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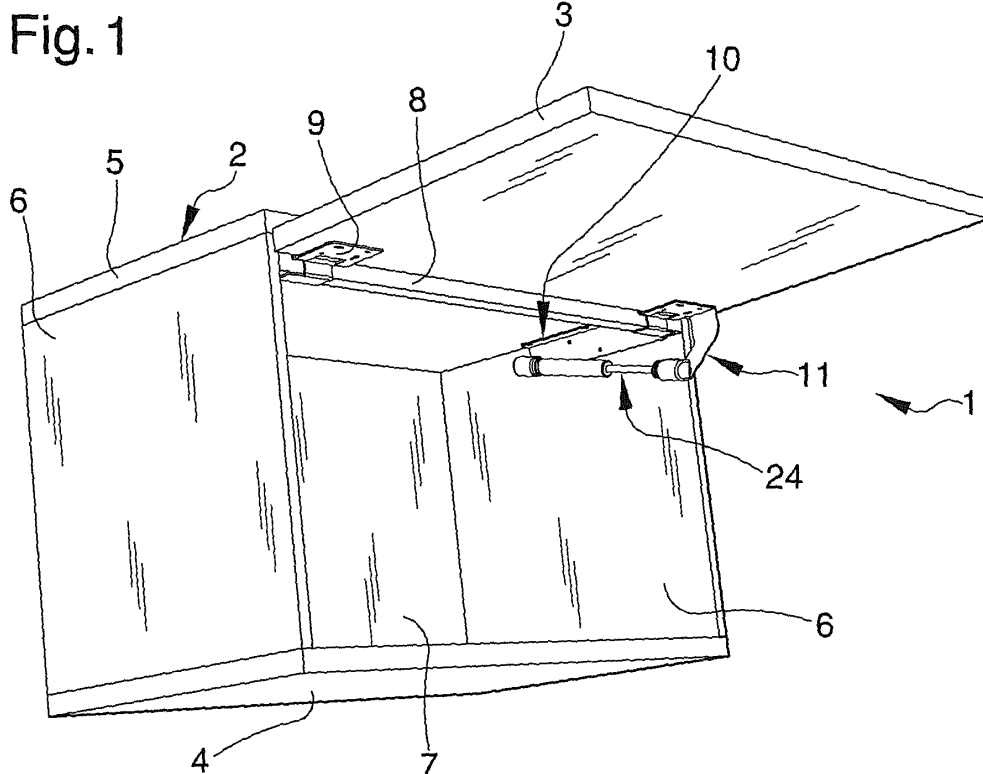
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(54) **Hinging device for doors of furniture units of vehicles, particularly caravans, motorhomes and boats**

(57) The hinging device for doors of furniture units of vehicles, particularly caravans, motorhomes and boats, comprises a first element associable with a furniture unit, a second element associable with a door, rotation means which are placed between the first element and the second element and which are suitable for permitting the

mutual rotation substantially around a swinging axis between a closing configuration of the door and an opening configuration of the door, and a gas spring which is provided with a first extremity associable with the first element and with a second extremity associable with the second element and which is suitable for making the opening and/or the closing of the door easier.



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Description

[0001] This invention relates to a hinging device for doors of furniture units of vehicles, particularly caravans, motorhomes and boats.

[0002] It is well known that vehicles used for the transport and for the permanent and/or temporary accommodation of people, such as caravans, motorhomes, boats, airplanes or the like, need to be fitted out with furnishing articles substantially the same as those used in immovable buildings, with the specific particularity of having a very small total weight together with compact shapes and dimensions aimed at reducing excess overall dimensions.

[0003] With reference to furniture units with doors, such as wardrobes, cabinets, wall units or the like, it must be pointed out that such furnishing articles are usually fitted with particularly essential and lightweight hinges, composed of two slabs hinged together which are connected to the door and to the furniture unit respectively by means of screws, bolts, rivets, adhesive materials or the like.

[0004] Such hinges, in point of fact, leave the door completely free to rotate with respect to the furniture unit and are not able to provide any push or pull to make opening and/or closing the door easier.

