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PIECE OF FURNITURE

Abstract

A piece of furniture, comprising a first and second furniture part, which are coupled to each other at an angle by means of mechanical coupling means. A female part is made as an oblong slot in the second furniture part with an insertion opening for introducing a male part. When coupling the first furniture part and the second furniture part to each other, the male part is brought from an insertion position in the insertion opening to an end position in the female part by moving the male part and the female part along each other. The male part is situated on a narrow end of the first furniture part and is positioned with its center line between the central plane of the first furniture part and the inner side of the first furniture part. The slot is realized in the inwardly directed flat side of the second furniture part.

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Background/Summary

BACKGROUND

1. Field of the Disclosure

[0001] This invention relates to a composed element, in particular to a piece of furniture, as well as to a corner connection which is applied therewith.

[0002] More particularly, the invention relates to a piece of furniture, which comprises at least a first furniture part and a second furniture part, which are coupled to each other, can be coupled to each other, respectively, at an angle. Preferably, the respective furniture parts relate to panel-shaped elements. Herein, the invention relates to any type of composed element which comprises at least two or more parts, such as panel-shaped elements, irrespective of the field of application, and irrespective of the fact whether the composed element substantially consists exclusively of these parts or panel-shaped elements, or whether these parts only form a component thereof.

[0003] Although the invention can be applied in any application, it is primarily intended for application in the furniture sector, for loose furniture a well as for built-in furniture, such as dressing furniture, room dividers, and the like.

[0004] More particularly, the invention relates to connections between furniture parts, such as between panel-shaped elements, which can be realized in a smooth manner and are suitable for being employed with furniture which are sold in dismounted condition and have to be mounted by the buyer himself. Herein, this primarily relates to so-called flat-pack furniture.

[0005] Still more particularly, the invention relates to a piece of furniture, wherein this piece of furniture comprises at least a first furniture part and a second furniture part, which are coupled at an angle by means of mechanical coupling means, and wherein said coupling means consist at least of a male part provided on the first furniture part and a cooperating therewith female part provided on the second furniture part, wherein said female part is made as an oblong slot in said second furniture part and wherein said male and female part comprise one or more cooperating grooves and protrusions, wherein said slot comprises an insertion opening for introducing said male part and wherein, when coupling the first furniture part and the second furniture part to each other, the male part is brought from an insertion position in said insertion opening to an end position in said female part by moving the male part and the female part along each other in the longitudinal direction of said slot, wherein said grooves and protrusions in said end position cooperate such that a coupling of the first and second furniture part is obtained.

2. Related Art

[0006] Such piece of furniture is known from WO 2013/104422 and US 2014/205,373, wherein a first furniture part is provided with respectively three male parts on opposite ends. These male parts

respectively are made as dowels which are glued into the respective end or are attached by means of a connection obtained by an ultrasonic treatment. Herein, each time a tensioning effect is effected between two furniture parts by means of the cooperating grooves and protrusions. This tensioning is achieved in that the male part and the female part mutually are made of another material and in particular in that the material of the grooves of the female part is softer than the material of the grooves of the male part. The female part is made as an oblong slot in the inwardly directed flat side of one of the furniture parts. The slot is realized in the proximity of the edge of this furniture part. The material requirements and the positioning of the coupling means can weaken the whole and may lead to the occurrence of a variety of risks. For example, there is the risk that the soft material on the edge of the furniture part may break off. The piece of furniture of the aforementioned documents possibly will lead to installation faults. Moreover, the production of the furniture parts, in particular connecting the male parts onto the respective furniture part, requires particular treatments.

SUMMARY

[0007] The present invention, according to its different independent aspects, primarily relates to alternative furniture with a first and second furniture part which are coupled at an angle by means of mechanical coupling means. According to various preferred embodiments thereof, advantages are obtained in respect to the state of the art.

[0008] To this aim, the invention, according to a first independent aspect, relates to a piece of furniture, wherein this piece of furniture comprises at least a first furniture part and a second furniture part, which are coupled to each other at an angle by means of mechanical coupling means, and wherein said coupling means consist at least of a male part provided on the first furniture part and a cooperating therewith female part provided on the second furniture part, wherein said female part is made as an oblong slot in said second furniture part and wherein said male and female part comprise one or more cooperating grooves and protrusions, wherein said slot comprises an insertion opening for introducing said male part and wherein, when coupling the first furniture part and the second furniture part to each other, the male part is brought from an insertion position in said insertion opening to an end position in said female part by moving the male part and the female part along each other in the longitudinal direction of said slot, wherein said grooves and protrusions in said end position cooperate such that a coupling of the first and second furniture part is obtained, with the characteristic that said male part is situated on a narrow end of said first furniture part and is positioned with its center line between the central plane of the first furniture part and the inner side of the first furniture part, whereas said slot is realized in the inwardly directed flat side of the second furniture part. As the male part is provided towards the inner side of the piece of furniture, said slot of the female part can be realized at a distance from the distal end of the second furniture part, such that the risk of the respective edge breaking off can be minimized.

