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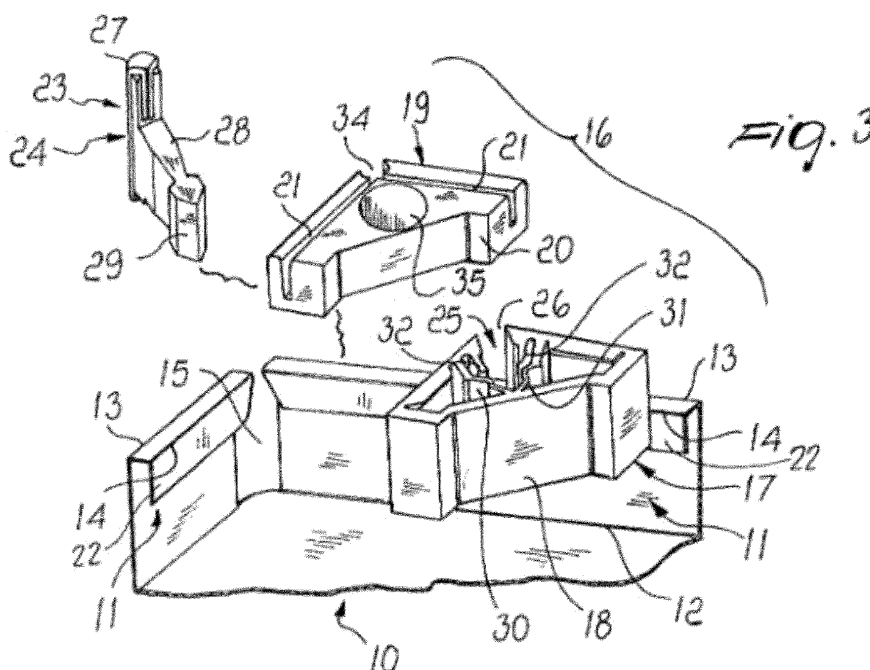
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(54) **ANGULAR METAL LOCKING DEVICE AND RESPECTIVE METAL PANEL FOR FURNITURE OR FURNITURE PARTS**

(57) Panel for metal furniture items and angular metal locking device associated therewith, comprising a first metal element which is provided with a prismatic hollow member with a substantially triangular cross-section and which comprises a seat and which is formed to be supported at corresponding portions of an internal surface of an edge of the panel near an angular zone thereof, a second metal element which is formed in order to be able to be placed in contact with the first element and which

comprises a prismatic member which comprises two channels which are formed to receive corresponding portions of U-like free ends of the edge, a third metal closure element which has a flat member which is capable of being inserted in the channel which is defined in the angular area of the edge and in the angular opening of the first element, at least the third element being covered with a thin ceramic film having a thickness which is between 1 and 200 micrometres.



Description

[0001] The present invention relates to an angular metal locking device and a metal panel associated therewith which can be used, by way of non-limiting example, for furniture items or furniture item parts.

[0002] As known, in public places, in addition to in industrial sectors and sometimes residential ones, furniture items having metal parts (typically aluminium or steel) which are provided with closure panels and/or shutters are particularly appreciated as a result of their robustness and the interesting hygiene characteristics.

[0003] Such metal panels of furniture items, which are used for closing or constructing cupboard doors, doors or the like, must have, in addition to good functional characteristics in relation to the area of use, a high structural resistance and also, when the environment in which they are located requires it, an appreciable level of style and aesthetics.

[0004] Currently, the metal panels which are commercially available for the uses described above are generally constructed from a plate of metal. The construction process commonly adopted, in addition to being particularly expensive, often requires different dies or complex incisions and often gives rise at the edges to cracks which have to be eliminated subsequently, the cracks being particularly unattractive when present in the front panels of a furniture item.

[0005] Furthermore, the panels obtained by means of the known techniques in the field often require reinforcements because the rigidity of the sheet is not sufficient per se to provide the structural characteristics necessary to be capable of ensuring high strength requirements.

[0006] Currently, there are also metal panels which are obtained on the market from cutting sheet metal which are deformed by bending in order to define a desired edge.

[0007] In this case, however, the angle zones of the edge, in order to ensure the continuity thereof, have to be welded.

[0008] The welding process, as known, in addition to being long and costly, does not always ensure reliable results which are particularly aesthetically appreciable.

[0009] This aesthetic and mechanical limitation is critically emphasized by the presence of visible welds and is often perceived by the market as a solution which is not ideal. In order to seek to reduce this disadvantage, the techniques proposed in this industrial field have attempted to explore solutions which provide for blocks which are connected to the edge of the panel and which are formed so as to perform the function of the welding.

[0010] Unfortunately, however, these solutions are very imprecise as a result of the limited connections which are capable of being produced at the edges and which cannot reproduce a precise surface continuity with the edge itself, thereby defining unattractive and unpleasant discontinuities and surface cracks.