[0005] Such limitation is particularly felt in the case of doors to be hinged along a horizontal axis and which open upwards, inasmuch as the weight force tends to close the door again.

[0006] To overcome this limit, special hinging devices have been developed composed of two slabs for fastening to the door and to the furniture unit and of a series of metal arms connecting the two slabs and forming a more or less complicated kinematic rotation mechanism.

[0007] Integrated between the slabs and the arms are elastic push means that allow dragging the furniture unit door in rotation.

[0008] The elastic means consist, e.g., in one or more helical metal springs of the traditional type, or else are composed of particularly strong metal-plate component parts suitable for bending and exploiting the elasticity of the material of which they are made.

[0009] These hinging devices are however not without their drawbacks, including the fact that the push force of the elastic means is usually rather sudden and not very regular and, sometimes, the user has to be very careful in opening/closing the furniture unit to prevent the door from jolting and jerking.

[0010] To overcome these drawbacks, in some types of furniture units with doors that open upwards, such as, e.g., in the hand-luggage compartments of aeroplanes, the use is known of one or more additional devices made up of gas springs able to withstand the weight of the door in an opening configuration.

[0011] The gas springs, in point of fact, are made up of a small compression-charged pneumatic cylinder the extremities of which are hinged to the furniture unit and

the door respectively.

[0012] In this particular field of application, the door is first of all assembled and made turnable with respect to the furniture unit by means of two or more hinges of the traditional type.

[0013] At this point, the extremities of the small pneumatic cylinder are screwed onto the internal surfaces of the furniture unit and of the door at more or less distant points with respect to the previously fitted hinges.

[0014] This particular hinging system is however also affected by a number of drawbacks.

[0015] If on the one hand in fact, the push applied by the gas spring is more regular compared to the metal springs of the traditional hinging devices, on the other hand, it appears evident that to fit one or more gas springs after the assembly of the door is an inconvenient additional operation that requires a considerable increase in production time and costs.

[0016] In this respect, the fact is underlined that the positioning and fastening of the extremities of a gas spring are almost never quick and immediate operations but, in point of fact, require care and attention because, depending on the mutual position between the two extremities, the push force is determined which the gas spring is able to produce in opening configuration.

[0017] It should not be forgotten on the other hand that the extremities of the gas spring must be fitted so they are able to turn around axes parallel to the rotation axis of the hinges so as to prevent the gas spring from balking or other malfunctions.

[0018] In the light of this consequently, it is understandable that the gas springs have to be inconveniently fitted by trained personnel and at a fairly high cost.

[0019] The main aim of this invention is to provide a hinging device for doors of furniture units of vehicles, particularly caravans, motorhomes and boats, which has a very simple structure, is easy to make, has particularly low fabrication, installation and labour costs and, once assembled, permits the opening and closing of the doors in a practical, easy, functional and effortless way for the user.

[0020] Another object of this invention is to provide a hinging device for doors of furniture units of vehicles, particularly caravans, motorhomes and boats, which permits overcoming the mentioned drawbacks of the state of the art within the ambit of a simple and rational solution that is easy and effective to use and has a low cost.

[0021] The above objects are achieved by this hinging device for doors of furniture units of vehicles, particularly caravans, motorhomes and boats, characterized by the fact that it comprises at least a first element associable with at least a furniture unit, at least a second element associable with at least a door, rotation means which are placed between said first element and said second element and which are suitable for permitting the mutual rotation substantially around a swinging axis between a closing configuration of said door and an opening configuration of said door, and at least a gas spring which is

provided with a first extremity associable with said first element and with a second extremity associable with said second element and which is suitable for making the opening and/or the closing of said door easier.

[0022] Other characteristics and advantages of this invention will become more evident from the description of some preferred, but not sole, embodiments, of a hinging device for doors of furniture units of vehicles, particularly caravans, motorhomes and boats, illustrated purely as an example but not limited to the annexed drawings in which:

the figure 1 is a perspective view of a furniture unit having a preferred embodiment of the device according to the invention;

the figure 2 is a perspective view on an enlarged scale of the device of figure 1;

the figure 3 is a perspective view of an alternative embodiment of the device according to the invention;

the figure 4 is a side view of the device of figure 3 in an opening configuration;

the figure 5 is a side view of the device of figure 3 in a closing configuration.