[0009] Preferably, at least two thirds of the male part are situated between said central plane and the inwardly directed side of the first furniture part. Still better, the male part is situated entirely between the central plane and the inwardly directed side of the first furniture part.

[0010] According to a second independent aspect, the invention relates to a piece of furniture, wherein this piece of furniture comprises at least a first furniture part and a second furniture part, which are coupled to each other at an angle by means of mechanical coupling means, and wherein said coupling means consist at least of a male part provided on the first furniture part and a cooperating therewith female part provided on the second furniture part, wherein said female part is made as an oblong slot in said second furniture part and wherein said male and female part comprise one or more cooperating grooves and protrusions, wherein said slot comprises an insertion opening for introducing said male part and wherein, when coupling the first furniture part and the second furniture part to each other, the male part is brought from an insertion position in said insertion opening to an end position in said female part by moving the male part and the female part along each other in the longitudinal direction of said slot, wherein said grooves and

protrusions in said end position cooperate such that a coupling of the first and second furniture part is obtained, with the characteristic that said male part comprises one or more recesses which effect the elasticity of one or more of the respective grooves and/or protrusions. As the elasticity of the male and/or the female part now can be influenced by providing recesses, the male and female parts can be realized in a similar material, more particularly in equally hard or soft material. Said recesses can be situated internally in the respective part or can extend from an outer edge inwards in the respective part.

[0011] According to a third independent aspect, the present invention relates to a piece of furniture, wherein this piece of furniture comprises at least a first furniture part and a second furniture part, which are coupled to each other at an angle by means of mechanical coupling means, and wherein said coupling means consist at least of a male part provided on the first furniture part and a cooperating therewith female part provided on the second furniture part, wherein said female part is made as an oblong slot in said second furniture part and wherein said male and female part comprise one or more cooperating grooves and protrusions, wherein said slot comprises an insertion opening for introducing said male part and wherein, when coupling the first furniture part and the second furniture part to each other, the male part is brought from an insertion position in said insertion opening to an end position in said female part by moving the male part and the female part along each other in the longitudinal direction of said slot, wherein said grooves and protrusions in said end position cooperate such that a coupling of the first and second furniture part is obtained, with the characteristic that said male and/or female part consist of at least two different materials, wherein one or more of the respective grooves and/or protrusions is made in a more elastic or softer material than the core material of the respective male and/or female part. As the material of the male and/or the female part is made of a more elastic or of a softer material only locally, a compromise is obtained between strength and compressibility. Such part may be obtained, for example, by coating techniques, wherein the core material of the respective part is provided with a coating with a more elastic material.

[0012] According to a fourth independent aspect, the present invention relates to a piece of furniture, wherein this piece of furniture comprises at least a first furniture part and a second furniture part, which are coupled to each other at an angle by means of mechanical coupling means, and wherein said coupling means consist at least of a male part provided on the first furniture part and a cooperating therewith female part provided on the second furniture part, wherein said female part is made as an oblong slot in said second furniture part and wherein said male and female part comprise one or more cooperating grooves and protrusions, wherein said slot comprises an insertion opening for introducing said male part and wherein, when coupling the first furniture part and the second furniture part to each other, the male part is brought from an insertion position in said insertion opening to an end position in said female part by moving the male part and the female part along each other in the longitudinal direction of said slot, wherein said grooves and protrusions in said end position cooperate such that a coupling of the first and second furniture part is obtained, with the characteristic that said male part is gluelessly connected to the first furniture part. Such glueless connection can be realized in a variety of possibilities. Below, various possibilities are listed, while not attempting to be exhaustive: [0013] the possibility that said glueless connection consists at least of a mechanical coupling connection by means of one or more hooks and undercuts; [0014] the possibility that said glueless connection consists at least of that the male part, on its end where it is connected to the first furniture part, is made with grooves which cooperate with a female part with grooves, which female part is also realized in the first furniture part; [0015] the possibility that said glueless connection consists at least of a screw thread connection.

[0016] A glueless connection offers a connection which is simpler to realize, which possibly can be realized by the end user.

[0017] According to a fifth independent aspect, the invention relates to a piece of furniture, wherein

this piece of furniture comprises at least a first furniture part and a second furniture part, which are coupled to each other at an angle by means of mechanical coupling means, and wherein said coupling means consist at least of a male part provided on the first furniture part and a cooperating therewith female part provided on the second furniture part, wherein said female part is made as an oblong slot in said second furniture part and wherein said male and female part comprise one or more cooperating grooves and protrusions, wherein said slot comprises an insertion opening for introducing said male part and wherein, when coupling the first furniture part and the second furniture part to each other, the male part is brought from an insertion position in said insertion opening to an end position in said female part by moving the male part and the female part along each other in the longitudinal direction of said slot, wherein said grooves and protrusions in said end position cooperate such that a coupling of the first and second furniture part is obtained, with the characteristic that the first furniture part, preferably on a first of two opposite ends, is provided with said male part as well as at least a female part. As different coupling parts are combined on one and the same furniture part, preferably on one and the same of two opposite ends, a better stability of the whole is achieved. Thus, the material parts which are weakened by the female parts are distributed over two furniture parts, which offers a spreading of the risk of break.

