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(54) **A flush-mounted shelf support for supporting a shelf of a piece of furniture and shelf comprising said device**

(57) Herein is described a flush-mounted shelf support (10) for supporting a shelf (12) of a piece of furniture, configured to be housed at a lateral sidewall (12a) of the shelf (12) and comprising: a containment casing (14); a pin (16) axially slidable in a respective sliding seat (18) formed in the casing (14) between an operative position in which the pin (16) projects at least partially from a front wall (14a) of the casing (14) and out of the lateral sidewall (12a) of the shelf (12), and a non-operative position in which the pin (16) is retracted in the seat (18) so as to not project from the lateral sidewall (12a) of the shelf (12); a spring (20) active on the pin (16) to push the pin into

the operative position and at least one holding element (22a) configured to unstably hold the pin (16) in the non-operative position.

The spring (20) is housed in a respective sliding seat (22) structurally distinct from and positioned alongside the sliding seat (18) of the pin (16) and the element (22a) for holding the pin (16) is constituted by a portion (22a) of the sliding seat (22) of the spring (20) distal with respect to the front wall (14a) of the casing (14) and configured to cooperate with the spring (20) to prevent the spring (20) from exerting an axial thrust on the pin (16).

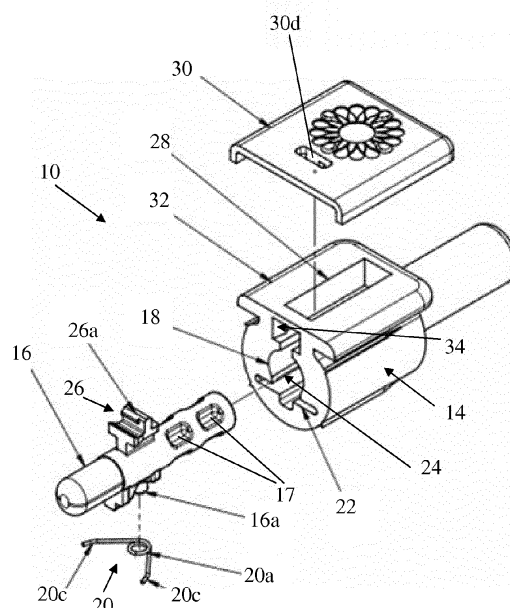


Fig. 2

Description

Field of the invention

[0001] The present invention relates to a flush-mounted shelf support for supporting a shelf of a piece of furniture, such as for example a wooden shelf.

Related art

[0002] Shelf supports are known for supporting shelves in a piece of furniture which devices are configured to be inserted into suitable seats provided at the lateral sidewalls of the shelves.

[0003] Such shelf supports are provided with respective pins elastically projecting from the side walls of the shelves in order to be inserted into corresponding holes formed in vertical walls of the piece of furniture.

[0004] These shelf supports are of the so-called "flush-mounted" type, in the sense that they are provided with construction features capable of allowing the pin to maintain two positions:

- a first operative position in which a front part of the pin projects out of the lateral sidewall of the shelf, so as to be inserted into the holes of the vertical walls of the piece of furniture, and
- a second unstable non-operative or rest position in which the pin is retracted - i.e. "flushed" - in the device and does not project out of lateral the sidewall of the shelf so as to allow a disassembling of the latter.

[0005] In order to obtain this functionality, a first device of known type described in EP 1228721 comprises:

- a helical spring for exerting an axial thrust, partially positioned in a respective housing seat formed coaxially and at a rear part of a sliding seat of the pin and partially in a blind hole coaxially formed in the pin, the helical spring being active on the pin to push the same into the aforementioned first operative position, and
- holding elements configured to unstably hold the pin in the non-operative position and constituted by elastic fins which cooperate in abutting relationship with suitable protrusions formed in the sidewall of the pin.

[0006] In this way, in order to displace the pin towards or away from the operative position it is necessary to overcome the elastic resistance of the elements for unstably holding the pin (the elastic fins), which operation is manually performed by moving a driving element, which laterally projects from the pin and which slides in a groove of the device which is open on a lateral face thereof to allow a driving of the pin between said positions.

[0007] In a further support of known type described in

EP 1454565 the aforementioned functionality is obtained with a similar helical spring exerting an axial thrust (housed in a respective housing seat formed coaxially and at a rear part of the sliding seat of the pin and active thereon to push the pin into the aforementioned first operative position) and with holding elements configured to unstably hold the pin in the non-operative position of a different kind, in this case constituted by a pair of protrusions extending in a guiding and sliding groove of the driving element of the pin, which protrusions stop the free sliding of the driving element and hence of the pin.

[0008] In order to move the pin towards or away from the operative position, it is necessary to manually move the driving element so as to overcome the elastic resistance of the elements for unstably holding the pin (the protrusions interfering with the driving element itself).

Summary of the invention

[0009] The Applicant observed that the aforementioned shelf supports of known type possess several drawbacks which have not been sufficiently addressed up to date.

[0010] As a matter of fact, the structure of the aforementioned supports of known type which - due to cost and weight reasons - are substantially entirely made of plastic materials (except, in some cases, for the pin or parts thereof) is quite complicated to be manufactured by moulding since it is necessary to provide complex and costly moulds which also require considerable costs for the maintenance of the moulding equipment.

[0011] Actually, the use - on the pin or on the sidewalls of the guiding and sliding groove of the driving element - of protrusions which are required to have an accurate calibrated interferences, neither too high (which would hamper the projection of the pin towards the operative position) nor too low and thus ineffective (which would jeopardise or even prevent an unstable holding of the pin in the non-operative position), requires a suitable configuration of the moulds and of the moulding equipment which makes expensive the manufacturing and maintenance of the moulding equipment.

[0012] The known structures of shelf supports are therefore not fully satisfactory from this point of view given that the market requires that such supports should have a cost as low as possible.

[0013] In addition, in order to be adaptable to shelves having a low thickness, the support should have a size as low as possible, a requirement which prevents the achievement of elastic fins and protrusions provided with the desired requirements of robustness and of both wear resistance and breakage resistance consequent to the friction between parts caused by repeated operations on the device.