[0023] With particular reference to the embodiment shown in figure 1 and 2, 1 is used generally to indicate a hinging device for doors of furniture units of vehicles, particularly caravans, motorhomes and boats.

[0024] In detail, the device 1 is intended to be fitted on a furniture unit 2 to allow the hinging of a door 3.

[0025] The furniture unit 2 shown in the figures 1 and 2 consists, for example, in a small wall cabinet which has a base surface 4, a cap 5 and two side walls 6.

[0026] The rear face of the small cabinet 2 is closed by means of a bottom wall 7 while the front face is open and can be re-closed by means of the door 3.

[0027] At the upper corner of the front face, furthermore, the furniture unit 2 has a surround strip 8.

[0028] It cannot however be ruled out that the device 1 can be also fitted on furniture units 2 of different shape compared to that shown and, for example, without the surround strip 8.

[0029] In the embodiment shown in the figures 1 and 2, furthermore, the rotation of the door 3 is achieved by means of the device 1 and of a hinge 9 of the traditional type; alternative manufacturing solutions are however possible in which the hinge 9 is not provided and two or more devices 1 are fitted on the furniture unit 2.

[0030] The device 1 comprises a first element 10 associable with the furniture unit 2 and a second element 11 associable with the door 3, between which are placed rotation means 12 which are suitable for allowing their mutual rotation substantially around a swinging axis A between a closing configuration of the door 3 and an opening configuration of the door 3.

[0031] The swinging axis A is suitable for being placed parallel and substantially coinciding with a side of the front face of the furniture unit 2.

[0032] In the particular embodiment of the invention shown in the figures 1 and 2, for example, the device 1 is fitted at one of the two upper corners of the front face of the furniture unit 2 and the swinging axis A is arranged coinciding with the upper side of the front face so that the door 3 can be opened by rotating it upwards.

[0033] Alternative solutions are nevertheless possible in which the device 1 is fitted close to the lower corners of the furniture unit 2 and/or in which the swinging axis A is arranged along the lower side or along the sides of the front face of the furniture unit 2.

[0034] Advantageously, the first element 10 comprises a first slab 13 for attaching to a first inner surface of the furniture unit 2, i.e. one of the side walls 6, a second slab 14 for attaching to a second inner surface of the furniture unit 2, i.e. the cap 5, and a third slab 15 for attaching to the surround strip 8 of the furniture unit 2.

[0035] The slabs 13, 14, 15, in actual fact, make it possible to stably fasten the first element 10 to the furniture unit 2 but alternative embodiments cannot however be ruled out in which only one of the slabs 13, 14, 15, is provided or else only two of these are provided.

[0036] Each slab 13, 14, 15 is associated at right angles to the other two and has through holes 16 for fitting pins for attaching to the furniture unit 2, such as, for example screws, rivets, nails, etc...

[0037] The third slab 15, furthermore, has a bent portion 17 suitable for at least partially wrapping the surround strip 8 and facing out onto the outside of the furniture unit 2.

[0038] Of course, different embodiments of the invention cannot be ruled out in which the bent portion 17 of the first element 10 is not provided such as, for example, in the case of the furniture unit 2 being without the surround strip 8.

[0039] The second element 11 comprises a plate 18 with through holes 19 for fitting pins for attaching to an inner surface of the door 3.

[0040] In detail, the plate 18 has an outer face intended to be placed in contact with the door 3 and an inner face from which extends an elongated bracket 20.

[0041] The elongated bracket 20 is substantially flat and extends at right angles to the plate 18 along a surface parallel to the first slab 13.

[0042] In the particular embodiment of the invention shown in the figures 1 and 2, the rotation means 12 consist in a cylindrical hinge that comprises a first cylindrical seat 21 associated with the bent portion 17, a second cylindrical seat 22 associated with the plate 18, and a rotation hinge 23 fitted inside the first cylindrical seat 21 and the second cylindrical seat 22.