[0018] According to a sixth independent aspect, the present invention relates to still another piece of furniture, wherein this piece of furniture comprises at least a first furniture part and a second furniture part, which are coupled to each other at an angle by means of mechanical coupling means, and wherein said coupling means consist at least of a male part provided on the first furniture part and a cooperating therewith female part provided on the second furniture part, wherein said female part is made as an oblong slot in said second furniture part and wherein said male and female part comprise one or more cooperating grooves and protrusions, wherein said slot comprises an insertion opening for introducing said male part and wherein, when coupling the first furniture part and the second furniture part to each other, the male part is brought from an insertion position in said insertion opening to an end position in said female part by moving the male part and the female part along each other in the longitudinal direction of said slot, wherein said grooves and protrusions in said end position cooperate such that a coupling of the first and second furniture part is obtained, with the characteristic that the first furniture part, on a first of two opposite ends, is provided with at least three male and/or female parts, wherein the relations of the distance between a first and a second of these parts, and the distance between a second and a third of these parts, is at least 1.2 and preferably at least 1.5 or 2. As the distance between the parts is clearly made different, errors and/or time loss of the user when installing the piece of furniture will be minimized. To wit, the mutually strongly differing distance allows an identification of the front and rear sides of the furniture parts.

[0019] According to a seventh independent aspect, the present invention relates to a piece of furniture, wherein this piece of furniture comprises at least a first furniture part and a second furniture part, which are coupled to each other at an angle by means of mechanical coupling means, and wherein said coupling means consist at least of a male part provided on the first furniture part and a cooperating therewith female part provided on the second furniture part, wherein said female part is made as an oblong slot in said second furniture part and wherein said male and female part comprise one or more cooperating grooves and protrusions, wherein said slot comprises an insertion opening for introducing said male part and wherein, when coupling the first furniture part and the second furniture part to each other, the male part is brought from an insertion position in said insertion opening to an end position in said female part by moving the male part and the female part along each other in the longitudinal direction of said slot, wherein said grooves and protrusions in said end position cooperate such that a coupling of the first and second furniture part is obtained, with the characteristic that the first furniture part, on a first of two opposite ends, is provided with at least a male part, and wherein the first furniture part, on a second of these two opposite ends, comprises a second male part, which is least distant from said first male part, and

that the first and the second male parts, in respect to the longitudinal direction of the respective ends, are offset in mutual respect, or, in other words, are not positioned straight or inclined opposite to each other. By this particular positioning, an additional stability can be created.
[0020] According to an eighth independent aspect, the present invention relates to still another piece of furniture, wherein this piece of furniture comprises at least a first furniture part and a second furniture part, which are coupled to each other at an angle by means of mechanical coupling means, and wherein said coupling means consist at least of a male part provided on the first furniture part and a cooperating therewith female part provided on the second furniture part, wherein said female part is made as an oblong slot in said second furniture part and wherein said male and female part comprise one or more cooperating grooves and protrusions, wherein said slot comprises an insertion opening for introducing said male part and wherein, when coupling the first furniture part and the second furniture part to each other, the male part is brought from an insertion position in said insertion opening to an end position in said female part by moving the male part and the female part along each other in the longitudinal direction of said slot, wherein said grooves and protrusions in said end position cooperate such that a coupling of the first and second furniture part is obtained, with the characteristic that said female part is provided in a side of the second furniture part, which is provided with a layer-shaped covering. Preferably, this layer-shaped covering, in coupled condition, extends from on the inner side of the piece of furniture up to between the distal end of the first furniture part.
[0021] Preferably, said male part is provided in a narrow side of the first furniture part, wherein this side is free from layer-shaped coverings.
[0022] Preferably, said slot comprises a bevel or other chamfer.
[0023] According to a ninth independent aspect, the present invention relates to still another piece of furniture, wherein this piece of furniture comprises at least a first furniture part and a second furniture part, which are coupled to each other at an angle by means of mechanical coupling means, and wherein said coupling means consist at least of a male part provided on the first furniture part and a cooperating therewith female part provided on the second furniture part, wherein said female part is made as an oblong slot in said second furniture part and wherein said male and female part comprise one or more cooperating grooves and protrusions, wherein said slot comprises an insertion opening for introducing said male part and wherein, when coupling the first furniture part and the second furniture part to each other, the male part is brought from an insertion position in said insertion opening to an end position in said female part by moving the male part and the female part along each other in the longitudinal direction of said slot, wherein said grooves and protrusions in said end position cooperate such that a coupling of the first and second furniture part is obtained, with the characteristic that the first furniture part, on a first of two opposite ends, is provided with at least four male and/or female parts. Such a high number of local coupling parts results in a high strength in the corner connection.
[0024] According to a tenth independent aspect, the present invention relates to still another piece of furniture, wherein this piece of furniture comprises at least a first furniture part and a second furniture part, which are coupled to each other at an angle by means of mechanical coupling means, and wherein said coupling means consist at least of a male part provided on the first furniture part and a cooperating therewith female part provided on the second furniture part, wherein said female part is made as an oblong slot in said second furniture part and wherein said male and female part comprise one or more cooperating grooves and protrusions, wherein said slot comprises an insertion opening for introducing said male part and wherein, when coupling the first furniture part and the second furniture part to each other, the male part is brought from an insertion position in said insertion opening to an end position in said female part by moving the male part and the female part along each other in the longitudinal direction of said slot, wherein said grooves and protrusions in said end position cooperate such that a coupling of the first and second furniture part is obtained, with the characteristic that in the coupled condition of the first furniture part and the