[0014] Thus, the Applicant perceived the possibility of at least partially overcoming the aforementioned drawbacks and, more in detail, the possibility of providing a flush-mounted shelf support for supporting a shelf of a

piece of furniture that is particularly reliable, robust, inexpensive and easy to drive and having at the same time improved characteristics of robustness and wear resistance and breakage resistance consequent to repeated operations on the parts constituting the device and, this, by intervening on the configuration and on the positioning of the elements for unstably holding the pin in the non-operative position by making these elements no longer directly acting on the pin but by making them acting on the spring exerting an axial thrust on the pin.

[0015] More particularly, according to a first aspect, the present invention relates to a flush-mounted shelf support for supporting a shelf of a piece of furniture, said support being configured to be housed at a lateral side-wall of the shelf and comprising:

- a containment casing;
- a pin axially sliding in a respective sliding seat formed in said casing between an operative position in which the pin projects at least partially from a front wall of the casing and out of the lateral sidewall of the shelf, and a non-operative position in which the pin is retracted in the seat so as not to project from the lateral sidewall of the shelf;
- a spring active on the pin to push the pin into the operative position;
- at least one holding element configured to unstably hold the pin in the non-operative position,

which is characterised in that said spring is housed in a respective sliding seat structurally distinct from and positioned alongside said sliding seat of the pin and in that said at least one holding element of the pin in the non-operative position is constituted by a portion of the sliding seat of the spring distal with respect to said front wall of the casing and configured to cooperate with the spring to prevent the spring from exerting an axial thrust on the pin.

[0016] Advantageously, the shelf support of the present invention is robust and extremely reliable, without any noticeable deterioration of performance over time.

[0017] As a matter of fact, the configuration and position of the elements configured to unstably hold the pin in the non-operative position, which elements are in this case constituted by the distal portion of the sliding seat of the spring, allow to avoid the use of protrusions employed in the prior art and which should be obtained in an accurate manner so as to have accurate calibrated interferences but which are also inevitably subjected to a rapid wear and to a frequent breakage, in particular in case of repeated assembling and disassembling operations of the shelves.

[0018] Accordingly, the shelf support of the present invention and in particular its containment casing, may be

advantageously obtained by moulding a plastic material, using a mould and a moulding equipment having production, operating and maintenance costs lower than those used for the shelf supports of the prior art.

[0019] Furthermore, the shelf support of the present invention has the advantage of having a greater compactness with respect to the supports of the prior art. The sliding seat of the pin, in fact, may have a length smaller than the length of the supports of the prior art, given that the spring is no longer housed rearwardly and coaxially to the pin, but it is housed in a suitable sliding seat structurally distinct from and positioned alongside the sliding seat of the pin.

[0020] In addition, the shelf support of the present invention has the advantage of being extremely easy and comfortable to drive.

[0021] Preferred features of the shelf support according to the invention are the following.

[0022] In a preferred embodiment, the aforementioned spring acting on the pin is a torsion spring.

[0023] Advantageously, the torsion spring allows to exert an adequate axial thrust force on the pin even though the spring has a reduced size and a low cost related to the limited use of material.

[0024] Preferably, the torsion spring is associated to a support element laterally projecting from the pin and extending at least in part in the sliding seat of the spring.

[0025] Preferably, a guiding and sliding channel of the support element of the torsion spring is formed between the sliding seat of the pin and the sliding seat of the spring.

[0026] In this way, it is advantageously possible to simultaneously guide the sliding of both the pin and the spring within the support under the action of the axial thrust imparted to the pin by the spring itself.

[0027] In a preferred embodiment, the torsion spring comprises a central portion formed by a spirally wound wire and associated to the aforementioned support element.

[0028] Preferably, the torsion spring comprises a pair of arms, preferably substantially coplanar with each other, extending from said central portion.

[0029] Preferably, each arm comprises a substantially rectilinear main portion connected via an intermediate connecting portion to a substantially rectilinear free end portion inclined with respect to the main portion.

[0030] Advantageously, each free end portion of the arms of the spring constitutes a sliding shoe which facilitates the displacement of the spring in the distal portion of the respective sliding seat reducing the frictions and eliminating the risk of any sticking of the arms against the sidewalls of the sliding seat which may hamper or prevent a correct projection of the pin out of the front wall of the containment casing of the support.

[0031] In a preferred embodiment, the sliding seat of the spring comprises a portion of the sliding seat of the spring proximal to the front wall of the containment casing and configured to cooperate with the spring to allow the spring to exert an axial thrust on the pin.

[0032] Preferably, the proximal portion of the sliding seat of the spring comprises opposite side walls axially diverging towards the front wall of the casing and cooperating with the arms of the spring to allow the arms to form with each other a rest angle of predetermined value in said operative position of the pin.

[0033] Preferably, the distal portion of the sliding seat of the spring comprises opposite side walls cooperating with the arms of the spring to move closer and hold close the aforementioned arms with each other, so that the arms form with each other a compression angle smaller than the aforementioned rest angle.

[0034] Preferably, the opposite side walls of the distal portion of the sliding seat of the spring and the opposite side walls of the proximal portion of the sliding seat of the spring are connected with each other via respective sharp edges or respective substantially curvilinear connecting portions.

[0035] Advantageously and as will be better apparent hereinafter, this configuration of the opposite side walls of the sliding seat of the spring allows to define as required the line or area where the release of the elastic energy stored in the spring is triggered to perform the axial thrust action on the pin.

[0036] Preferably, the connecting line or area between the opposite side walls of the distal portion and of the proximal portion of the sliding seat of the spring is defined in a part of the aforementioned seat configured to cause the release of the elastic energy of the spring when the pin is still completely housed in the containment casing of the support.

[0037] Preferably, the opposite side walls of the distal portion of the sliding seat of the spring are substantially parallel to each other or are axially diverging at a side opposite to the aforementioned proximal portion of the sliding seat of the spring.