[0043] Usefully, between the first element 10 and the second element 11 is placed a pushing gas spring 24, which is suitable for making opening and/or closing of the door 3 easier.

[0044] The gas spring 24 is pre-charged in compression and comprises a liner 25 with a substantially cylindrical shape inside which is fitted a sliding piston 26.

[0045] The liner 25 has a first extremity 27 associable with the first element 10 while the piston 26 comprises a second extremity 28 associable with the second element 11.

[0046] In detail, the first extremity 27 is hinged to the first slab 13 around a rotation axis parallel with the swinging axis A and the second extremity 28 is hinged to the elongated bracket 20 around a rotation axis that is also parallel to the swinging axis A.

[0047] The operation of the embodiment of the invention shown in the figures 1 and 2 is the following.

[0048] During the installation, the first element 10 is fastened to the inner surfaces of the furniture unit 2 by means of the slabs 13, 14, 15 while the plate 18 is similarly associated with the door 3.

[0049] When the door 3 is opened, the user accompanies the door 3 in rotation around the swinging axis A while the gas spring 24 exercises a push force that tends to cause the piston 26 to come out of the liner 25 and push the door 3, thereby making its opening easier.

[0050] Once the opening configuration has been reached, the force of the gas spring 24 is such as to support the weight of the door 3 and keep it open.

[0051] In the alternative embodiment of the invention shown in the figures from 3 to 5, the device 1 has a first element 10 shaped in the same way as that shown in the figures 1 and 2 except for the fact that the third slab 15 does not have the bent portion 17 but, on the contrary, has an L-shaped body 29.

[0052] The L-shaped body 29 has an extremity associated with the third slab 15 and the opposite extremity extending towards the outside of the furniture unit 2.

[0053] In this embodiment as well, furthermore, the device 1 has a second element 11, with a plate 18 and an elongated bracket 20, and a gas spring 24 that is hinged to the first slab 13 around a rotation axis B and to the elongated bracket 20 around a rotation axis C.

[0054] Unlike the embodiment of the figures 1 and 2, on the other hand, with the plate 18 is associated a box body 30 fittable recessed in the door 3 and the rotation means 12 consist in a concealed hinge.

[0055] The concealed hinge 12, in particular, is composed of an articulated quadrilateral mechanism which comprises two connecting rods 31 that connect the L-shaped body 29 to the box body 30 and which can be fitted at least partially in the box body 30.

[0056] The rotary movement of the door 3 therefore consists in the rotary-translation movement defined by the articulated quadrilateral mechanism 12 which, nevertheless, taking into account the particular sizing of the connecting rods 31, is substantially similar to a rotation around a swinging axis A coinciding with the upper side of the front face of the furniture unit 2.

[0057] With reference to the figure 5, it will be seen that in the closing configuration, the gas spring 24 is arranged in a balanced configuration suitable for maintaining the door 3 closed.

[0058] In the closing configuration in fact, the rotation

axis C of the second extremity 28 is arranged above the lying plane in which the swinging axis A and the rotation axis B of the first extremity 27 are positioned.

[0059] Consequently, the force of the gas spring 24 which tends to cause the piston 26 to exit from the liner 25 is directed so as to produce a rotary torque around the swinging axis A, directed in the closing direction, on the elongated bracket 20 and on the door 3.

[0060] Alternative embodiments of the invention cannot however be ruled out in which in the closing configuration the gas spring 24 is arranged in a balanced configuration suitable for pushing the door 3 in opening, the closing configuration being maintained by means of removable locking means for locking the door 3 such as locks, bolts, chains, padlocks and the like.

[0061] Such circumstance, for example, can be easily obtained by sizing the elongated bracket 20 so that even in closing configuration the rotation axis C of the second extremity 28 remains below the lying plane of the swinging axis A and of the rotation axis B of the first extremity 27.