second furniture part free spaces or chambers are present in the coupling zone, wherein there is at least a free space between the distal end of the first furniture part and either the distal end of the second furniture part, or the inwardly directed flat side of the second furniture part. Such free spaces can lead to a better connection of the furniture parts to one or more of their surfaces visible in the piece of furniture. The presence of free spaces restricts the size of the contact surfaces between both furniture parts and allows obtaining a good connection of the remaining contact surfaces. The moving along each other of the male and female part can be performed with less force, and a possible compression of the furniture parts towards each other can be guaranteed more simply.

[0025] Preferably, said free chambers are air chambers, however, one or more of such chambers may also be filled with compressible material.

[0026] Below follow some preferred embodiments, which can be applied generally and thus to all independent aspects. Preferably, said first and second furniture parts in the aforementioned end position are pressed towards each other by means of the cooperating grooves and protrusions. Herein, the measures of said second and/or third aspects are particularly advantageous.

[0027] Preferably, the grooves and/or protrusions are compressed during the aforementioned shifting.

[0028] Preferably, said grooves and protrusions of cooperating female and male parts are made mutually inclined.

[0029] Preferably, the male part is made as a dowel or pin, which is made with a profile, such that it, as aforementioned, comprises one or more grooves or protrusions.

[0030] Preferably, the first furniture part connects with its distal or narrow end to the inwardly directed side of the second furniture part in order to thereby include an angle of **90** degrees or approximately 90 degrees. However, it is not excluded that the second through tenth aspects are applied with furniture of which the first furniture part connects with its distal or narrow end against the distal or narrow end of the second furniture part in order to thereby include an angle of 90 degrees or approximately 90 degrees. Herein, this may relate to a so-called miter coupling.

[0031] Further characteristics of the invention will become clear from the following description and the appended claims.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] With the intention of better showing the characteristics of the invention, herein after, as an example without any limitative character, some preferred embodiments are described, with reference to the accompanying drawings, wherein:

[0033] FIG. **1** in perspective represents a piece of furniture having the characteristics of the invention;

[0034] FIG. **2**, at a larger scale, represents a cross-section according to the line II-II represented in FIG. **1**;

[0035] FIG. **3**, at a larger scale, represents a view on the area indicated by F**3** in FIG. **2**;

[0036] FIG. **4**, at the same scale as in FIG. **3**, represents a cross-section according to the line IV-IV represented in FIG. **2**;

[0037] FIG. **5** in perspective represents how the furniture parts of FIG. **1** can be coupled;

[0038] FIGS. **6** and **7**, in a view similar to that of FIG. **4**, represent some steps in the coupling action;

[0039] FIGS. **8** to **20**, in a view similar to that of FIG. **3**, represent variants;

[0040] FIG. **21**, in a view similar to that of FIG. **7**, represents how the embodiment of FIG. **20** can be coupled;

[0041] FIG. **22**, in a view according to the arrow F**22** represented in FIG. **5**, represents a furniture part for a piece of furniture having, amongst others, the characteristics of the second aspect;
[0042] FIGS. **23** and **24**, in similar views, represent a furniture part for a piece of furniture having, amongst others, the characteristics of the fifth and the seventh aspect, respectively, of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE DISCLOSURE