[0038] In the case where the opposite side walls of the distal portion of the sliding seat of the spring are axially diverging at a side opposite to the proximal portion of the seat, the spring advantageously exerts a thrust on the pin in the direction opposite to the projection direction of the pin from the seat itself (operative position of the pin) thereby more efficiently holding the pin in its non-operative position and increasing the amount of force required to cause the projection of the pin.

[0039] In a preferred embodiment, the pin comprises a respective driving element laterally projecting therefrom and slidably mounted in a respective guiding and sliding groove formed in the containment casing.

[0040] Preferably, the driving element is operable from the outside of the casing to allow a driving of the pin.

[0041] In this way, the driving element is advantageously operated from the outside of the casing in a manual manner.

[0042] Preferably, the driving element is associated to a drive plate slidable on the containment casing.

[0043] Preferably, the drive plate substantially forms a closing cover of the aforementioned guiding and sliding

groove of the driving element.

[0044] In this way, it is advantageously possible to combine an easy manual operation with excellent aesthetic characteristics of the support device.

5 **[0045]** In a preferred embodiment, the driving element is removably associated to the drive plate, preferably by means of a snap coupling.

[0046] In this way, it is advantageously possible to facilitate to a maximum extent the assembling operations of the drive plate with the driving element.

10 **[0047]** In a preferred embodiment, the shelf support further comprises at least one stop element configured to hold the pin in the operative position.

15 **[0048]** In this way, it is advantageously possible to prevent the pin from inadvertently projecting out of the support during the transport operations of the shelf support and the assembling operations of the latter in the shelf of the piece of furniture which occur before assembling the shelf within the piece of furniture.

20 **[0049]** Preferably, the aforementioned at least one stop element cooperates in abutting relationship with the driving element of the pin.

25 **[0050]** Preferably, the aforementioned at least one stop element comprises at least one shoulder formed in the guiding and sliding groove of the driving element of the pin at an end of the groove proximal to the front wall of the containment casing.

30 **[0051]** In this way, it is advantageously possible to form said at least one stop element using elements of the support device present within the containment casing.

[0052] According to a second aspect thereof, the present invention relates to a shelf of a piece of furniture comprising at least one shelf support of the aforementioned type.

35 **[0053]** Clearly, the advantageous features of the shelf support according to the present invention outlined above lead to an equal number of advantageous features of the shelf of a piece of furniture comprising such a support, such as for example a reduction of production costs and an increase of operating reliability.

Brief description of the drawings

45 **[0054]** Additional features and advantages of the invention will be more readily apparent from the following description of a preferred embodiment thereof, provided hereinafter solely by way of non-limiting example, with reference to the attached drawings. In the drawings:

- 50 - figure 1 shows a schematic perspective view of a flush-mounted shelf support for supporting a shelf of a piece of furniture according to the invention, as well as a portion of such a shelf of a piece of furniture;
- 55 - figure 2 shows a schematic perspective exploded view of the shelf support of figure 1;
- figure 3 shows a schematic perspective view, in en-

larged scale, of a component (torsion spring) of the shelf support of figure 1;

- figure 4 shows a schematic bottom view in partial section of the shelf support of figure 1 in a non-operative position of the pin;
- figure 5 shows a schematic bottom view in partial section of the shelf support of figure 1 in an operative position of the pin;
- figure 6 shows a schematic view in longitudinal section of the shelf support of figure 1 in the operative position of the pin, made according to line VI-VI of figure 5;
- figure 7 shows a schematic top view in cross section and in an enlarged scale, of a portion of the shelf support of figure 1 in the operative position of the pin.

Detailed description of the currently preferred embodiments

[0055] In the figures, a flush-mounted shelf support according to the invention for supporting a shelf 12 of a piece of furniture (not illustrated) is generally indicated at 10.

[0056] The shelf support 10 is configured to be housed at a lateral sidewall 12a of the shelf 12, in a corresponding seat 12b which is generally open towards the lateral sidewall 12a and towards a bottom wall 12c of the shelf 12 (in figure 1 the shelf is shown upside down, so as to better illustrate the shelf support 10).

[0057] The shelf support 10 comprises a containment casing 14 and a pin 16 axially mounted in a sliding manner in a respective sliding seat 18 formed in the casing 14. Preferably, the pin 16 is provided with lightening grooves 17.

[0058] The pin 16 is axially slidable between an operative position (figures 1, 5, 6 and 7), in which the pin 16 at least partially projects from a front wall 14a of the casing 14 and out of the lateral sidewall 12a of the shelf 12, and a non-operative position (figure 4), in which the pin 16 is retracted in the seat 18 so as to not project from the front wall 14a of the casing 14 and, when the support is mounted in the shelf 12, from the lateral sidewall 12a of the shelf 12. The operative position of the pin 16 allows the shelf 12 to be supported in the piece of furniture, while the non-operative position of the pin 16 allows to disassemble the shelf.

[0059] A spring 20 is active on the pin 16 to push the latter towards the operative position. Preferably, the spring 20 is configured to exert an axial thrust on the pin 16. Still more preferably, the spring 20 is a torsion spring.

[0060] The spring 20 is housed in a respective sliding seat 22 which is structurally distinct from and positioned alongside the sliding seat 18 of the pin 16.

[0061] In the non-limiting preferred embodiment illus-

trated, the seat 22 is positioned alongside the seat 18 at a side opposite to a lateral surface 32 of the casing 14 extending substantially flush with the bottom wall 12c of the shelf 12 in the assembled configuration of the device 10 (see figure 2).

[0062] The sliding seat 22 of the spring 20 comprises a portion 22a axially distal with respect to the front wall 14a of the casing 14 and configured to cooperate with the spring 20 to prevent the spring 20 from exerting an axial thrust on the pin 16. In this way, the distal portion 22a constitutes a holding element configured to unstably hold the pin 16 in the non-operative position (as shown in figure 4).

[0063] The sliding seat 22 of the spring 20 preferably comprises a portion 22b axially proximal to the front wall 14a of the casing 14 and configured to cooperate with the spring 20 and to allow the latter to exert an axial thrust on the pin 16, until the pin reaches its operative position (as shown in figure 5).

