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Fastening assembly

The invention relates to a fastening assembly for connecting a pivotable furniture part to a four-link joint, the four-link joint comprising a first fastening piece for fastening to the pivotable furniture part and a second fastening piece for fixing to a furniture carcass, and a plurality of pivoted levers being provided between the two fastening pieces so as to be mounted on said pieces in the manner of operation of a four-link joint, a damping apparatus being assigned to the pivoted levers, the damping apparatus being effective in both the opening direction and the closing direction of the pivotable furniture part, and both the soft stop and the backcheck of the damping apparatus occurring by means of one of the pivoted levers of the four-link joint.

Fastening assemblies of the above-mentioned kind are in particular used to pivot front elements of kitchen wall units open and closed about a horizontal axis. For this purpose, fittings having four-link joints are known that comprise pivoted levers, on which a damping device can act. In this case, the soft stop conventionally occurs by means of separate impact dampers. A backcheck is integrated in a gas compression spring, or spiral compression spring assemblies are known that comprise an additional impact damper for the backcheck. The components required for the soft stop and backcheck are considerable.

A fastening device of the kind mentioned at the outset is known from DE 101 59 140 A1.

The problem addressed by the present invention is that of developing a fastening device of the outset such that an effective soft stop and backcheck are produced with minimal complexity.

In order to solve this problem, the fastening device of the type according to the invention is characterised initially by the features specified in claim 1. A further solution to this problem is specified in claim 2.

A fastening assembly is therefore provided in which both the backcheck and the soft stop occur by means of the same damping apparatus. The damping apparatus comes out of the damped position in each case during a closing or opening process, initially moves back out of said position during the opening or closing movement, and re-enters the damped position during the subsequent movement phase, such that in the relevant open end position and in the relevant closed end position, the damping apparatus is in the damped position. This is

therefore a single-acting damper. The damping apparatus is therefore effective over the entire path of an opening and closing movement.

According to the invention, said apparatus is associated with one single pivoted lever of the four-link joint, and therefore connecting parts to additional pivoted levers are not necessary. It is also conceivable, although not according to the invention, to carry out actuation of one damping apparatus for opening by means of one pivoted lever and to carry out actuation for closing by means of the other pivoted lever. Although this leads to greater constructional complexity, the design possibilities of achieving different damping characteristics for opening and closing by means of different starting curves are improved as a result.

Preferably, it is also possible to individually adapt the relevant damping characteristic by means of curve elements that unroll or are similar to one another.

A linear action of force on the damper is brought about by curve elements that are provided on one or both of the pivoted levers near a base plate of the fastening piece on the furniture part. In addition, forces are transmitted via an intermediate slotted link. This arrangement makes it possible to optimally adjust the damping path and the damping force over the entire pivoting region of the furniture part with smooth transitions in each region. Alternatively, although not according to the invention, it is also possible, for example, depending on the lever shape or fitting design, to initiate the backcheck of one pivoted lever and the soft stop of the other pivoted lever on the same damping element.

The damping apparatus itself may comprise a linearly acting damper, but also a unilaterally acting rotation damper.

According to claim 2, it is proposed to produce damping by a unilaterally acting rotation damper being fastened in a fixed manner on a base plate of a fastening assembly opposite the pivoting region of a pivoted lever. The pivoted lever is formed such that it projects beyond its fulcrum and comprises an external tooth segment. Correspondingly, an internally toothed segment is provided on the side of the pivoted lever that is associated with the pivot bearing or rotary bearing. When the pivoted lever is pivoted into the relevant pivoted end position, there is engagement with the rotation damper on the defined length of the tooth segments in each case and thus deliberate damping is achieved. The segments of the external toothing and the internal toothing are constructed on the same pivoted lever; however, although not according to the

invention, they can also be constructed in each case on two different pivoted levers.

According to claim 1, the front end of a pivoted lever is formed as a curved cam that interacts with a slotted link part which can be displaced in a longitudinal guide and is in turn in operative connection with a damping element. In this case, during an opening and closing pivoting movement, the slotted link part passes through a dead centre position by means of the curved path control, such that the damping element can become effective when the pivotable furniture part is being both closed and opened.

Two relatively narrow but similarly wide pivoted levers can be used that approximately overlap in side view during the entire pivoting movement, in particular at least in the region in which said levers are easily accessible, i.e. openly accessible with fingers. In this case, one pivoted lever is displaced once to the left and once to the right by, at most, a lever width to the other lever during a pivoting movement, such that an effort is made not to produce a gap that is larger than approximately 4 mm. The levers move towards one another in parallel displacement, it being insignificant whether the pivoted levers are straight, bent, crescent-shaped or L-shaped, for example.

In this case, a lever width is provided that preferably corresponds to approximately from two thirds to half of the vertical spacing between the bearings of the two pivoted levers on the fastening piece of the pivotable furniture part. The pivoted levers may be very flat in order to save space and are arranged close to one another and move so closely to one another during their pivoting movement that there is never a gap that is larger than approximately 4 mm from this direction either. Therefore, in each direction, effective finger pinch protection is provided and a maximum usable width inside the cupboard is simultaneously ensured.

From the closed position having overlapping levers, for example, during pivoting open, one pivoted lever may be ahead of the other until the other pivoted lever overtakes the first pivoted lever to a maximum extent. The pivoted lever then moves in the opposite direction to the other pivoted lever again, becomes congruent, and then pivots past with its full width until it reaches the pivoted end position on the opposite side.

A linear action of force on the damper is brought about by curve elements that are provided on one or both of the pivoted levers near a base plate. In addition, it is possible to transmit forces

via an intermediate slotted link. This arrangement makes it possible to optimally adjust the damping path and the damping force over the entire pivoting region of the furniture part with smooth transitions in each region. Alternatively, depending on the lever shape or fitting design, it is also possible, for example, to initiate the backcheck of one pivoted lever and the soft stop of the other pivoted lever on the same damping element.