[0062] In this case, even in the closing configuration the gas spring 24 exercises a push force that tends to cause the door 3 to open and which permits opening the furniture unit 2 once the removable locking means have been released.

[0063] The installation and operation procedures of the embodiment shown in the figures from 3 to 5 are the same as those of the device 1 shown in the figures 1 and 2.

[0064] It has in practice been seen how the invention described achieves the proposed objects.

[0065] In this respect, the fact is underlined that the special solution of fitting a gas spring between a first and a second element associable with a furniture unit and its corresponding door permits making use of a device that is able to make opening/closing the door easier with a particularly regular supply of the push force and which, at the same time, is easy to install.

[0066] The fact is also underlined how the device according to the invention is particularly simple in terms of structure and operation and can be manufactured in a practical and easy way at low costs.

[0067] The invention thus conceived is susceptible to numerous modifications and variations, all of which falling within the scope of the inventive concept.

[0068] Furthermore all the details can be replaced with others that are technically equivalent.

[0069] In practice, the materials used, as well as the contingent shapes and dimensions, may be any according to requirements without because of this moving outside the protection scope of the following claims.

55 Claims

1. Hinging device for doors of furniture units of vehicles, particularly caravans, motorhomes and boats, **char-**

- acterized by** the fact that it comprises at least a first element associable with at least a furniture unit, at least a second element associable with at least a door, rotation means which are placed between said first element and said second element and which are suitable for permitting the mutual rotation substantially around a swinging axis between a closing configuration of said door and an opening configuration of said door, and at least a gas spring which is provided with a first extremity associable with said first element and with a second extremity associable with said second element and which is suitable for making the opening and/or the closing of said door easier.
2. Device as claimed in claim 1, **characterized by** the fact that in said closing configuration said gas spring is charged in compression.
3. Device as claimed in one or more of the preceding claims, **characterized by** the fact that in said closing configuration said gas spring is arranged in at least one between:
- a balanced configuration suitable for maintaining said door closed; and
 - a balanced configuration suitable for pushing said door in opening, the closing configuration being maintained by means of removable locking means for locking the door.
4. Device as claimed in one or more of the preceding claims, **characterized by** the fact that said gas spring comprises a substantially cylindrical liner inside which is fitted a sliding piston.
5. Device as claimed in one or more of the preceding claims, **characterized by** the fact that at least one between said first extremity and said second extremity is hinged to said first element and to said second element respectively around a rotation axis substantially parallel with said swinging axis.
6. Device as claimed in one or more of the preceding claims, **characterized by** the fact that said first element comprises at least a first slab for attaching to a first inner surface of said furniture unit.
7. Device as claimed in one or more of the preceding claims, **characterized by** the fact that said first element comprises at least a second slab for attaching to a second inner surface of said furniture unit.
8. Device as claimed in one or more of the preceding claims, **characterized by** the fact that said first element comprises at least a third slab for attaching to a surround strip of said furniture unit.
9. Device as claimed in one or more of the preceding claims, **characterized by** the fact that said second element comprises at least a plate for attaching to an inner surface of said door.
10. Device as claimed in one or more of the preceding claims, **characterized by** the fact that said second element comprises at least an elongated bracket which extends from said plate and which is associated with said second extremity.
11. Device as claimed in one or more of the preceding claims, **characterized by** the fact that said second element comprises a box body fittable recessed inside said door.
12. Device as claimed in one or more of the preceding claims, **characterized by** the fact that said swinging axis is suitable for being placed substantially parallel and/or substantially coinciding with a side of said furniture unit.
13. Device as claimed in one or more of the preceding claims, **characterized by** the fact that said rotation means comprise at least one between a cylindrical hinge and a concealed hinge.
14. Device as claimed in one or more of the preceding claims, **characterized by** the fact that said cylindrical hinge comprises at least a first cylindrical seat associable with said first element, at least a second cylindrical seat associable with said second element, and at least a rotation hinge fittable inside said first cylindrical seat and said second cylindrical seat.
15. Device as claimed in one or more of the preceding claims, **characterized by** the fact that said concealed hinge comprises at least an articulated quadrilateral mechanism comprising at least two connecting rods that connect said first element with said second element and which are fittable at least partially in said box body.