[0011] Furthermore, the market has identified the ne-

cessity for being able to have angular connection panels and elements which always have superior properties in terms of aesthetic characteristics and characteristics of tribological and chemical resistance.

[0012] An object of the present invention is to at least partially overcome the disadvantages of the prior art.

[0013] Within this object, an objective is to provide an angular element and a panel which can have advantageous aesthetic characteristics and characteristics of resistance which ensure an efficient functionality over time.

[0014] In a first aspect thereof, the invention is directed towards an angular metal locking device comprising a first metal element which is provided with a prismatic hollow member with a substantially triangular cross-section and which comprises a seat and which is formed to be supported with external surfaces of the respective cathetuses thereof at corresponding portions of an internal surface of an edge of a panel near an angular zone thereof. Preferably, the device comprises a second metal element which is formed in order to be able to be placed in contact with the first element when it is received near the angular zone and which includes a prismatic member which has substantially the same cross-section as the first element and which in turn comprises, in the region of the surface opposite the one directed towards the first element, two channels, each of which is parallel with a corresponding portion of the edge of the panel and which are formed to receive corresponding portions of U-like free ends of the edge.

[0015] The device preferably comprises a third metal closure element which has a flat member which is capable of being inserted in the channel which is defined in the angular area of the edge and in an angular opening of the first element, mutually locking the first element and second element, in a seat of the first element which is substantially counter-formed and which is defined in a first access slot of the first element which is placed in the region of the channel in the angular area of the edge.

[0016] Again in a preferable manner, at least the third element is covered with a thin ceramic film having a thickness which is between 1 and 200 micrometres.

[0017] It is thereby possible to construct an angular device which has high levels of surface characteristics and characteristics of tribological and chemical resistance and which can be engaged with a metal panel in a fixedly joined manner which is reliable, precise and aesthetically pleasing.

[0018] In a second aspect of the present invention, there is disclosed a panel for furniture items or parts of furniture items comprising a sheet having an edge which is obtained by means of first bending lines near a free zone of an end and the sheet being shaped in the manner of a "U" by means of double bending in accordance with a second and third bending line parallel with each other and parallel with the first bending line and which are shaped, by cutting, in order to interrupt the continuity thereof in the region of the angular areas of the panel itself, defining therein at least one channel with a depth

similar to the edge.

[0019] Preferably, the panel comprises at least one angular locking device which has at least partially the characteristics set out in the present description and which is associated with the corresponding angular areas, the sheet of the panel and the angular locking device being constructed from the same metal material and comprising the same covering with a thin ceramic film in order to have uninterrupted continuity of optical and tribological characteristics between the sheet and the angular device.

[0020] Preferably, the entire panel also has the same thin covering which is present on the angular locking device.

[0021] As a result of this technical solution, there is continuity of aesthetic, tribological characteristics and characteristics of chemical resistance over all the portions of the panel. Furthermore, in relation to the above-mentioned aspects, another important objective of the present invention is to provide a panel, the structure of which is particularly solid and which, to this end, can be associated simply and rapidly with the angular locking device.

[0022] Another object of the present invention is to provide a metal panel which can also be produced as configurations with particular aesthetic/stylistic value.

[0023] Another object of the present invention is to provide a metal panel, the production costs of which are competitive with respect to the known panels and in which production times allow the production of high quantities thereof.

[0024] Yet another object of the present invention is to provide at least one metal panel which can be partially produced automatically.

[0025] Another object of the present invention is to provide a metal panel which can be produced with known technologies and which can where applicable be applied to structures of furniture items which are already in production.

[0026] Other features and advantages of the present invention will be appreciated more clearly from the description of one of the embodiments thereof, which is illustrated by way of non-limiting example, in the appended drawings, in which:

- Figure 1 is an axonometric view of the fixing device and a portion of a metal panel according to the invention;
- Figure 2 is an orthogonal projection of what has been illustrated in Figure 1;
- Figure 3 is an exploded view of what has been illustrated in Figure 1;
- Figure 4 shows an orthogonal projection, which is sectioned along the line II-II, of what is illustrated in Figure 2;
- Figure 5 still shows an orthogonal projection, which is sectioned along the line II-II, of what has been illustrated in Figure 2.

[0027] With particular reference to Figures 1 to 5, a metal panel for furniture items or parts of furniture items according to the invention is generally designated 10.

[0028] Still with reference to Figures 1 to 5, an angular metal locking device according to another aspect of the invention is generally designated 16.

[0029] Preferably, the angular metal locking device 16 comprises a first metal element 17 which is provided with a prismatic hollow member 18 with a substantially triangular cross-section comprising a seat 25 which is formed in order to be supported with external surfaces of the respective cathetuses thereof at corresponding portions of an internal surface of an edge 11 of a panel 10 near an angular zone thereof.