[0043] FIG. **1** represents a piece of furniture **1** which consists of a plurality of furniture parts **2-5**, in this case a plurality of panel-shaped elements. The panel-shaped elements form, amongst others, both side panels **3-4**, the top panel **2**, the bottom panel **4**, a baseboard **6**, various shelves **7** and a back **8**.
[0044] FIGS. **2** and **3** represent that the side panels **3-5** and, for example, the top panel **2** are coupled to each other at an angle by means of mechanical coupling means **9**. In this case, the entire framework of the represented piece of furniture **1** is composed by means of such mechanical coupling means **9**. The four main panels **2-3-4-5**, namely both side panels **3-5**, the top panel **2** and the bottom panel **4**, are coupled to each other in a similar manner at an angle and include an angle A of 90 degrees or almost 90 degrees. It is not excluded that one or more of the shelves **7** and/or the baseboard **5** and/or the back **8** are attached to the framework in such manner as well.
[0045] The coupling means **9** consist at least of a male part **10** and a female part **11**. It is evident that a plurality of such male parts **10** and female coupling parts **11** can be positioned one behind the other along the coupling zone **12**. Preferably, at least two or three of such coupling parts **10-11** are applied along a coupling zone **12**.
[0046] FIG. **4** represents that the male part **10** in this case is provided on the distal or narrow end **13** of the top panel **2**, and that the female part **11** is made as an oblong slot **14** in a side panel **3**, more particularly in the inwardly directed side **15** of this side panel **3**.
[0047] The male part **10** and the female part **11** in this case show a plurality of cooperating grooves **16** and protrusions **17**.
[0048] FIG. **5** clearly shows that said slot **14** shows an insertion opening **18**. The insertion opening **8** is made with a larger diameter than the remaining portion of the slot **14**.
[0049] FIG. **6** represents that the male part **10** can be introduced in said slot **14** according to the arrow **19** and via the insertion opening **18**.
[0050] FIG. **7** represents that, when coupling the side panel **3** and the top panel **2** to each other, the male part **10** is brought from this insertion position to an end position **20** in the female part **11** by moving the male part **10** and the female part **11** along each other in the longitudinal direction of said slot **14**.
[0051] In the end position **20**, which is represented in FIGS. **2**, **3** and **4**, the aforementioned grooves **16** and protrusions **17** mutually cooperate, such that a coupling of the side panel **3** and the top panel **2** is obtained.
[0052] The particularity of the arrangement represented here is that the male part **10**, in accordance with the first aspect of the invention, is positioned with its center line **21** between the central plane **22** of the top panel **2** and the inwardly directed side **23** of the top panel **2**. Hereby is obtained that a considerable material part **24** remains present between the slot **14** of the female part **11** and the narrow end **25** of the side panel **3**, which leads to a reduced risk of breaking.
[0053] In this example, the grooves **16** and protrusions **17** of the female part **11** are made inclined, for example, at an angle B of 2 to 20°. Hereby, it is obtained that during shifting, the narrow end **13** of the top panel **2** is pulled towards the flat side **15** of the side panel **3**, such that in the end position **20** an initially present gap **26** is reduced or eliminated. It is possible to realize the inclination such that in the end position **20** a compression of both panels **2-3** is obtained, analogous to the compression of the document WO 2013/104422 mentioned in the introduction.
[0054] The embodiment represented by means of FIGS. **1** to **7** further also shows the characteristics of the eighth independent aspect. To this aim, the female part **11** is provided in a side **15** of the side panel **3**, which is provided with a layer-shaped covering **27**. In this case, the layer-shaped covering

27, in the coupled condition, extends from on the inner side **28** of the piece of furniture **1** up to between the distal end **13** of the first furniture part **2** and this inner side **28**, or the inwardly directed flat side **15** of the second furniture part **3**. The layer-shaped covering **27** accompanies the mutual shifting during the coupling action and may lead to an improved quality of the inner corner of the coupling. A possible compression effect also benefits from the presence of such layer-shaped covering **27**.

[0055] FIG. **8** represents a variant wherein also the characteristics of the tenth independent aspect mentioned in the introduction are applied. In the represented coupled condition, free spaces **29-30** are present between the distal or narrow end **13** of the first furniture part **2** or the top panel and the inwardly directed flat side **15** of the second furniture part **3** or the side panel. Here, this relates to a straight coupling, wherein the respective furniture parts **2-3** adjoin each other with perpendicular or almost perpendicular sides or ends and thus no miter coupling, wherein the respective furniture parts adjoin each other with inclined-made edges, for example, at an angle between 30 and 60 degrees, preferably approximately 45 degrees.

[0056] FIG. **9** represents another variant with the characteristics of the tenth independent aspect, wherein, in coupled condition, free spaces **29-30** are present between the distal or narrow end **13** of the top panel **2** and the distal or narrow end **25** of the side panel **3**. Here, this relates to a so-called miter coupling, wherein the respective ends adjoin against each other at an angle C of approximately 45 degrees.

[0057] It is clear that the characteristics of the tenth aspect do not necessarily have to be combined with the characteristics of the first aspect.

[0058] FIGS. **8** and **9** also represent some preferred embodiments of the tenth independent aspect, which each can be applied separately or in combination. This relates to the following particularities: [0059] There is at least a free space **29** between the outwardly directed side **31** of the first furniture part **2** and the male part **10**. This free space **29** preferably is closed off towards the outside in that the first and the second furniture part **2-3** form a contact surface **32**. [0060] There is at least a free space **30** between the inwardly directed side **23** of the first furniture part **2** and the male coupling part **10**. This free space **30** may or may not be made closed towards the inside. FIG. **9** represents a closed embodiment in that the first and the second furniture part **2-3** form a contact surface **33**. FIG. **8** represents an open embodiment. Such embodiment forms a better guarantee for the adjoining of the contact surfaces **32** on the outwardly directed sides **31**. [0061] Said free spaces **29-30** are formed as recesses in the distal end **13** of the first furniture part **2**. Of course, it is also possible that they are formed as a recess in the inwardly directed side **15** of the second furniture part **3**, or in the distal end **25** of the second furniture part **3**, this latter in particular in the case of miter couplings. Also, a combination of recesses in the first and the second furniture part **2-3** is not excluded either.