Fig. 1

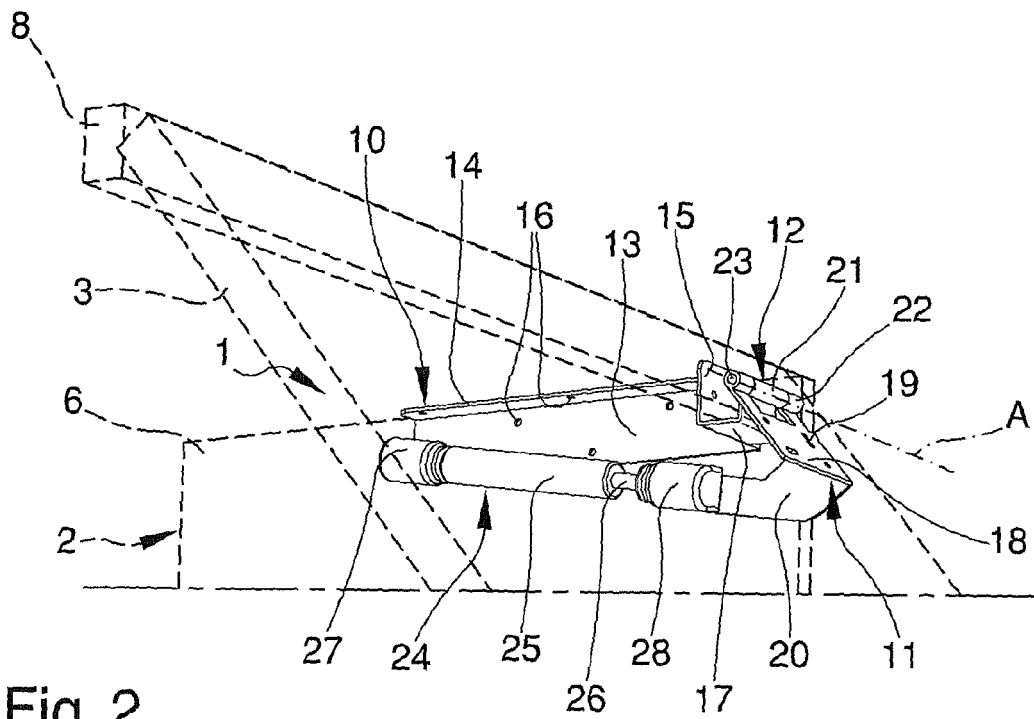
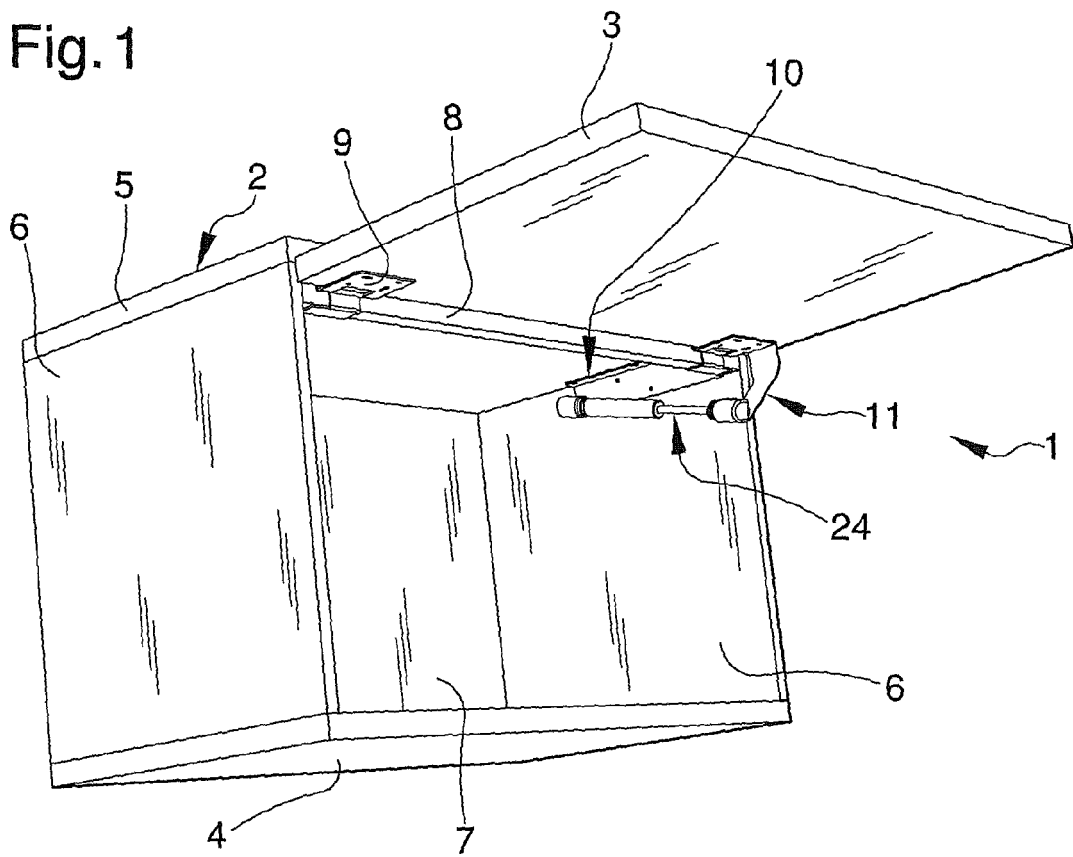