[0064] Preferably, the spring 20 is associated to a support element 16a laterally projecting from the pin 16 and at least partially extending in the sliding seat 22 of the spring 20.

[0065] Preferably, a guiding and sliding channel 24 of the support element 16a of the spring 20 is formed between the sliding seat 18 of the pin 16 and the sliding seat 22 of the spring 20.

[0066] Preferably, a driving element 26 laterally projects from the pin 16 and slides in a respective guiding and sliding groove 28 formed in the casing 14. Preferably, the driving element 26 is operable from the outside of the casing 14 to allow an operation of the pin 16, preferably to and from the non-operative position.

[0067] Preferably, in order to facilitate the driving of the driving element 26 even without the use of tools (such as for example a screwdriver), the driving element 26 is associated to a drive plate 30, which can be easily operated in a manual manner.

[0068] Preferably, the plate 30 is slidably mounted on the casing 14. Still more preferably, the plate 30 slides on the lateral surface 32 of the casing 14 extending substantially flush with the bottom wall 12c of the shelf 12 in the assembled configuration of the support 10.

[0069] Preferably, the drive plate 30 substantially forms a cover for closing the guiding and sliding groove 28 of the driving element 26.

[0070] Preferably, the driving element 26 is removably associated to the drive plate 30. More preferably, a snap-coupling of a free end 26a of the driving element 26 in a corresponding housing seat 30a formed in the drive plate 30 is provided. Preferably, the seat 30a is formed between a pair of flexible walls 30b, extending from the plate 30 towards the free end 26a of the driving element 26 in the assembled configuration of the support 10 (figure 6).

[0071] In the preferred embodiment illustrated, the seat 30a is also advantageously provided with a slot 30d accessible from the outside to allow, if desired, a driving

of the plate 30 by means of the tip of a screwdriver (see figure 2).

[0072] Preferably, the shelf support 10 further comprises a stop element 34 configured to hold the pin 16 in the operative position, preventing the pin 16 from being completely pushed out of its sliding seat 18.

[0073] Preferably, the stop element 34 cooperates in abutment relationship with the driving element 26.

[0074] As shown in figure 2 and more clearly in the enlarged view of figure 7, the stop element 34 preferably comprises at least one shoulder and, still more preferably, a pair of shoulders 35 formed at an end of the guiding and sliding groove 28 of the driving element 26 proximal to the front wall 14a of the casing 14. More preferably, the shoulders 35 are formed by a pair of teeth substantially shaped in a herringbone pattern, directed towards the inner part of the groove 28.

[0075] The inclination and the size of the teeth allow the passage of the driving element 26 (by way of an elastic deformation thereof), when the device 10 is assembled by pushing the pin 16 in its seat 18. Afterwards, the inner edge of the teeth forms a stop element against which a front edge of the driving element 26 (shown with dashed lines in figure 7) abuts, so as to prevent the projection of the pin 16 beyond its operative position.

[0076] As shown in figure 3, the spring 20 preferably comprises a central portion 20a formed by a spirally wound wire 20b. Preferably, the spring 20 is externally associated to the support element 16a by means of the central portion 20a, in which the support element 16a (for example constituted by a peg, as shown in figures 2 and 4-6) is inserted.

[0077] Preferably, the spring 20 comprises a pair of arms 20c substantially coplanar with each other and extending from the central portion 20a. Preferably, the arms 20c are constituted by an extension of the wire 20b forming the central portion 20a of the spring 20, as conventionally known for torsion springs.

[0078] Preferably, each arm 20c comprises a substantially rectilinear main portion 20d connected - via an intermediate connecting portion 20e - to a substantially rectilinear free end portion 20f preferably inclined with respect to the main portion 20d.

[0079] Preferably, the intermediate connecting portion 20e is substantially curvilinear.

[0080] Preferably, the distal portion 22a of the sliding seat 22 of the spring 20 comprises opposite side walls 23a cooperating with the arms 20c to move closer and hold close to each other the arms 20c, so that the arms 20c form with each other a compression angle (as shown in figure 4). The arms 20c of the spring 20 are arranged on a side of the central portion 20a facing the front wall 14a of the casing 14.

[0081] Preferably, the opposite side walls 23a of the distal portion 22a of the seat 22 are substantially parallel to each other (figures 4 and 5) and are also preferably substantially parallel to a longitudinal centreline plane of the casing 14 and of the seat 22, indicated at X-X in fig-

ures 4 and 5.

[0082] In a preferred alternative embodiment, not shown, the opposite side walls 23a may be axially diverging at a side opposite to the proximal portion 22b of the seat 22.

[0083] Preferably, the proximal portion 22b of the sliding seat 22 of the spring 20 comprises opposite side walls 23b cooperating with the arms 20c, preferably with the substantially curvilinear intermediate connecting portion 20e, to allow the arms 20c to form with each other a rest angle having a predetermined value in the operative position of the pin 16 (shown in figure 5).

[0084] Preferably, the opposite side walls 23b are axially diverging (with respect to the axis of symmetry of the seat 22) towards the front wall 14a of the casing 14 so as to allow the arms 20c to slide on the opposite side walls 23b until the arms 20c form the rest angle with each other.

[0085] Preferably, the opposite side walls 23b of the proximal portion 22b are arranged according to an angle which can be lower than or substantially equal to said rest angle of the arms 20c of the spring 20 and which is greater than said compression angle of the arms 20c of the spring 20.

[0086] Within the present description and in the subsequent claims, the expression rest angle is used to indicate the maximum angle of opening formed by the arms 20c of the spring 20 with each other within the seat 22 of the spring 20 (see figure 5). Such an angle may be equal to or lower than the angle of complete release of the elastic energy of the torsion spring 20, which angle corresponds to the angle between the arms 20c of the spring 20 when the latter is completely extracted from the seat 22.

[0087] Preferably, the rest angle formed with each other by the arms 20c of the spring 20 - or rather by their main portion 20d - is comprised between 60° and 180°, more preferably between 60° and 120° and, still more preferably, between 80 and 100°.