Preferably, another synchronisation rod is provided between the four-link joints provided on both sides of the furniture carcass. The synchronisation rod is preferably provided coaxially to the main bearings on a base plate of the fastening assembly. These are the bearings of the pivoted lever that are associated with the furniture carcass. In order to ensure optimal transmission of force again, a bearing bush formed of an aluminium rod profile, for example, is provided, on which bush a tube shaped like a half-shell at the ends thereof is fastened as a synchronisation rod, having corresponding offsets or expansions outwards, as a result of which a larger lever arm can be produced. Fastening can occur by means of space-saving clamping, for example by means of a clamping screw. This allows high torque or force transmission. A fulcrum bearing arrangement and simultaneous synchronisation rod fixation of this kind can easily be accommodated on a very narrow width, such that only a round tube is visible when a cover is used. The offsetting or the formed link plates can be hooked onto corresponding trough-shaped undercuts in the bearing bush. The connection is secured by a clamping screw on the side opposite the link plate. The screwing direction of the clamping screws may be slightly oblique in this case, such that the screws can be screwed before the synchronisation rod is inserted in the bearing bush and clamping can occur without many rotations.

A particular advantage of a synchronisation rod formed in such a way is that this rod is very simple in construction and can be inserted in the carcass after the fitting side parts have been mounted. The force or torque transmission occurs in direct proximity to the pivoted lever, there being a greater spacing between the connection point and the swivel pin relative to the diameter of the synchronisation rod. This is a combination of non-positive and positive engagement.

Preferably, a spiral compression spring assembly is also provided as an energy storing device for supporting the opening and closing pivoting movement, which spring assembly can be locked into a fitting and can be safely replaced at any time without the use of tools. Length-limited guide rods prevent the compression spring assembly from extending further than the

maximum possible deflection in the fitting. Using a fitting of this kind, the compression spring assemblies can be mounted immediately before locking the furniture front or thereafter. Known rigidly mounted, unsecured force assemblies have the great disadvantage that, if handled clumsily, the pre-tensioned springs may shoot up in a catapult-like manner without the counterweight of the furniture front and may cause serious injuries, which is prevented by the spiral compression spring assembly described above.

Further advantages and embodiments of the invention can be found in the additional dependent claims, the following description and the drawings, in which:

Fig. 1 to 7 show an embodiment of a fastening assembly according to the invention in various pivoting positions of the pivotable furniture part,

Fig. 1.1 to 7.1 are enlarged views of the relevant detail A in Fig. 1 to 7,

Fig. 8 and 9 show the design of a pivoted lever in cooperation with a rotation damper,

Fig. 8.1 and 9.1 are enlarged views of the details A and B in Fig. 8 and 9 respectively,

Fig. 10 shows a synchronisation rod, comprising half-shells on the ends thereof, in various views, and a plurality of views of the bearing bush part, and

Fig. 11 shows a spiral compression spring assembly as an energy storing device for the fastening assembly in a plurality of views.

In the drawings, parts having substantially the same function are provided with like reference numerals.

In general, the fastening device for connecting the pivotable furniture part 2 is given the reference numeral 1. In the embodiment shown, a kitchen wall unit 3 comprising a furniture carcass 4 is shown. The front panel 2 can, as shown in Fig. 1 to 7, be pivoted open and closed and specifically about a main swivel pin 5.

The fastening assembly 1 comprises a four-link joint 6 having two pivoted levers 7 and 8 and having a fastening piece 9 that is fastened to the front plate 2 and a fastening piece 10 that is fastened to the furniture carcass 4. The opening pivoting movement is supported by an energy storing device 11 in the form of a spiral compression spring assembly, which will be presented in more detail in connection with the explanation of Fig. 11.

As can be seen in more detail in Fig. 1 to 7, the pivoted levers 7 and 8 each have an arrangement and a mutually corresponding lever width. For this purpose, said pivoted levers are mounted on the fastening piece 9 in bearings 12 and 13. These bearings 12 and 13 have a vertical spacing that is substantially twice as great as the lever width.

As can be seen in Fig. 1, the pivoted levers 7 and 8 substantially overlap one another in the linear region thereof in the closed position of the front panel. During the pivoting movement of the pivoted levers, this (partial) overlap is maintained or there is never a gap that is greater than approximately 4 mm, which provides effective finger pinch protection. During the opening pivoting movement, the pivoted lever 7 is initially displaced downwards relative to the pivoted lever 8 and then moves upwards in the opposite direction, such that in the completely pivoted open position according to Fig. 6, the pivoted lever 7 at the front in the drawing is above the pivoted lever 8 at the rear in the plane of the drawing.

As can also be seen in Fig. 1 to 7, in particular in Fig. 1.1 to 7.1, a damping apparatus 15 is associated with the four-link joints 6, which damping apparatus is effective both in the opening direction and the closing direction. This damping apparatus can interact with both pivoted levers 7, 8. According to the invention, however, the apparatus interacts, as shown in the embodiment, with a pivoted lever. This is the pivoted lever 7 in the embodiment shown. For this purpose, the pivoted lever 7 can interact directly with a damper of the damping apparatus 15. In the present embodiment, one end of the pivoted lever 7 is formed as a curved cam 16 which is associated with a slotted link slide 18 that is guided in a longitudinal guide 17. This slotted link slide 18 is also provided with a contour 19, on which the curved cam 16 of the pivoted lever 7 slides down.

As is clear from Fig. 1 to 7 and in particular from the enlarged details shown according to Fig. 1.1 to 7.1, during the opening pivoting movement, the slotted link slide 18 moves out of the initial position shown in Fig. 1/1.1 into a position in which the screw guides 20 shown are in the left-hand end position (Fig. 4) in order to then assume the right-hand end position shown in Fig.