[0030] Still preferably and with reference to Figure 3, the device 16 comprises a second metal element 19 which is formed in order to be able to be placed in contact with the first element 17 when it is received near the angular zone, comprising a prismatic member 20 which has substantially the same cross-section as the first element 17 and which comprises, in the region of the surface opposite the surface directed towards the first element 17, two channels 21, each of which is parallel with a corresponding portion of the edge 11 of the panel 10 and which is formed to receive corresponding portions of U-shaped free ends 22 of the edge 11.

[0031] As known from Figures 1 and 3, the channels 21 are parallel with the main longitudinal extent and provide a cavity which is formed so as to allow the free vertical portion of the U-shaped edge 11 to be at least partially received.

[0032] According to an embodiment, the device 16 further comprises a third metal closure element 23 which has a flat body 24 which is capable of being inserted in the channel 15 which is defined in the angular area of the edge 11 and in the angular opening of the first element, thereby mutually locking the first element 17 and second element 19 in a seat 25 of the first element 17 which is substantially counter-formed and which is defined in a first access slot 26 of the first element 17 which is positioned in the region of the channel 15 in the angular area of the edge 11. Preferably, the at least third element 23 is covered with a thin ceramic film which has a thickness between 1 and 200 micrometres.

[0033] More preferably, both the first element and second element 17, 19 are made from the same metal and covered identically with the third element 23.

[0034] It should further be noted that, in this context, the term "ceramic material" is intended to be understood to identify a material which comprises at least one metal element which is chemically bonded to a non-metal element.

[0035] Therefore, this definition evidently includes, for example, all the metal oxides, metal nitrides, metal carbides, metal borides and combinations thereof.

[0036] Preferably, the covering is produced from ceramic material comprising titanium, nitrogen and oxygen. Even more preferably, this covering is produced from ti-

tanium oxide/nitrides. This is because this covering has advantages and pleasing aesthetic characteristics together with high capacities of tribological resistance.

[0037] In this context, the term "tribological" is intended to be understood to be all the physical and/or mechanical characteristics connected with the response to wear (therefore, friction forces, surface roughness, surface hardness, etc.) of the material being referred to.

[0038] Preferably, the thin ceramic film of the covering has a thickness between 50 and 150 micrometres.

[0039] In this context, the term "thin film" is intended to be understood to identify a covering which has a thickness which is far less than that of the device 16 and which is generally within a scale of dimensions which is from 10^{-9} to 10^{-4} metres, more preferably from 10^{-8} to 10^{-6} metres.

[0040] According to an embodiment, the thin film is deposited by means of a physical vapour deposition technique.

[0041] This is because this technique allows very controlled and uniform deposits to be carried out while at the same time bringing about so-called "conformal coverage", that is to say, the capacity for also covering with equal thicknesses the most complex forms and contours of an object.

[0042] Preferably, the device 16 is produced from sintered steel.

[0043] According to an embodiment, the panel 10 comprises the device 16.

[0044] Preferably, the panel 10 is constructed with precisely the same materials from which the device 16 is constructed. In other words, if the device 16 is constructed from sintered steel and covered with a thin film of ceramic material based on titanium, nitrogen and oxygen, the panel 10 is also constructed in precisely the same manner.

[0045] Preferably, the panel 10 comprises a sheet which has an edge 11 which is obtained along first bending lines 12.

[0046] The edge 11 in the region of a free zone of an end is formed by the sheet which is shaped in a U-like manner by double-bending in accordance with a second bending line 13 and a third bending line 14 parallel with each other and parallel with the first bending line 12.

[0047] Furthermore, with reference to Figure 3, the second and third bending lines 13, 14 are shaped and preferably cut so as to have an interruption of the continuity thereof in the region of the angular areas of the panel itself, thereby defining therein at least one channel 15 having a height similar to the edge 11.

[0048] The edge 11 is also formed by means of, for example, a cut so as to interrupt the continuity thereof in the region of the angular areas of the same panel 10, defining therein channels (only one of which is illustrated in the Figure) which are designated 15 and which have depths similar to the edge 11.

[0049] As set out above, the panel 10 comprises, in a state associated with the corresponding angular areas,

the above-mentioned locking devices 16 (only one of which is illustrated in the Figures), each of which comprises at least partially the above-described characteristics. In fact, it comprises the first element 17 which is provided with a prismatic hollow member 18 with a substantially triangular cross-section which is formed to be supported with the external surfaces of the individual cathetuses on the surfaces of the corresponding portions of the internal surface of the edge 11 near the area of the angle. Furthermore, the first element 17 is in contact with a second element 19, having a prismatic member 20 with the same cross-section with respect to that of the first element 17 which is arranged in the region of the first element 17, on which it can be supported. Furthermore, the second element 19 comprises two channels 21, each of which are parallel with the corresponding lug and which are formed so as to be able to receive therein corresponding portions of the free ends 22 of the edge.