[0088] Preferably, the compression angle formed with each other by the arms 20c of the spring 20 - or rather by their main portion 20d - is comprised between 10° and 50° and, more preferably, between 30° and 45°.

[0089] Preferably and as is better shown in figures 4 and 5, the opposite side walls 23a of the distal axial portion 22a of the sliding seat 22 of the spring 20 and the opposite side walls 23b of the proximal axial portion 22b are connected with each other via respective sharp edges 23c. Alternatively, the side walls 23a and the side walls 23b may be connected with each other via respective substantially curvilinear connecting portions.

[0090] The support operates as follows.

[0091] In a first operating step adapted to allow the assembling of the shelf 12 within a piece of furniture, it is required to "cock" the support 10, i.e. to displace the pin 16 in its non-operative position. Such operation is manually carried out by moving the driving element 26 (in the preferred embodiment illustrated by operating on

the plate 30 associated to the driving element) so as to move the spring 20 in the distal portion 22a of the sliding seat 22 of the spring 20 overcoming the resistance exerted by the arms 20c of the spring.

[0092] In such a step, the spring 20 is "cocked", i.e. the arms 20c of the spring 20 are forced to move close to each other by the side walls 23a of the distal axial portion 22a and they are "loaded" with elastic energy.

[0093] In a subsequent operating step, adapted to allow the shelf 12 to be supported within the piece of furniture, the pin 16 should be displaced in its operative position by moving the driving element 26 (preferably by acting on the plate 30 associated thereto) towards the front wall 14a of the casing 14.

[0094] As soon as the substantially curvilinear intermediate connecting portions 20e of the arms 20c of the spring 20 pass beyond the sharp edges 23c, or the substantially curvilinear connecting portions, and enter in the proximal axial portion 22b of the seat 22, the arms 20c are "released" moving away from each other and releasing the elastic energy previously loaded and causing the axial sliding of the pin 16 in its sliding seat 18 towards the front wall 14a of the casing 14 up to the operative position of the pin 16.

[0095] During the sliding step of the spring 20 in its sliding seat 22, the substantially curvilinear intermediate connecting portions 20e and the free end portions 20f of the arms 20c (which form with each other an angle smaller than the angle formed by the two main portions 20d of the arms 20c) advantageously constitute as many slides which facilitate the movement of the spring 20 in the distal portion 22a of the seat 22 by reducing friction and eliminating the risk of a possible sticking of the arms 20c against the side walls 23a of the distal portion 22a which may hamper or prevent the correct projection of the pin 16.

[0096] In connection with the angle formed between the arms 20c of the spring 20, or rather between their main portion 20d, it should be observed that the arms 20c are held by the opposite side walls 23a of the distal portion 22a of the seat 22 according to an acute compression angle of predetermined value and that the arms increase their angle up to reaching the rest angle during the step of sliding of the torsion spring 20 and of release of the elastic energy accumulated therein which occurs in the proximal portion 22b of the seat 22.

[0097] In order to disassemble the shelf 12 from the piece of furniture, the pin 16 is moved back in its non-operative position by operating again on the driving element 26 (preferably by acting on the plate 30 associated thereto) so as to move the spring 20 in the distal axial portion 22a of the sliding seat 22 thereof and "cock" again the support 10.

[0098] It should be observed that should the opposite side walls 23a of the distal portion 22a of the seat 22 be axially diverging at a side opposite to the proximal portion 22b, the spring 20 exerts a thrust on the pin 16 in a direction opposite to the projection direction of the pin 16

from the seat 18 (operative position of the pin 16) thereby more efficiently holding the pin 16 in its non-operative position and increasing the amount of force required to cause the projection of the pin 16.

[0099] Clearly, a man skilled in the art can bring modifications and variants to the shelf support and to the shelf of a piece of furniture described above in order to satisfy specific and contingent application requirements, said variants and modifications falling in any case within the scope of protection as defined by the following claims.

Claims

1. A flush-mounted shelf support (10) for supporting a shelf (12) of a piece of furniture, said support (10) being configured to be housed at a lateral sidewall (12a) of the shelf (12) and comprising:

- a containment casing (14);
- a pin (16) axially sliding in a respective sliding seat (18) formed in said casing (14) between an operative position in which the pin (16) projects at least partially from a front wall (14a) of the casing (14) and out of the lateral sidewall (12a) of the shelf (12), and a non-operative position in which the pin (16) is retracted in the seat (18) so as not to project from the lateral sidewall (12a) of the shelf (12);
- a spring (20) active on the pin (16) to push the pin into the operative position;
- at least one holding element (22a) configured to unstably hold the pin (16) in the non-operative position,

characterised in that said spring (20) is housed in a respective sliding seat (22) structurally distinct from and positioned alongside said sliding seat (18) of the pin (16) and **in that** said at least one holding element (22a) of the pin (16) in the non-operative position is constituted by a portion (22a) of the sliding seat (22) of the spring (20) distal with respect to said front wall (14a) of the casing (14) and configured to cooperate with the spring (20) to prevent the spring (20) from exerting an axial thrust on the pin (16).