6, which corresponds to the backcheck. The opposite is also true, such that in the end situation, the end position shown in Fig. 1 is then reached, in which end position the screws 20 have in turn reached the end position corresponding to Fig. 6, which corresponds to the soft stop.

In Fig. 8 and 9, and 8.1 and 9.1, respectively, a rotation damper 21 is alternatively shown, the pivoted lever 7 being formed such that said lever projects beyond its front fulcrum 22 and is formed as an external tooth segment 23. Furthermore, said lever comprises an internally toothed segment 24, the segments 23 and 24 engaging, during the pivoting movement, with the rotation damper 21 provided with an external toothing, such that the backcheck and soft stop can also be accomplished by means of the pivoted lever 7 comprising a damping element 15.

As is furthermore clear from Fig. 10, a synchronisation rod 25 may be provided on the main bearing 5. This synchronisation rod 25 is therefore to be arranged coaxially to the swivel pin 5 of the pivoted lever 8 and is therefore to be provided on both side walls of the furniture carcass 4 on the fastening piece 10 that is associated with the furniture carcass 4. For this purpose, the ends of the synchronisation rod 25 are expanded in a half-shell shape, such that said ends form a half-shell 26 having offset ends that form the link plates 27. These link plates, together with the semicircle-shell 26, are each to be inserted in a bearing bush 28 that comprises a trough-shaped undercut 29 and into which a clamping screw 30 having an oblique screwing alignment is to be screwed. In addition, a round region 31 is provided, such that the half-shell 26 can be inserted therein, together with the link plates 27, in a positive manner and can be clamped by means of the clamping screw 30. The greater spacing between the link plates allows a greater torque and therefore high-torque transmission via the synchronisation rod 25. The synchronisation rod 25 is very easy to insert after the fitting side parts have been mounted. The transmission of force occurs in direct proximity to the pivoted lever 8 and on the largest possible circumference, as well as directly above the fulcrum bearing arrangement of the pivoted lever 8.

The compression spring assembly 30 shown in Fig. 11 is formed as a secured, pre-loaded, self-sufficient energy storing device 34 that can be both locked into a fitting and safely replaced at any time without the use of tools. The compression spring assembly 33 remains exactly at the maximum possible deflection in the fastening assembly due to length-limited guide rods 35. The compression spring assembly 33 is mounted in that said assembly clamps behind crank pins on the pivoted lever side and locks on ball pins of a base support plate on the other side. The spiral

springs 36 can therefore be mounted as force assemblies immediately before the furniture front is locked or thereafter. The pivotable furniture part can be individually adjusted to the movement force by means of an adjusting screw 37.

P A T E N T K R A V

1. Fastgørelsesanordning (1) til forbindelse af en drejelig møbeldel (2) med en firledsmekanisme (6), hvor firledsmekanismen (6) frembyder et første fastgøringsstykke til fastgøring på den drejelige møbeldel (2) og et andet fastgøringsstykke (10) til fastlæggelse på et møbellegeme (4), og mellem de to fastgørelsesstykker (9, 10) er tilvejebragt flere svingarme (7, 8) lejret på hine efter en firledsmekanismes virkemåde, hvor der til svingarmene (7, 8) er tilordnet en dæmpningsanordning (15), hvor dæmpningsanordningen (15) er virksom i både den svingbare møbeldels (2) åbne- og lukkeretning, og både dæmpningsindretningens (15) lukke- og åbningsdæmpning sker ved hjælp af en af svingarmene (7, 8) i firledsmekanismen (6), k e n d e t e g n e t ved, at en ende af en svingarm (7, 8) er udformet som en kurveformet kam (16) eller kan forbindes med en kurveformet kam, som er tilordnet til dæmpningsanordningen (15), og hvor der mellem svingarmen (7, 8), der udviser den kurveformede kam (16), og dæmpningsanordningen (15) er anbragt en kulisseskyder (18), der føres i en langsgående føring (17) i anordningen (1).

2. Fastgørelsesanordning (1) til forbindelse af en drejelig møbeldel (2), eksempelvis en hæve- og sænkbar køkkenskabslåge, med en firledsmekanisme (6), hvor firledsmekanismen (6) frembyder et første fastgøringsstykke til fastgøring på den drejelige møbeldel (2) og et andet fastgøringsstykke (10) til fastlæggelse på et møbellegeme (4), og mellem de to fastgørelsesstykker (9, 10) er tilvejebragt flere svingarme (7, 8) lejret på hine efter en firledsmekanismes virkemåde, hvor der til svingarmene (7, 8) er tilordnet en dæmpningsanordning (15), hvor dæmpningsanordningen (15) er virksom i både den svingbare møbeldels (2) åbne- og lukkeretning, og både dæmpningsindretningens (15) lukke- og åbningsdæmpning sker ved hjælp af en af svingarmene (7, 8) i firledsmekanismen (6), hvor en ensidigt virkende rotationsdæmper (21) er tilvejebragt på en bundplade i anordningen (1) med hensyn til en svingarms (7, 8) svingområde, og en (7) af svingarmene (7, 8) er udformet således, at den rager ud over sit drejepunkt (22) og er tildannet som ydre tandsegment (23), k e n d e t e g n e t ved, at der på siden af en drejearm (7, 8) i området for dens drejepunkt (22) er tilvejebragt et inderfortandingssegment (24), og at det ydre tandsegment (23) og inderfortandingssegmentet er tilvejebragte på siden af en og samme svingarm (7) i området for dens drejepunkt.

3. Fastgørelsesanordning ifølge krav 1, k e n d e t e g n e t ved, at kulisseskyderen (18) på den side, der vender mod svingarmen (7, 8), er forsynet med en kontur (19), hvorpå svingarmens (7, 8) kurveformede kam (16) glider ned.