[0050] Still with reference to Figure 3, the device 16 and therefore also the panel 10 comprises the third metal closure element 23 having a flat member 24 which is capable of being inserted in the channel 15 which is defined in the angular area of the edge 11 and in the angular opening of the first element 17, thereby mutually locking the first element 17 and the second element 19. In particular, the third closure element 23 is formed in order to be readily inserted in a seat 25 of the first element 17 which is substantially counter-formed with respect to the third closure element and which is connected at the exterior by means of a first access slot 26 of the first element 17 which is placed in the region of the channel 15 in the angular area of the edge 11.

[0051] In particular, the third closure element 23 has a first shaped portion 27 which is formed so as to define a continuity of surface with the external walls of the edge 11 of the panel 10 in the region of the angular zone.

[0052] Preferably, the first shaped portion 27 is made from the same material as the sheet of the panel 10 and also has the same covering as the sheet so as to be able to bring about an optimum continuity effect of all the characteristics in the region of the angular area. Alternatively, it is possible to cover all the third closure element 23 with the above-mentioned covering, if desired.

[0053] Still with reference to Figure 3, the first shaped portion 27 is monolithically attached to a second flat portion 28, the free end of which opposite the first portion 27 is formed so as to define a locking bulb 29 which is suitable for being inserted in the seat 25 of the first element 17.

[0054] In particular, in an embodiment shown in Figure 3, the bulb 29 is substantially prismatic. Alternatively, this bulb may be spherical, conical or may have a similarly functional shape.

[0055] In order to produce an effective connection between the third closure element 23 and the first element 17, it comprises retention or securing means which are formed so as to produce a releasable interference-fit engagement.

[0056] Preferably, the first element 17 is provided with an internal wall 30 which is shaped to define the seat 25, the base of which, which is designated 31, is substantially counter-formed with the bulb 29.

[0057] The above-mentioned retention or securing means comprise, in this case, two wings 32 which are suitable for being resiliently deformed and which are developed internally with respect to the first element 17 by areas adjacent to the first slot 26 and which converge relative to each other while remaining substantially parallel and internal with respect to the internal wall 30.

[0058] As illustrated in Figure 3, the wings 32 are suitable for locking the bulb 29 by pinning the free ends designated 33 thereof.

[0059] Preferably, the second element 19 is shaped to define a second channel 34 which generally coincides with the corresponding channel 15 which is provided in the corresponding angular zone.

[0060] According to an embodiment, the second element 19 is further provided with a through-hole 35, with a development substantially perpendicular to the upper surface of the member 20 thereof which is suitable for affording access to the corresponding zone below, in which there is the bulb and the retention means so as to allow an operator or user to produce the detachment of the bulb 29 from the support or abutment of the wings 32 if desired.

[0061] In practice, operation is as follows: once the metal portion of the panel 10 is produced by being cut and bent in the region of each of the desired angles of the metal sheet, the operator continues by inserting the free ends of the edge 11 of the sheet in the corresponding channels 21 of the second element 19.

[0062] Once the second element 19 is positioned, the operator can carry out the insertion without interference and therefore without resilient or resilient/plastic deformation of the first element 17 which is supported both on the corresponding internal surfaces of the edge 11 and against the internal portion of the planar area of the sheet of the panel 10 itself.

[0063] At this point, in order to lock the assembly, the operator also applies the third element 23, the fixing bulb 29 of which is inserted in the seat 25 and thereby becomes retained with an interference fit by the free ends 33 of the wings 32 which resiliently abut the bulb itself during the insertion step.

[0064] Where applicable, the operator can carry out the disconnection of the device by acting by means of resilient deformation of the wings 32 and accessing it through the through-hole 35, as described above.

[0065] In practice, it has been discovered that the present invention has achieved the general objective and other objectives set out.

[0066] In particular, the simplicity of use and the innovative aesthetic characteristics and characteristics of tribological and chemical resistance to potential damaging agents should be set out, both during assembly and where applicable during disconnection of the device ac-

cording to the invention, which thereby allows the production of robust metal panels without dispensing with possible high-value finishes in terms of style and technology.

[0067] At the same time, it may be emphasized that the locking device of the panel according to the invention does not require any plastic deformation of the articular structure of the panel, thereby ensuring an optimum construction thereof in terms of shape and dimensions.

[0068] Furthermore, the flexibility in terms of application and production of the panel according to the invention allows compliance with practically any type of requirement in the sector of furniture items made from metal or with metal parts.

[0069] The dimensions may be any dimensions depending on the requirements of the manufacturer.