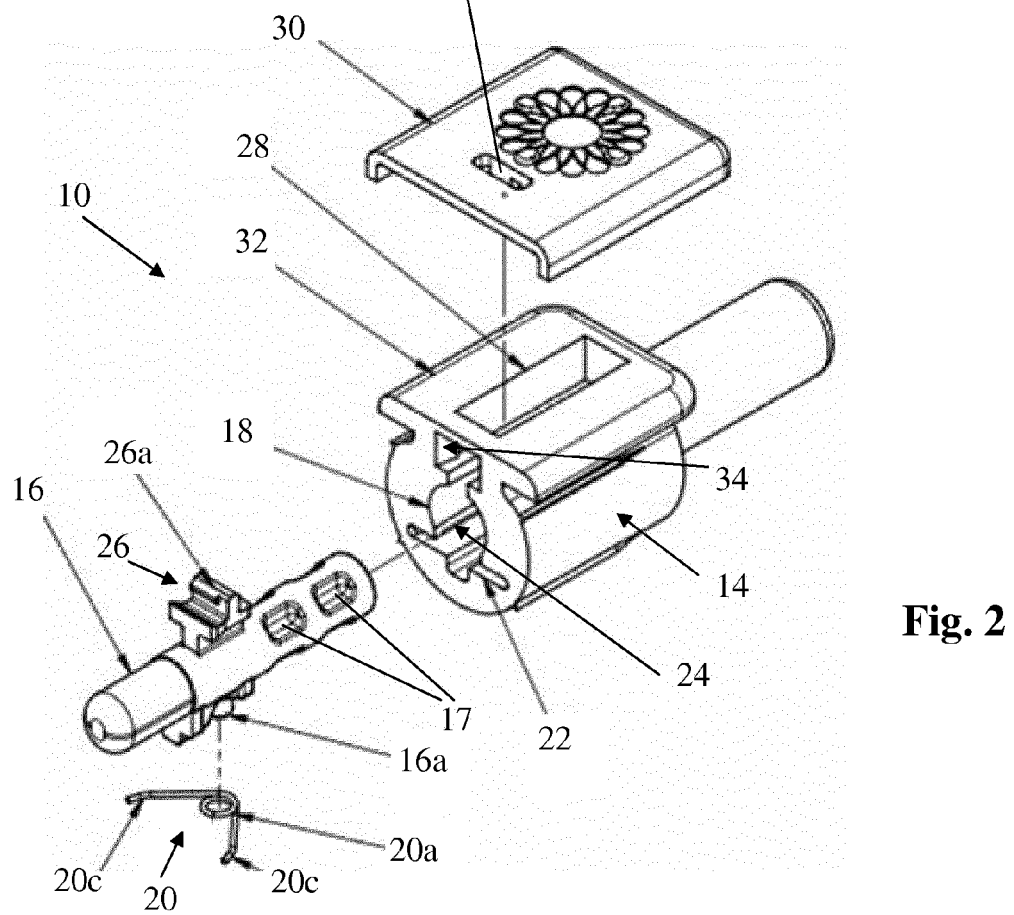
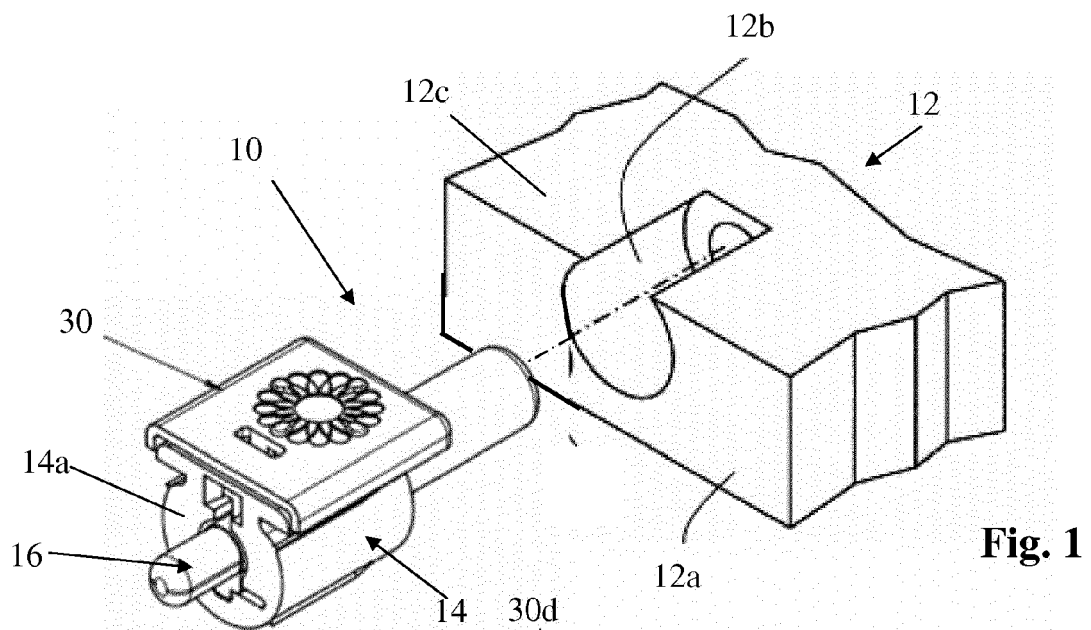
2. Shelf support (10) according to claim 1, wherein said spring (20) is a torsion spring.

3. Shelf support (10) according to claim 2, wherein the torsion spring (20) is associated to a support element (16a) laterally projecting from said pin (16) and extending at least in part in said sliding seat (22) of the spring (20).

4. Shelf support (10) according to claim 3, wherein the torsion spring (20) comprises a central portion (20a) formed by a spirally wound wire (20b) and associated

to said support element (16a).