4. Fastgørelsesanordning ifølge et af kravene 1 til 3, k e n d e t e g n e t ved, at svingarmene (7, 8) udviser en armbredde og/eller armform, hvorved svingarmene (7, 8) tilnærmelsesvist under deres samlede svingbevægelse i det mindste i deres beskadigelsesudsatte områder overlapper hinanden.

5. Fastgørelsesanordning ifølge krav 4, k e n d e t e g n e t ved, at et eventuelt under svingbevægelsen opstået mellemrum i svingarmenes overlap højst andrager et omfang af ca. 4 mm set fra siden.

6. Fastgørelsesanordning ifølge krav 4 eller 5, k e n d e t e g n e t ved, at svingarmene (7, 8) har en armbredde, som i forhold til højdeafstanden (12, 13) af svingarmenes (7, 8) lejringssteder på fastgørelsesstykket (9) tilordnet til den drejelige møbeldel (2) andrager omtrent 2:3 eller mindre.

5 7. Fastgørelsesanordning ifølge et af kravene 4 til 6, k e n d e t e g n e t ved, at svingarmene (7, 8) i møbeldelens lukkede stilling i det mindste i det midterste område af deres længdeudstrækning tilnærmelsesvis dækker hinanden med hensyn til deres armbredde.

10 8. Fastgørelsesanordning ifølge et af kravene 4 til 7, k e n d e t e g n e t ved, at en svingarm (8) under den drejbare møbeldels (2) udsvingbevigelse går forud for den anden (7), indtil denne (7) i det mindste tilnærmelsesvist overhaler hin (8).

9. Fastgørelsesanordning ifølge et af kravene 4 til 8, k e n d e t e g n e t ved, at svingarmen er tildannet seglformet, vinkelbøjet eller bøjet efter et retlinet forløb.

15 10. Fastgørelsesanordning ifølge krav 9, k e n d e t e g n e t ved, at svingarmene (7, 8) er udformet omtrentligt ens i deres bredde og/eller grundform.

11. Fastgørelsesanordning ifølge et af kravene 4 til 10, k e n d e t e g n e t ved, at sideafstanden mellem svingarmen (7) og svingarmen (8) set fra forsiden højst andrager et omfang af ca. 4 mm.

20 12. Fastgørelsesanordning ifølge et af kravene 1 til 11, k e n d e t e g n e t ved, at der forefindes en trykfjedersamling (33), som er udformet som sikret forspændt energilag (34).

13. Fastgørelsesanordning ifølge krav 12, k e n d e t e g n e t ved, at trykfjederssamlingen (33) er udformet til værktøjsløs indsættelse og udskiftning i et beslag i fastgørelsesanordningen (1).

25 14. Fastgørelsesanordning ifølge et af kravene 1 til 13, k e n d e t e g n e t ved, at der på begge sider af fastgørelsesanordningen forefindes firledsmekanismer (6), forbundet med en synkroniseringsstang (25).

30 15. Fastgørelsesanordning ifølge krav 14, k e n d e t e g n e t ved, at synkroniseringsstangen (25) er anbragt koaksialt med svingaksen (5) for en af svingarmene (8), som er tilvejebragt på fastgørelsesstykket (10), der er tilordnet til møbellegemet (4).

16. Fastgørelsesanordning ifølge krav 14 eller 15, k e n d e t e g n e t ved, at forbindelsesstedet for synkroniseringsstangen (25) udviser en afstand til svingaksen (5) for svingarmen (8), der er lagt fast på møbellegemets (4) fastgørelsesstykke (10).

35 17. Fastgørelsesanordning ifølge et af kravene 14 til 16, k e n d e t e g n e t ved, at enderne af synkroniseringsstangen (25) er udformede trugformet (26) udvidede med knækkede ender (27), som kan lægges fast i en modsvarende formet lejbøvningsdel, der skal fastgøres på en firledsmekanisme.

18. Fastgørelsesanordning ifølge krav 17, k e n d e t e g n e t ved, at synkroniseringsstangen (25) kan klemmes fast med sine knækkede ender til lejbøvningsdelen (28).

19. Fastgørelsesanordning ifølge krav 17 eller 18, k e n d e t e g n e t ved, at de knækkede ender af truget (26) danner flade medbringerlasker (27), der sætter sig fast i tilsvarende trugformede undersnit (29) i lejbøsningerne (28), og at synkroniseringsstangen (25) ved hjælp af den trugformede del (26) centrerer sig om et modsvarende rundt stykke (31) af lejbøsningen (28).

5

20. Fastgørelsesanordning ifølge krav 18 eller 19, k e n d e t e g n e t ved, at påspændingen af synkroniseringsstangen (25) på lejbøsningen (28) sker ved hjælp af en spændeskrue (30), hvor spændeskruens (30) indskruningsretning er skrå.