Claims

1. An angular metal locking device (16) comprising

- a first metal element (17) which is provided with a prismatic hollow member (18) with a substantially triangular cross-section and which comprises a seat (25) and which is formed to be supported with external surfaces of the respective cathetuses thereof at corresponding portions of an internal surface of an edge (11) of a panel (10) near an angular zone thereof,
- a second metal element (19) which is formed in order to be able to be placed in contact with the first element (17) when it is received near the angular zone and which comprises a prismatic member (20) which has substantially the same cross-section as the first element (17) and which comprises, in the region of the surface opposite the one directed towards the first element (17), two channels (21), each of which is parallel with a corresponding portion of the edge (11) of the panel (10) and which are formed to receive corresponding portions of U-like free ends (22) of the edge (11),
- a third metal closure element (23) which has a flat member (24) which is capable of being inserted in the channel (15) which is defined in the angular area of the edge (11) and in the angular opening of the first element (17), mutually locking the first element (17) and second element (19), in a seat (25) of the first element (17) which is substantially counter-formed and which is connected by means of a first access slot (26) of the first element (17) which is placed in the region of the channel (15) in the angular area of the edge (11),
- at least the third element (23) being at least partially covered with a thin ceramic film having a thickness which is between 1 and 200 mi-

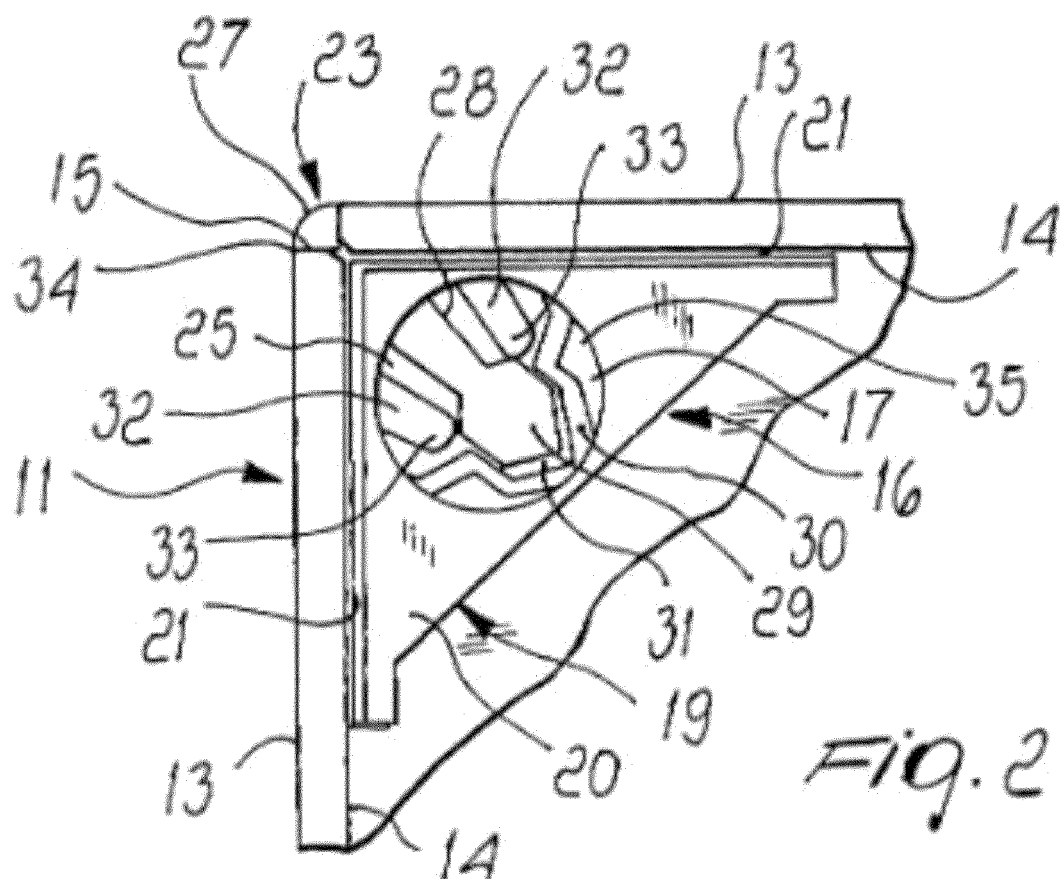
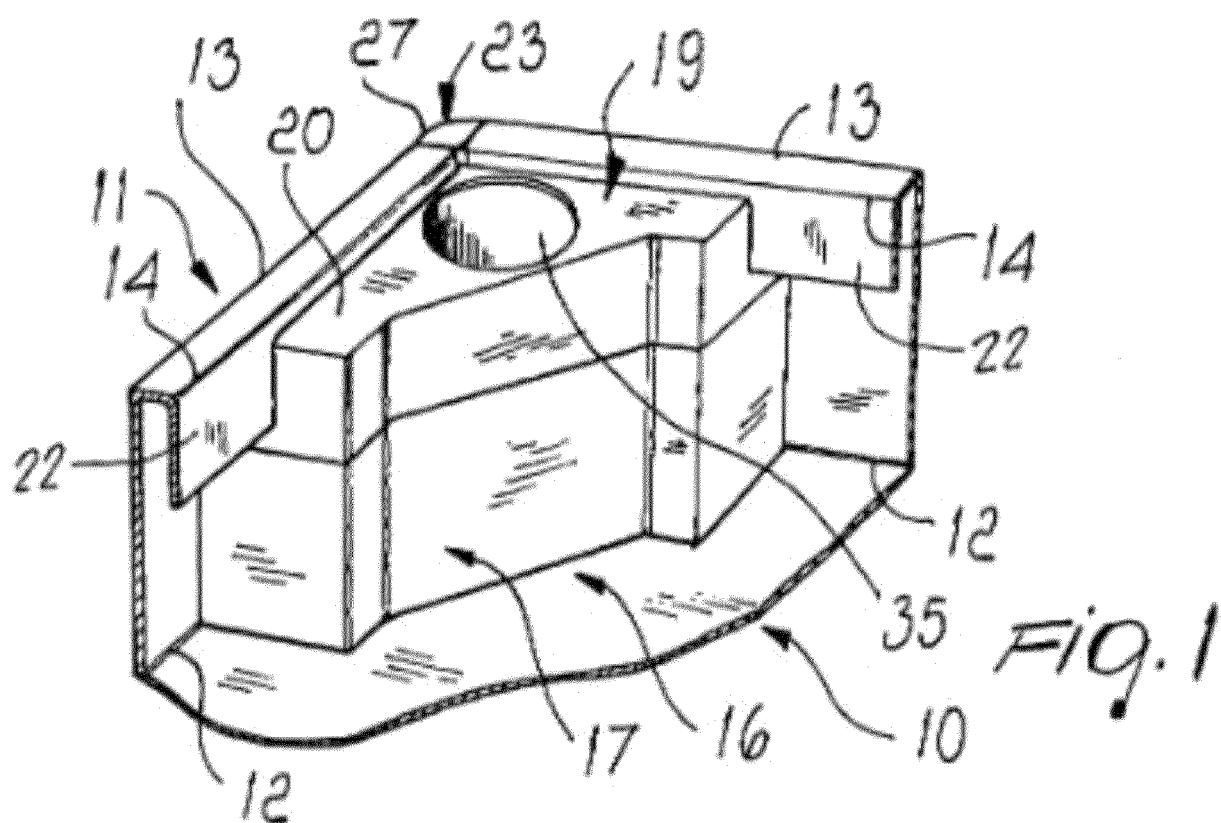
crometres.