[0062] FIG. **10** represents another embodiment of the tenth independent aspect, wherein the male part **10** partially is countersunk in the narrow or distal end **13** of the first furniture part **2**, in this case the top panel. By this is meant that the male part **10** protrudes from a surface **34**, which latter is inwardly situated in respect to the contact surfaces **32**. This is illustrated here by means of a miter coupling, however, can also be applied in a straight coupling.

[0063] FIG. **11** represents an embodiment having, amongst others, the characteristics of the second independent aspect mentioned in the introduction. To this aim, the male part **10** comprises a recess **35**, in this case realized in the depth direction of the slot **14**. In dashed line **36**, the relaxed condition of the male part **10** is illustrated. The respective recess **35** increases the elasticity of the male part **10**, such that the protrusions **17** thereof, in the coupled condition represented here, can be bent inward. Due to the spring-back force of the male part **10**, the furniture parts **2-3** are pulled towards each other. Hereby, a strong connection between the respective furniture parts **2-3** can be obtained.

[0064] FIG. **12** shows another example of the second independent aspect, wherein the one or more recesses **35** are realized transverse to the depth direction of the slot **14**. The obtained effects are

similar to those in the case of FIG. **11**.
[0065] FIG. **13** represents another example of the second independent aspect, wherein the one or more recesses **35** are situated internally in the male part **10**. Here, too, similar effects are achieved as in FIGS. **11** and **12**.
[0066] FIG. **14** represents an example of the third aspect of the invention, mentioned in the introduction, wherein the male part **10** consists of at least two different materials **37**-**38**. Herein, the protrusions **17** are provided with a material **37** which is more elastic than the core material **38** of the male part **10**. With such embodiment, similar effects can be obtained as those in the FIGS. **11** to **13**, however, here rather a spring-back effect on the basis of compression of the elastic material is applied. Suitable materials for the elastic surface material **37** are for example, polyurethane or soft polyvinyl chloride. Suitable core materials **38** are, for example, acrylonitrile butadiene styrene (ABS) or hard polyvinyl chloride (rigid PVC). The surface material **37** can also be formed by a deposited layer of paraffin. The use of a different surface material **37** can also have a positive influence on the sliding features, such that coupling the male part **10** and female part **11** to each other can be performed more smoothly by means of the relative shifting movement. This is in particular the case when paraffin or polyurethane is applied as a surface material **37**.
[0067] FIG. **15** represents still another particular embodiment, which combines the characteristics of the second and the third aspect. To this aim, the slot **14** of the female part **11** is at least partially formed by an insert **39** of a more elastic material **37** than the core material **38** of the second furniture part **3**. Moreover, this insert **39** is provided with recesses **35**, which are separated by elastically bendable lips or protrusions **17**. Here, too, similar effects are achieved as in the case of FIGS. **11** to **14**.
[0068] FIG. **16** represents another additional eleventh independent aspect, wherein the male part **10** and the female part **11** are made conical in the depth direction, or wherein the male part **10** comprises a plurality of protrusions **17**, wherein these protrusions **17** are situated at different distances from the center line **21** of the male part **10**. Preferably, this distance, as here, increases with the depth of the slot **14**. In this manner, an extra strong coupling is obtained.
[0069] FIG. **17** represents another additional twelfth independent aspect, wherein the female part **11** and/or the male part **10** in coupled condition extends to beyond the central plane **40** of the second furniture part **3**, and/or wherein the female part **11** is free from cooperating protrusions **17** and grooves **16** up to at least a depth D of 25% of the thickness T of the second furniture part **3**. In this manner, very strong couplings can be obtained. In particular when a compression is striven for, the risk is minimized that such compression would show on the inwardly directed side **15** of the second furniture part **3**.
[0070] FIG. **18** represents an embodiment with the characteristics of the fourth aspect of the invention, mentioned in the introduction, wherein the male part **10** is gluelessly connected to the first furniture part **2**, in that it is attached by means of a screw connection **41**. The protruding part of the male part **10** in this case is provided with an eyelet **42** through which a tool can be put to serve as a lever for fixing the screw connection **41**.
[0071] FIG. **19** represents another example of the fourth aspect, wherein said glueless connection consists of a mechanical coupling connection by means of one or more hooks **43** and undercuts **44**. Preferably, said hooks **43** allow for a snap connection of the male part **10** in the narrow or distal end **13** of the respective furniture part **2**.
[0072] FIGS. **20** and **21** represent another example of the fourth aspect, wherein said glueless connection consists at least of that the male part **10** at its end with which it is connected to the first furniture part **2**, or, in other words, at its attachment part, is realized with protrusions **17** and/or grooves **16**, which cooperate with a female part **11**A, which is also realized in the first furniture part **2** and comprises grooves **16** and/or protrusions **17**. In the example, a symmetric male part **10** is obtained which can be connected by the user without the possibility of faults.
[0073] FIG. **21** shows that the connection of the male part **10** from FIG. **20** possibly can be

performed entirely or partially by means of the same movement by which the furniture parts **2-3** are coupled to each other.