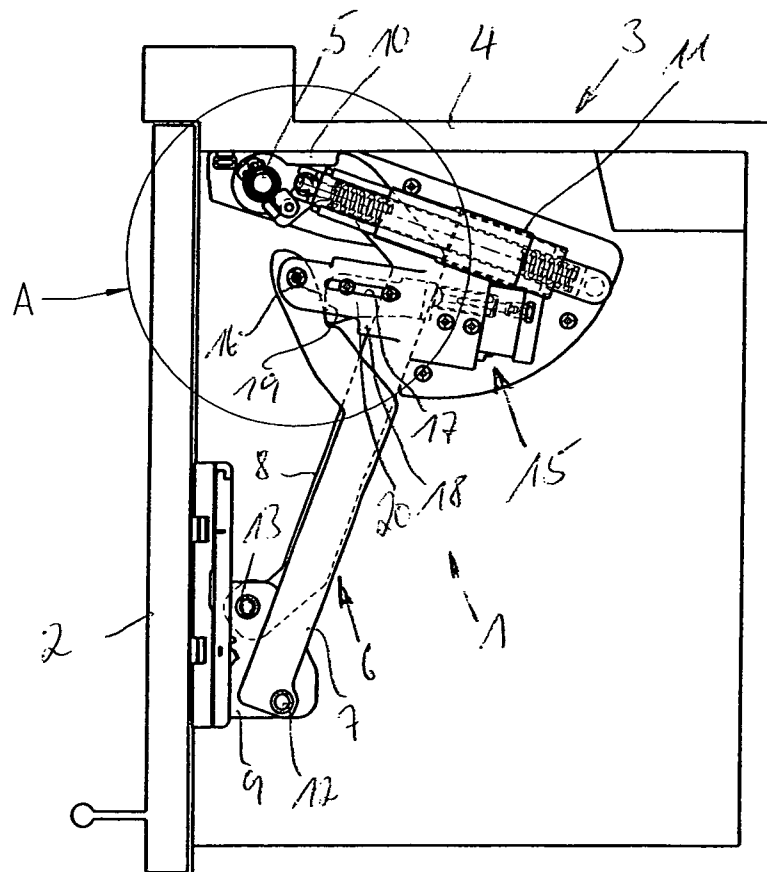
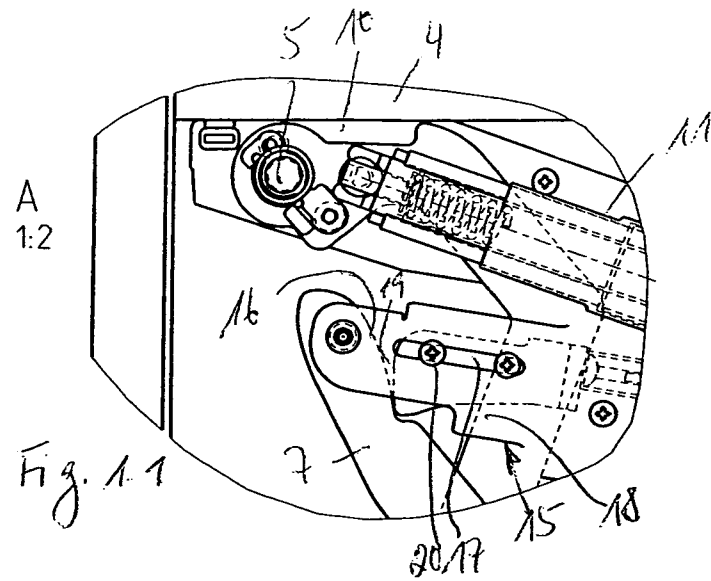