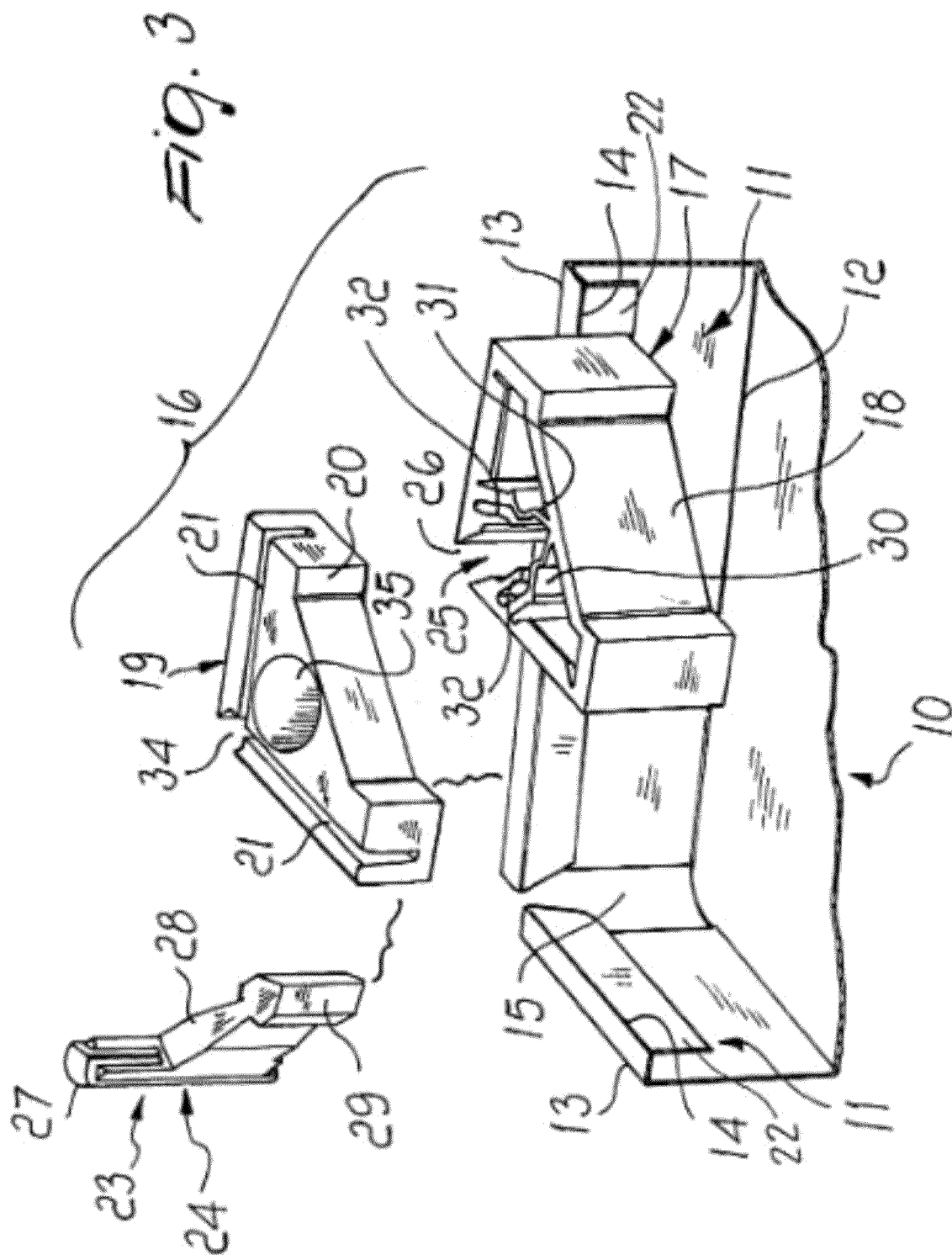
2. A device according to the preceding claim, wherein the covering is produced from ceramic material comprising titanium, nitrogen and oxygen. 5
3. A device according to claim 1 or 2, wherein the thin ceramic film has a thickness between 50 and 150 micrometres. 10
4. A device according to any one of the preceding claims, wherein the thin film is deposited by means of a physical vapour deposition technique.
5. A device according to any one of the preceding claims, wherein it is produced from sintered steel. 15
6. A device according to any one of the preceding claims, wherein the third element (19) has a first shaped portion (27) in order to define a continuity connection joint from the external surface of the edge (11) in relation to the corresponding angular zone. 20
7. A device according to any one of the preceding claims, wherein the first shaped portion (27) is monolithically attached to a second flat portion (28), the free end of which opposite the first portion (27) is shaped to define a locking bulb (29) which is suitable for being inserted, in order to carry out the fixing, in association with retention means (32) which are included, in the seat (25) of the first element (17). 25 30
8. A device according to one or more of the preceding claims, wherein the locking bulb (29) is prismatic. 35
9. A device according to one or more of the preceding claims, wherein the first element (17) is provided with an internal wall which is shaped to define the seat (25), the base of which is substantially counterformed with respect to the locking bulb (29). 40
10. A device according to one or more of the preceding claims, wherein the retention means (32) comprise two wings which can be resiliently deformed and which are developed internally with respect to the first element (17) by areas adjacent to the first slot and which continue to converge relative to each other while being substantially parallel with the internal wall of the seat (25), the wings are capable of locking the bulb (29) which is inserted by abutting the free ends thereof. 45 50
11. A device according to one or more of the preceding claims, wherein the second element (19) is shaped to define a second channel (34) which generally coincides with the corresponding channel (15) which is present in the corresponding angular zone. 55