Fig. 2

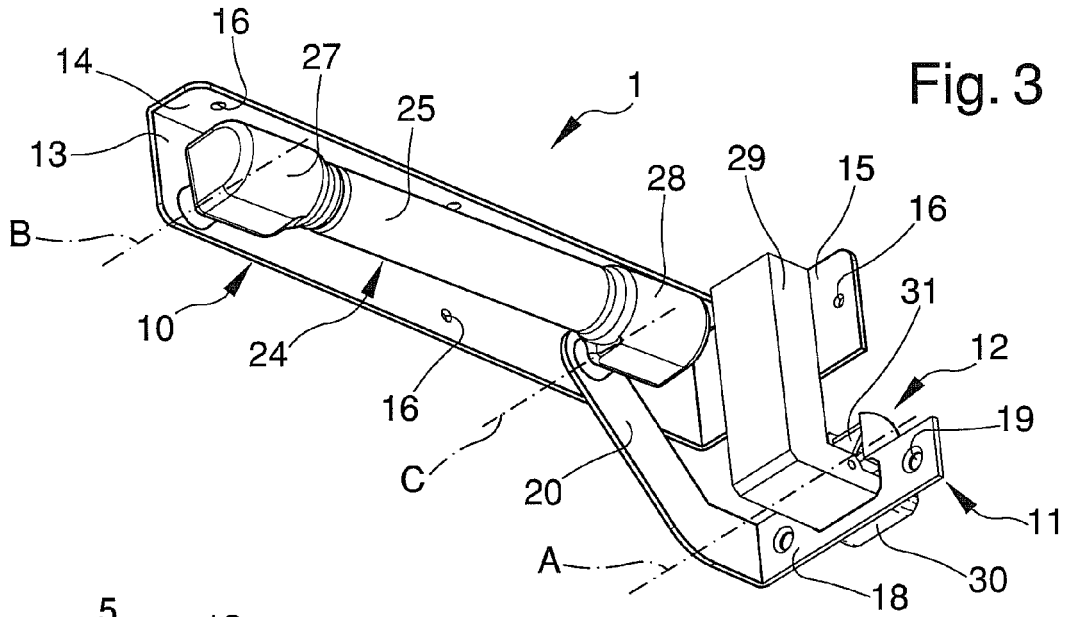


Fig. 3

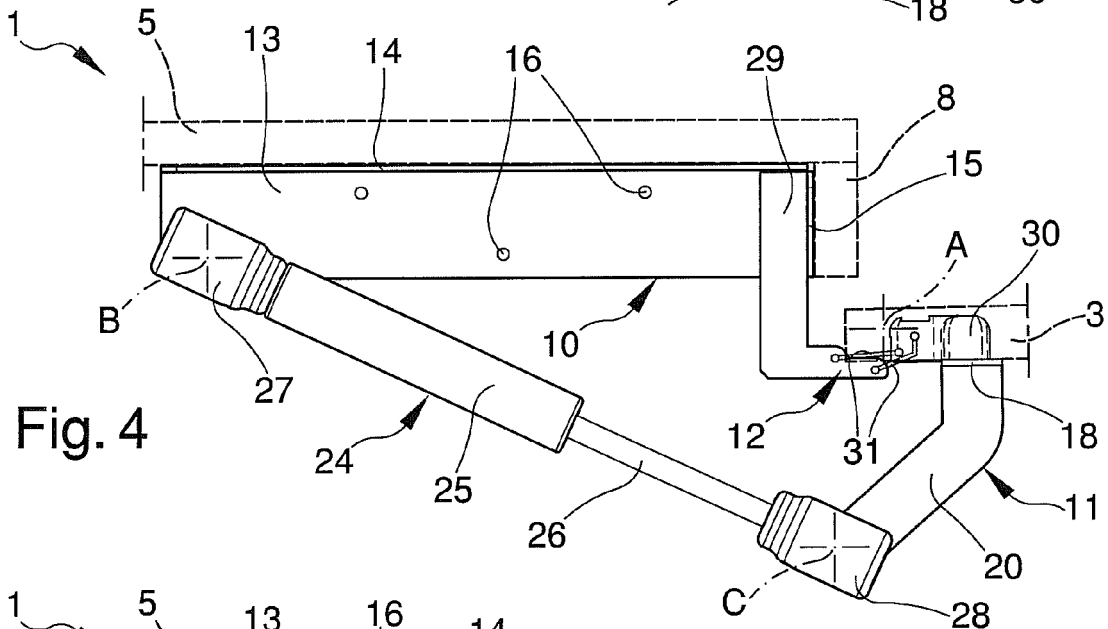