Fig. 1

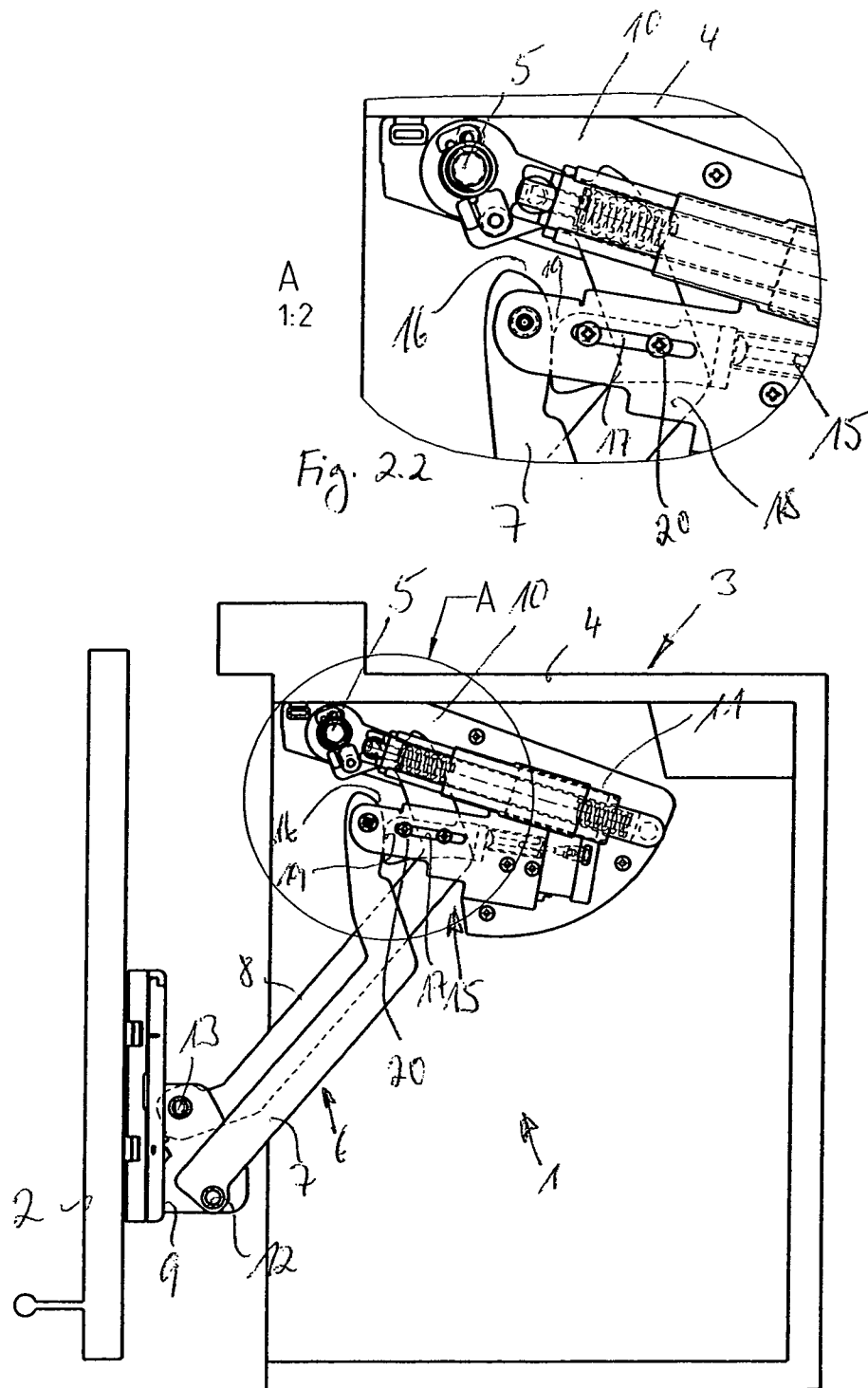


Fig. 2