5. Shelf support (10) according to claim 4, wherein each arm (20c) comprises a substantially rectilinear main portion (20d) connected via an intermediate connecting portion (20e) to a substantially rectilinear free end portion (20f) inclined with respect to the main portion (20d). 5
6. Shelf support (10) according to any one of the preceding claims, wherein said sliding seat (22) of the spring (20) comprises a portion (22b) of the sliding seat (22) of the spring (20) proximal to said front wall (14a) of the casing (14) and configured to cooperate with the spring (20) to allow the spring (20) to exert an axial thrust on the pin (16). 10 15
7. Shelf support (10) according to claim 6, wherein said proximal portion (22b) of the sliding seat (22) of the spring (20) comprises opposite side walls (23b) axially diverging towards the front wall (14a) of the casing (14) and cooperating with the arms (20c) of the spring (20) to allow the arms (20c) to form with each other a rest angle of predetermined value in said operative position of the pin (16). 20 25
8. Shelf support (10) according to claim 4 or 7, wherein said distal portion (22a) of the sliding seat (22) of the spring (20) comprises opposite side walls (23a) cooperating with the arms (20c) of the spring (20) to move closer and hold close said arms (20c) with each other, so that the arms (20c) form with each other a compression angle smaller than said rest angle. 30
9. Shelf support (10) according to claim 8 when depending from claim 7, wherein the opposite side walls (23a) of the distal portion (22a) of the sliding seat of the spring and the opposite side walls (22b) of the proximal portion (22b) of the sliding seat (22) of the spring (20) are connected with each other via respective sharp edges (23c) or respective substantially curvilinear connecting portions. 35 40
10. Shelf support (10) according to claims 8 or 9, wherein said opposite side walls (23a) of the distal portion (22a) of the sliding seat (22) of the spring (20) are substantially parallel to each other or are axially diverging at a side opposite to said proximal portion (22b) of the sliding seat (22) of the spring (20). 45 50
11. Shelf support (10) according to any one of the preceding claims, wherein the pin (16) comprises a respective driving element (26) laterally projecting from the pin and slidably mounted in a respective guiding and sliding groove (28) formed in the casing (14), said driving element (26) being operable from the outside of the casing (14) to allow driving of the pin (16). 55
12. Shelf support (10) according to any one of the preceding claims, comprising at least one stop element (34) configured to hold the pin (16) in said operative position.
13. Shelf support (10) according to claim 12, when depending from claim 11, wherein said at least one stop element (34) cooperates in abutting relationship with said driving element (26).
14. Shelf support (10) according to claim 13, wherein said at least one stop element (34) comprises at least one shoulder (35) formed in the guiding and sliding groove (28) of the driving element (26) at an end of the groove (28) proximal to the front wall (14a) of the casing (14).
15. Shelf (12) of a piece of furniture comprising at least one shelf support (10) according to any one of the preceding claims.