Fig. 4

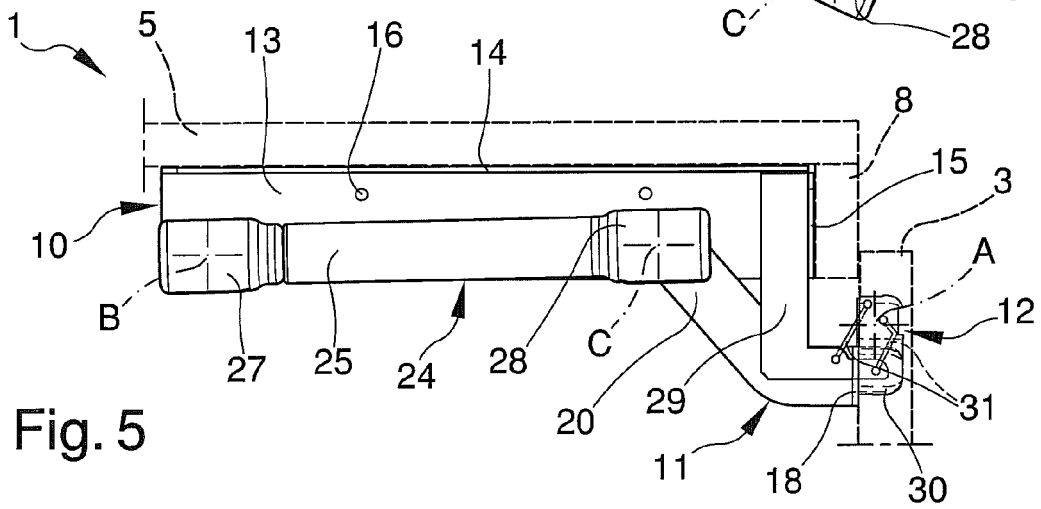


Fig. 5