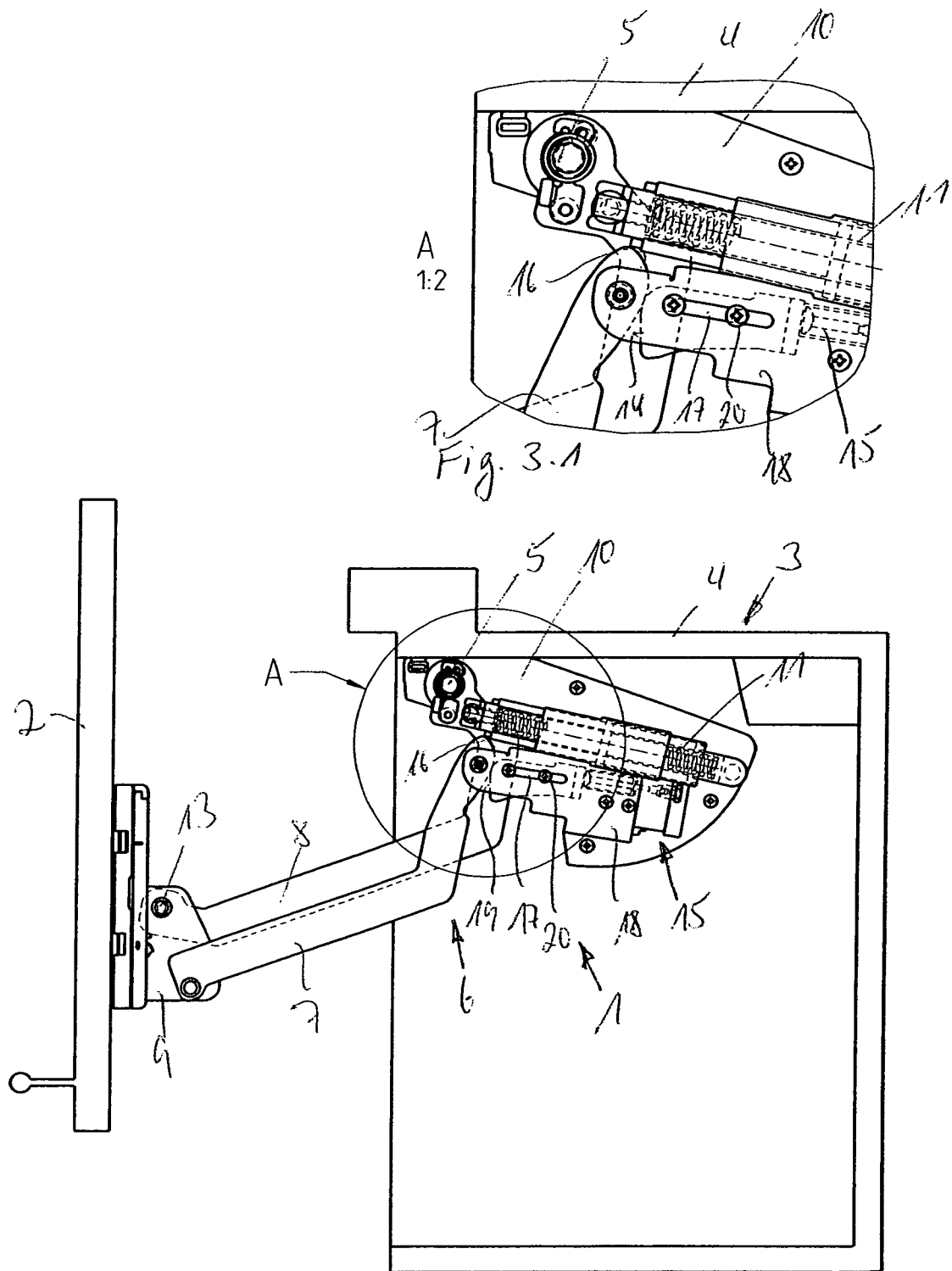
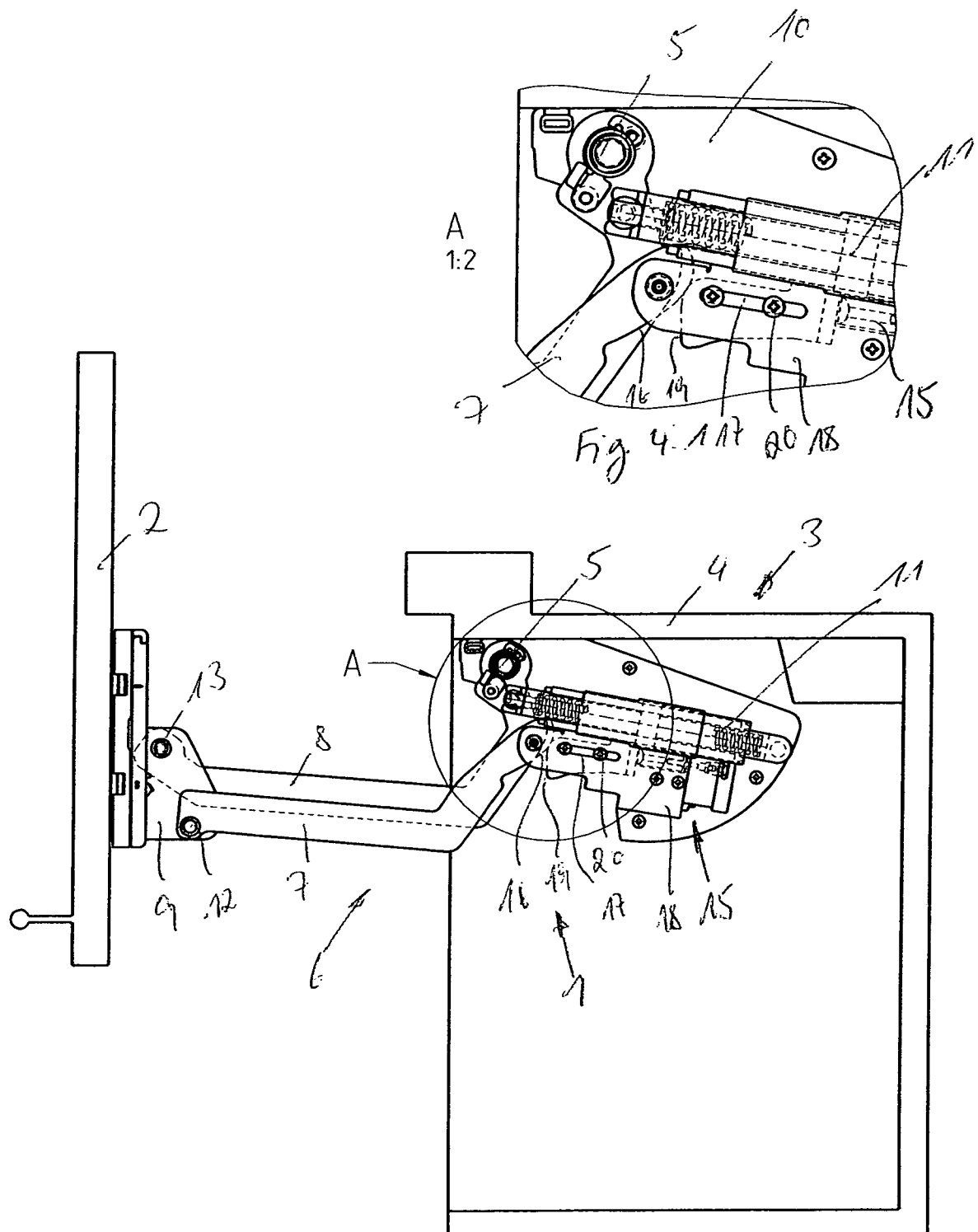