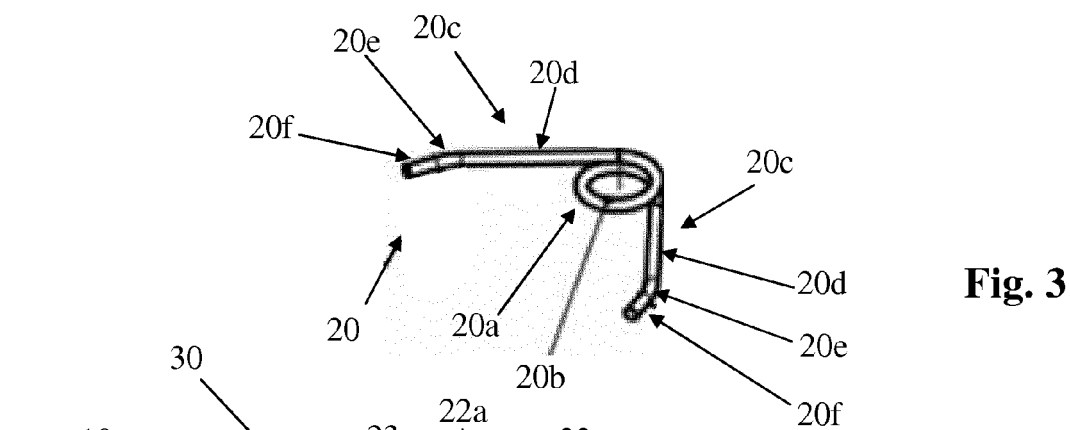


Fig. 3

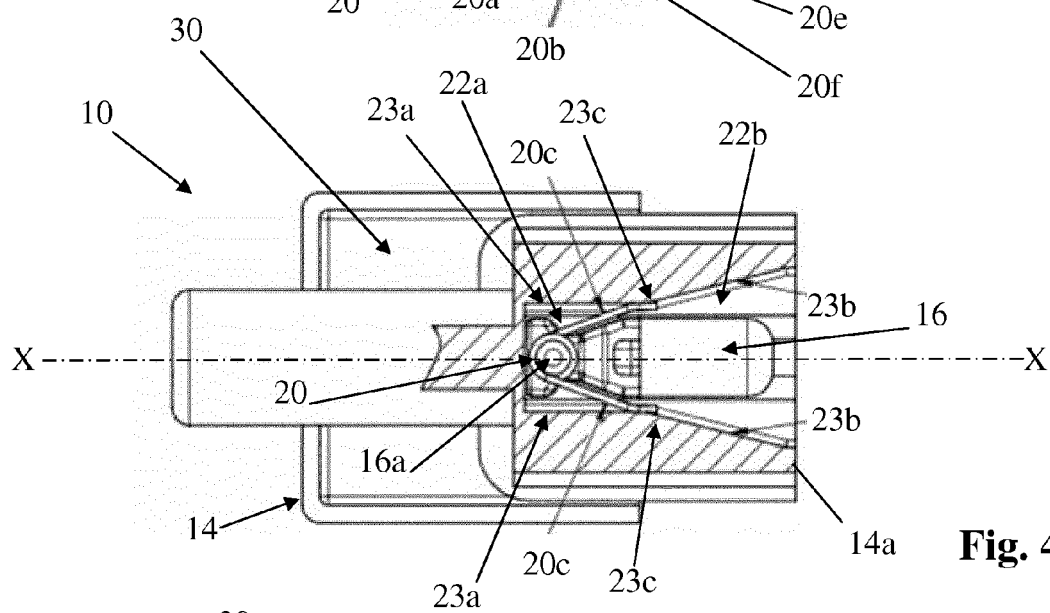


Fig. 4

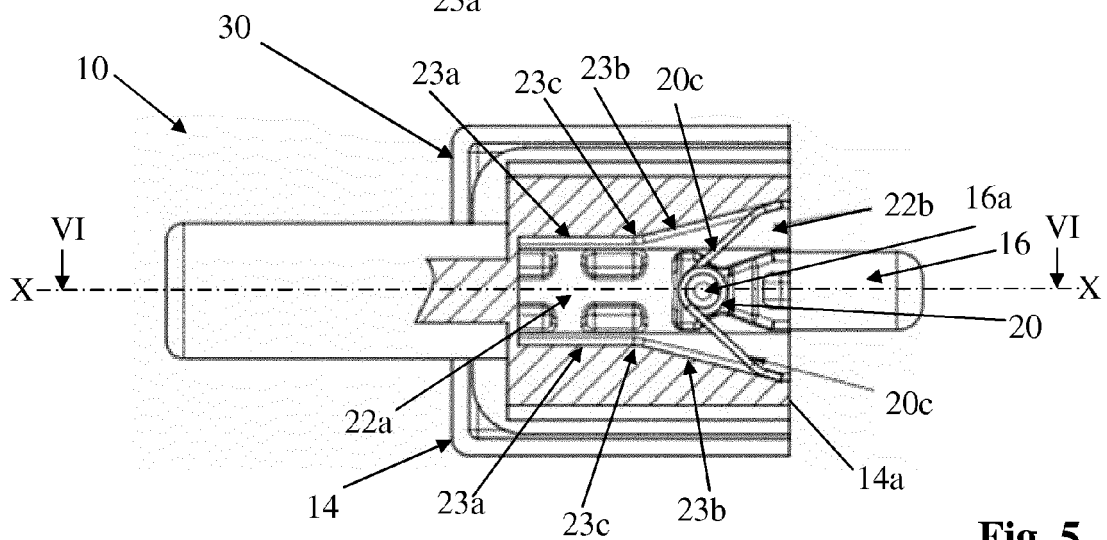
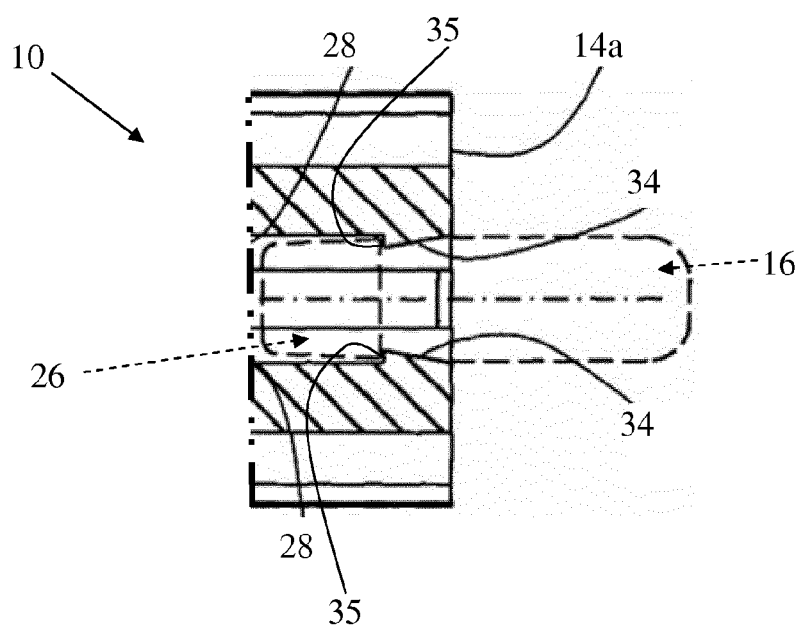
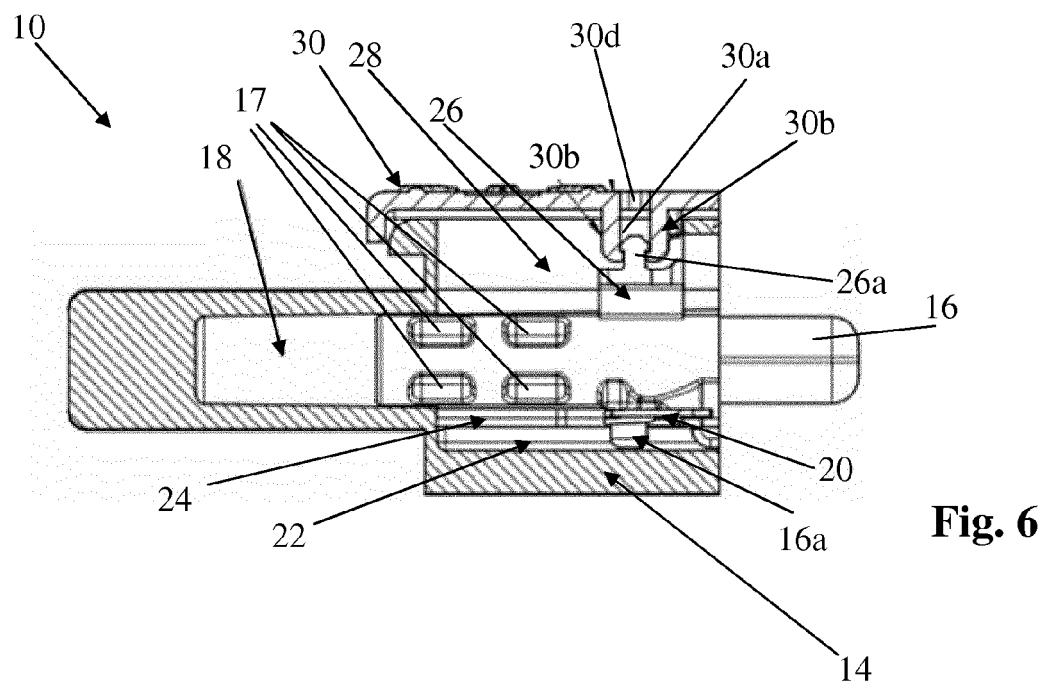


Fig. 5





EUROPEAN SEARCH REPORT

Application Number
EP 14 15 2100

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 177 129 A1 (LIVENZA FERRAMENTA SRL [IT]) 21 April 2010 (2010-04-21) * abstract * * column 3, paragraph 0015 - column 4, paragraph 0027; figures 1-9 *	1	INV. A47B96/06
A	US 2004/155163 A1 (MIGLI CARLO [IT]) 12 August 2004 (2004-08-12) * abstract; figures 1-6 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47B E05C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 28 May 2014	Examiner Jones, Clive
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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28-05-2014

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