[0074] FIG. **22** represents an example of the sixth independent aspect of the invention, mentioned in the introduction, wherein the first furniture part **2** on a first end **45** of two opposite ends **45-46** is provided with at least three male parts **10**, and wherein the relation of the distance D**1** between a first male part **10** and a second neighboring male part **10** and the distance D**2** between this second and a third neighboring male part **10** is at least 1.2.

[0075] FIG. **23** represents an example of the fifth independent aspect mentioned in the introduction, wherein the first furniture part **2** on a first of two opposite ends **45-46** is provided with at least a male part **10** as well as with at least a female part **11**.

[0076] It is clear that FIG. **23** further also forms an example of the sixth independent aspect, wherein the position of the female part **11** is determined by the position of the cooperating therewith male part **10** in the end position **20**.

[0077] FIG. **24** represents an example of the seventh aspect of the invention, mentioned in the introduction. To this aim, the first furniture part **2**, on a first of two opposite ends **45**, is provided with at least a first male part **10**A, and the first furniture part **2**, on a second of these two opposite ends **46**, is provided with a second male part **10**B, which is least distant from the first male part **10**A. In this case, this always relates to the male parts **10**A-**10**B, which are situated centrally along the respective ends **45-46**. In respect to the longitudinal direction of the respective ends **45-46**, this first and second male parts **10**A-**10**B are shifted in mutual respect over a distance D**3**. Preferably, the shifting is at least 5 percent of the length L of the respective end, however, preferably at least 10 percent or more.

[0078] By such configuration, particular effects can be achieved. FIG. **24** represents that in an attempt to pull the side panels **3-5** away from the top panel according to the arrows **47**, a torque effect **48** is created, which pushes the male parts **10**-**10**A-**10**B more strongly into their end position **20** in the slot **14**. In this case, the asymmetric placement thus effects a reinforcement of the whole of the piece of furniture **1**. In this case, this is also obtained in that the female parts **11** of both side panels **3-5** are made mirrored. In an analogous manner, it can be provided for that such torque effect leads to a simpler de-installation, namely, in that the torque results in the tendency to push the male parts **10**-**10**A-**10**B loose from their end position **20**, however, this is not represented here.

[0079] It is noted that FIG. **24** also forms an example of an additional thirteenth aspect, wherein the first furniture part **2** on at least two opposite ends **45-46** has to be coupled to a second furniture part **3**, third furniture part **5**, respectively, and wherein the movement of the male parts **10**-**10**A-**10**B along the female parts **11** for the respective two opposite sides **45-46** is opposed to each other. In the example of FIG. **24**, the side panel **3** shown on the left hand side must be shifted in the direction of arrow **49**, whereas the side panel **5** shown on the right hand side must be shifted in the opposite direction, namely in the direction of arrow **50**, in respect to the top panel **2**.

[0080] It is clear that many of the mentioned independent aspects can be combined with each other. For example, the features of the tenth aspect thus may be applied in the embodiments of all figures or other aspects.

[0081] The eighth independent aspect, too, can be applied broadly. In this respect, it is noted that embodiments of the eighth aspect are represented, amongst others, in FIGS. **2** to **8** and **11** to **21**. To this aim, the female part **11** is provided in a side **15** of the second furniture part **3**, which is provided with a layer-shaped covering **27**. Herein, this respectively relates to furniture parts **2-3** which form an outer side of the piece of furniture **1**, and no shelves **7**. The male part **10** respectively is provided in a narrow side or narrow end **13** of the first furniture part **2**, wherein this end **13** is free from layer-shaped coverings **27**. In most cases, the slot **14** comprises a bevel **51** or other chamfer, which is beneficial for the quality of the connection.

[0082] It is evident that the coupled to each other first and second furniture parts **2-3** can be formed by any pair of coupled furniture parts. By way of example only, in the figures respectively a top

panel is depicted as the first furniture part **2** and a side panel as the second furniture part **3**.
[0083] Further, it is noted that, although all examples of the figures show male parts **10** with circular or approximately circular cross-sections, these male parts **10** of course also may show other shapes, such as a shape with an oblong cross-section, for example, a wedge shape, analogous to the shape of an insertion wedge in an axis connection. The longitudinal direction of the male part **10** in such case preferably is oriented according to the longitudinal direction of the narrow end **13** of the first furniture part **2**.
[0084] Further, it is also noted that, although the male part **10** in all examples is realized as a separate insert, this part can also be made in one piece with the first furniture part **2**, for example, in that this male part **10** is formed, by means of machining treatments, on the narrow or distal end **13** of the first furniture part **2**.
[0085] Further, it is clear that the connections of the invention, which are described as a connection between a first and a second furniture part, can also be applied more broadly than for furniture only. For example, they thus may be applied for any connection, at an angle or flat, in boxes, construction panels, floors and the like.
[0086] The present invention is in no way limited to the herein above-described embodiments, on the contrary may such furniture and connections be realized according to various variants, without leaving the scope of the present invention.