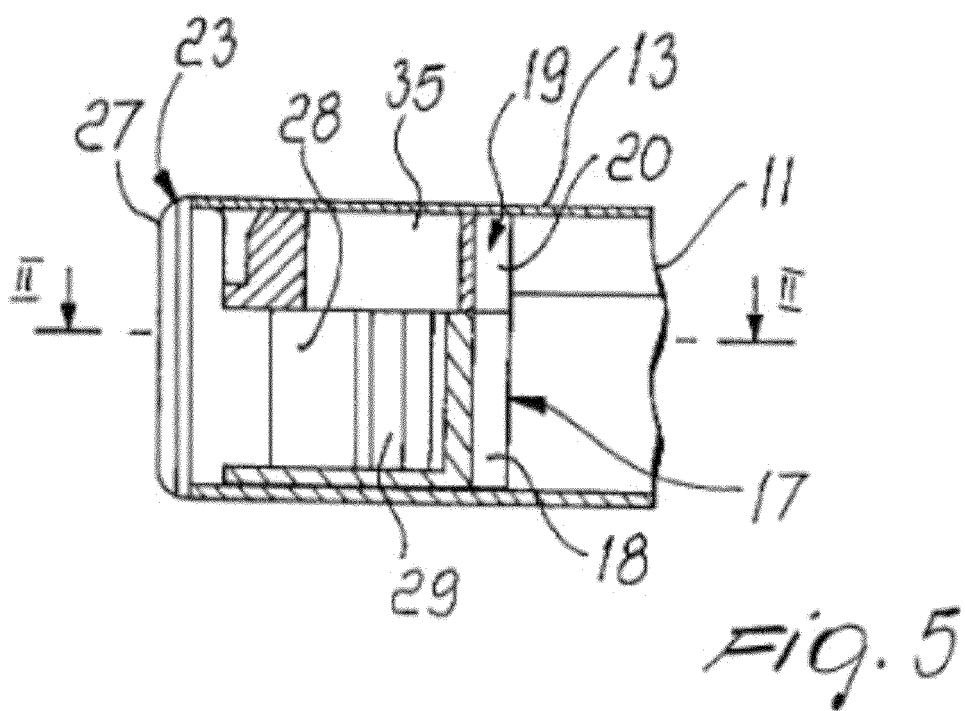
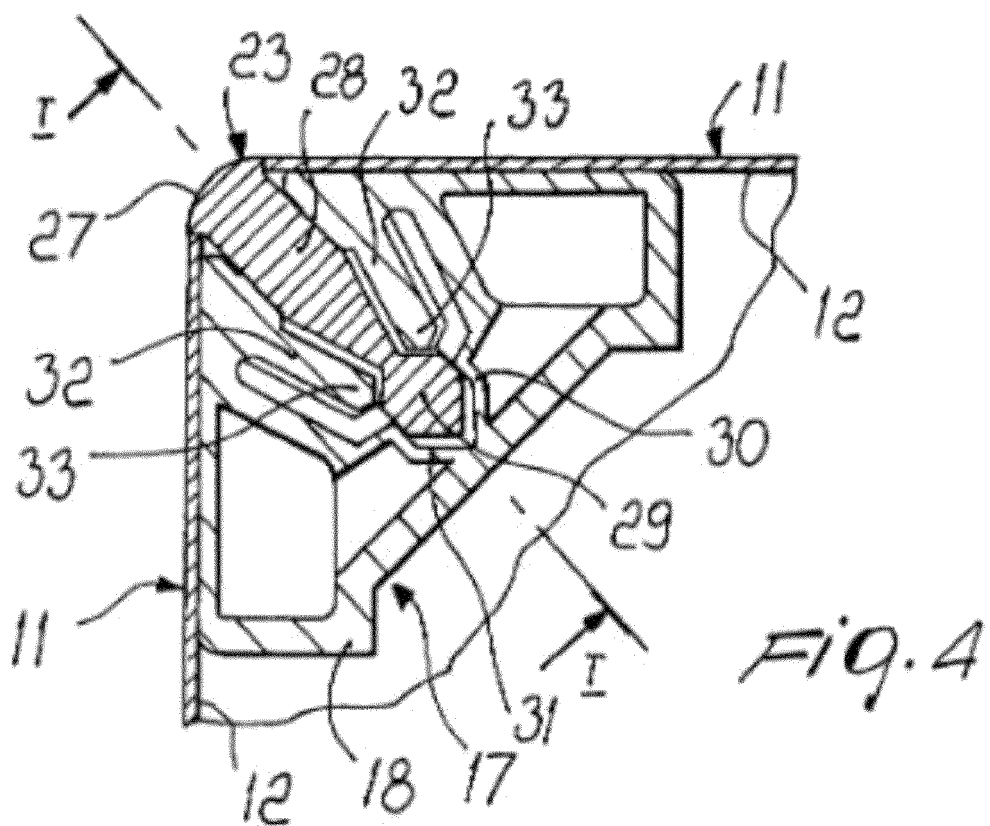
12. A device according to one or more of the preceding claims, wherein the second element (19) is provided with a through-hole (35), with a development substantially perpendicular to the location plane of the member thereof which is suitable for disconnecting the bulb (29) from the abutment of the wings.

13. A panel (10) for furniture items or parts of furniture items comprising

- a sheet having an edge (11) which is obtained by means of first bending lines (12) near a free zone of an end and the sheet being shaped in the manner of a "U" by means of double bending in accordance with a second bending line (13) and third bending line (14) parallel with each other and parallel with the first bending line and which are shaped, by cutting, in order to interrupt the continuity thereof in the region of the angular areas of the panel itself, defining therein at least one channel (15) with a depth similar to the edge (11),
- at least one angular locking device (16) according to one or more of the preceding claims, which is associated with the corresponding angular areas,
- the sheet of the panel (10) and the angular locking device being constructed from the same metal material and comprising the same covering with a thin ceramic film in order to have uninterrupted continuity of optical and tribological characteristics between the sheet and the angular device (16).









EUROPEAN SEARCH REPORT

Application Number
EP 21 17 0141

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 31 August 2021	Examiner Linden, Stefan
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 17 0141

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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