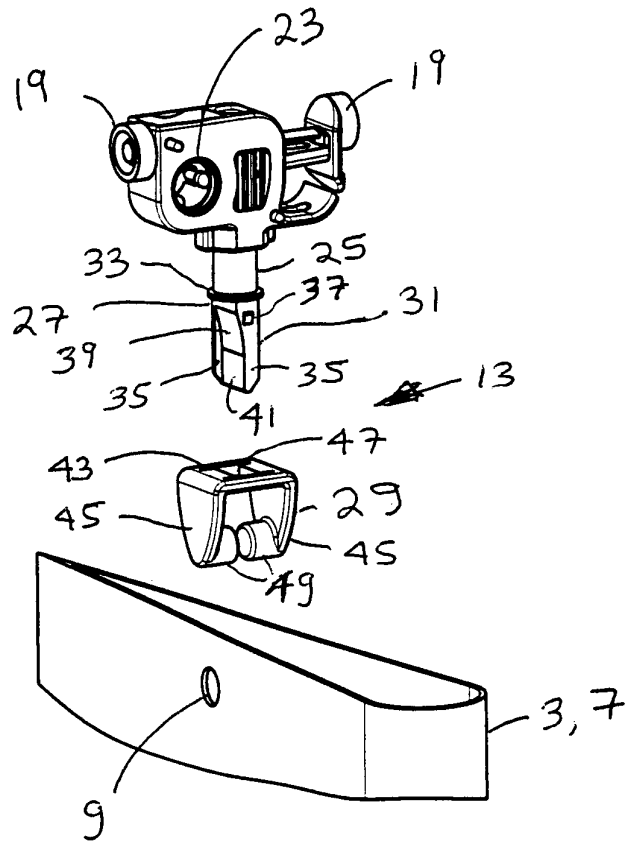


FIG. 3

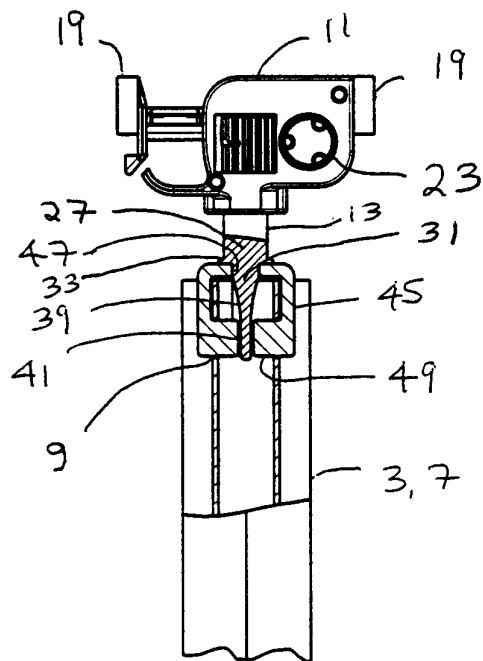


FIG. 4



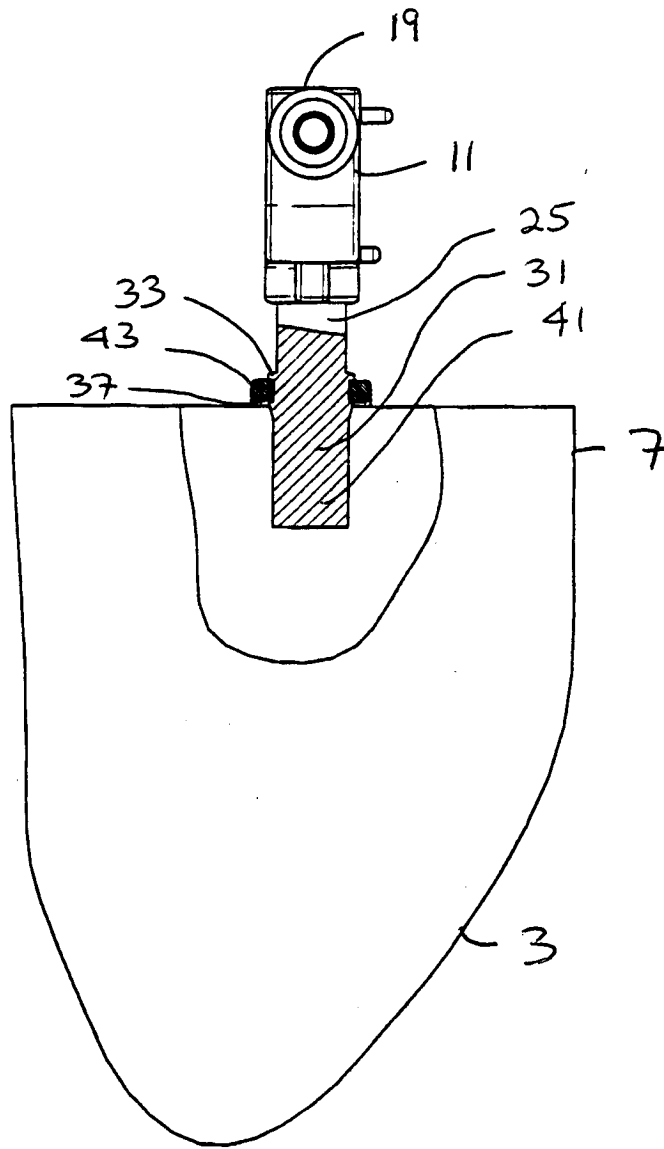


FIG. 5