Claims

1. A piece of furniture, comprising: a male part having a center line along which first and second portions are defined, the first portion forming engagement elements including a plurality of protrusions extending about the center line at different distances from the center line; a first furniture part defining a female part including an insertion opening and a slot having a center line, the slot forming engagement elements including a plurality of grooves arranged at different distances from the center line, the slot communicating with the insertion opening; a second furniture part into which the second portion of the male part is secured; and wherein the first portion of the male part is arranged to extend into the insertion opening of the female part, such that movement of the first furniture part relative to the second furniture part urges the engagement elements of the male part into cooperation with the engagement elements of the first furniture part to obtain a coupling of the first furniture part to the second furniture part.
2. The piece of furniture of claim 1, wherein the slot expands conically according to a depth direction of the slot.
3. The piece of furniture of claim 1, wherein the slot variably increases in distance relative to the center line thereof according to a depth direction of the slot.
4. The piece of furniture of claim 1, wherein the plurality of grooves of the female part are inclined relative to the plurality of protrusions of the male part.
5. The piece of furniture of claim 4, wherein the plurality of grooves of the female part are inclined at an angle B of 2 to 20°.
6. The piece of furniture of claim 1, wherein the male part is symmetrical about the center line and along a length of the second portion.
7. The piece of furniture of claim 6, wherein the first portion of the male part defines a circular cross-section of varying diameters relative to the center line thereof.
8. The piece of furniture of claim 1, wherein the male part is defined as a separate insert relative to the first and second furniture parts.
9. The piece of furniture of claim 1, wherein the second portion of the male part is arranged to be positioned in the second furniture part with the center line between a central plane and an inwardly directed side of the second furniture part.
10. The piece of furniture of claim 1, wherein at least two-thirds of the male part is located between

a central plane and an inwardly directed side of the second furniture part.

11. The piece of furniture of claim 1, wherein the insertion opening of the female part has a larger diameter than a diameter of the slot.

12. The piece of furniture of claim 11, wherein the center line of the male part is arranged to be aligned with an axis of the diameter of the insertion opening such that coupling occurs by urging the male part toward the slot in at least a longitudinal direction of the slot relative to the axis of the diameter of the insertion opening.

13. The piece of furniture of claim 1, wherein the female part is defined along a flat side of the first furniture part having a layered-shaped covering.

14. The piece of furniture of claim 13, wherein the female part is defined proximate to a corner of the first furniture part.

15. The piece of furniture of claim 1, wherein the insertion opening and the slot of the female part define a continuous oblong slot wherein at least a portion of the insertion opening is devoid of the engagement elements.

16. A system for coupling furniture, the furniture including a first furniture part and a second furniture part, the system comprising: a male part having a center line along which first and second portions are defined, the first portion forming at least one engagement element extending about the center line and arranged at different distances from the center line, the second portion of the male part securing to the second furniture part and the first portion of the male part protruding from a central plane of the second furniture part; wherein the first furniture part defines a female part including an insertion opening and a slot having a center line and forming at least one engagement element arranged at different distances from the center line, the slot communicating with the insertion opening; wherein the first portion of the male part is arranged to extend into the insertion opening of the female part, such that movement of the first furniture part relative to the second furniture part urges the at least one engagement element of the male part into cooperation with the at least one engagement element of the first furniture part to obtain a coupling of the first furniture part to the second furniture part.

17. The system of claim 16, wherein the first portion of the male part and the female part at the slot are arranged conically relative in a depth direction of the slot.

18. The system of claim 16, wherein the at least one engagement element of the male part comprises at least one protrusion, and the at least one engagement element of the female part comprises at least one groove arranged to engage the at least one protrusion.

19. A piece of furniture, comprising: a male part having a center line along which first and second portions are defined, the first portion forming at least one engagement element extending about the center line, and increasing conically relative to the center line along a length of the first portion extending from the second portion; a first furniture part defining a female part including an insertion opening and a slot having a center line and forming at least one engagement element increasing conically relative to the center line deeper into a depth of the slot; a second furniture part into which the second portion of the male part is secured; and wherein the first portion of the male part is arranged to extend into the insertion opening of the female part, such that movement of the first furniture part relative to the second furniture part urges the at least one engagement element of the male part into cooperation with the at least one engagement element of the first furniture part to obtain a coupling of the first furniture part to the second furniture part.

20. The piece of furniture of claim 19, wherein the at least one engagement element of the male part comprises a plurality of protrusions, and the at least one engagement element of the female part comprises a plurality of grooves arranged to engage the plurality of protrusions.