Fig. 3



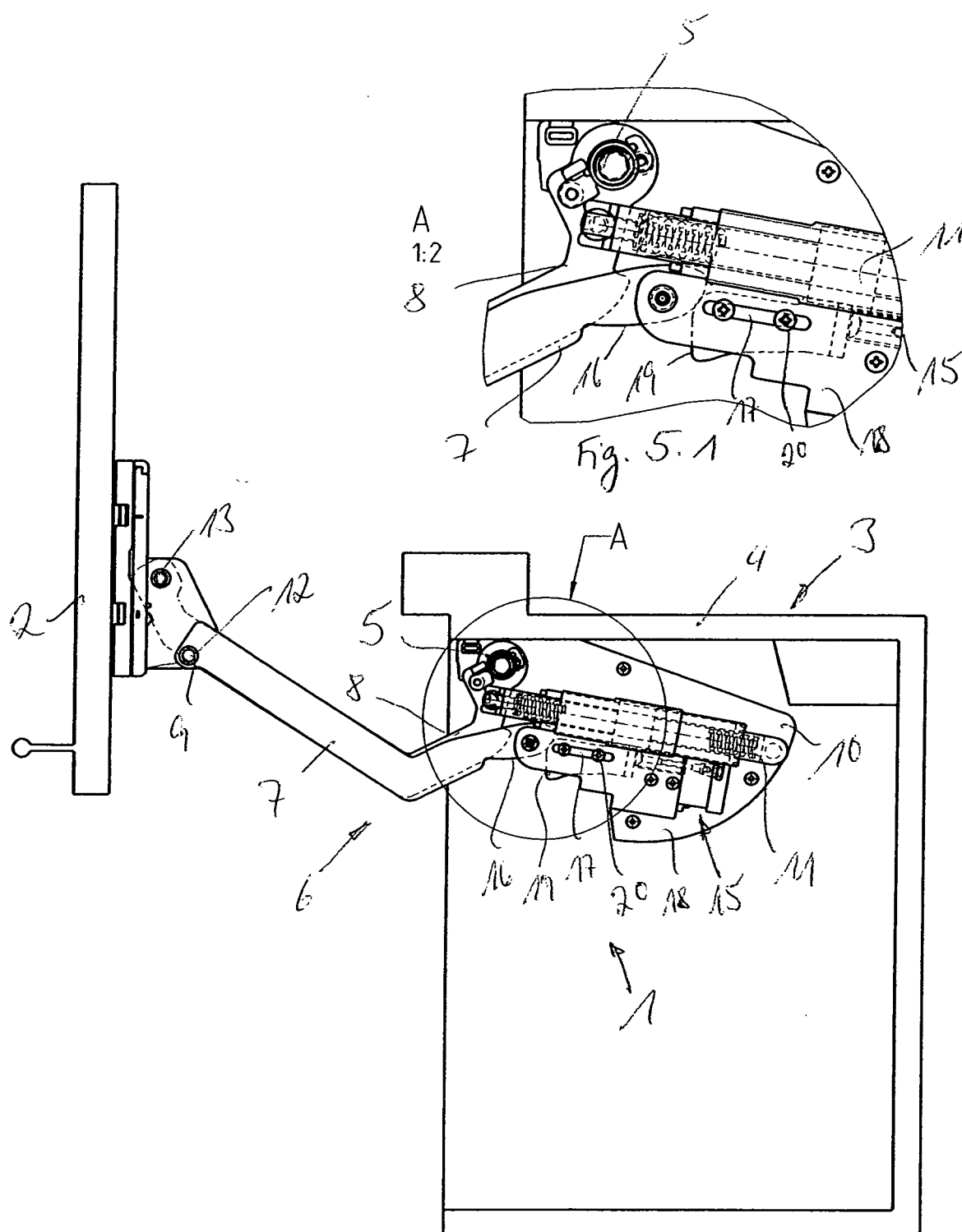


Fig. 5

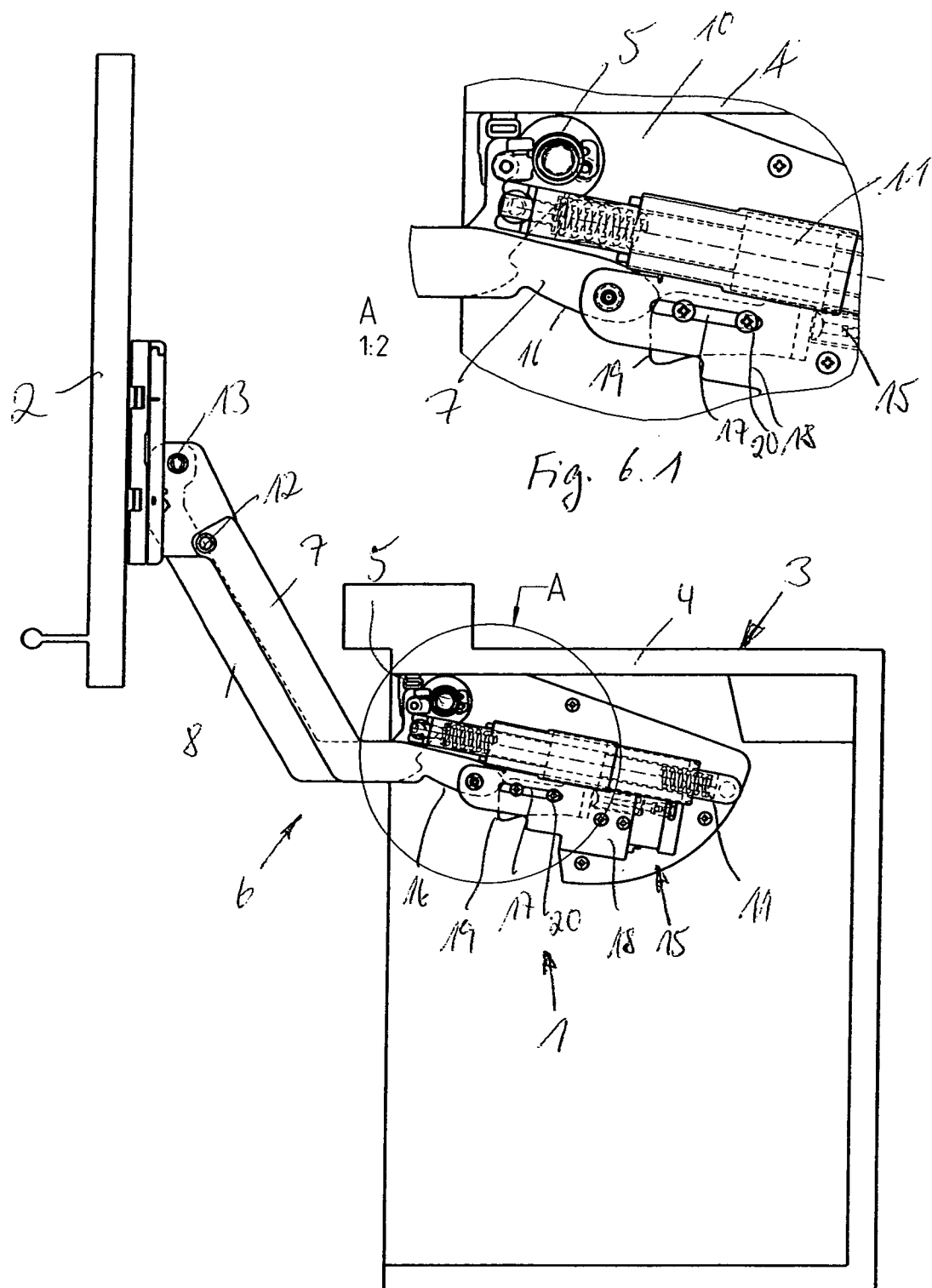


Fig 6

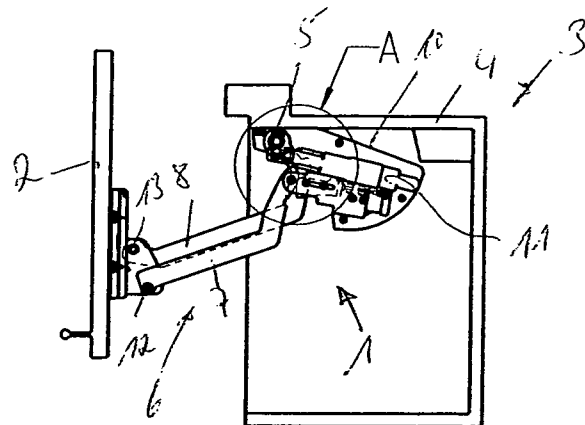
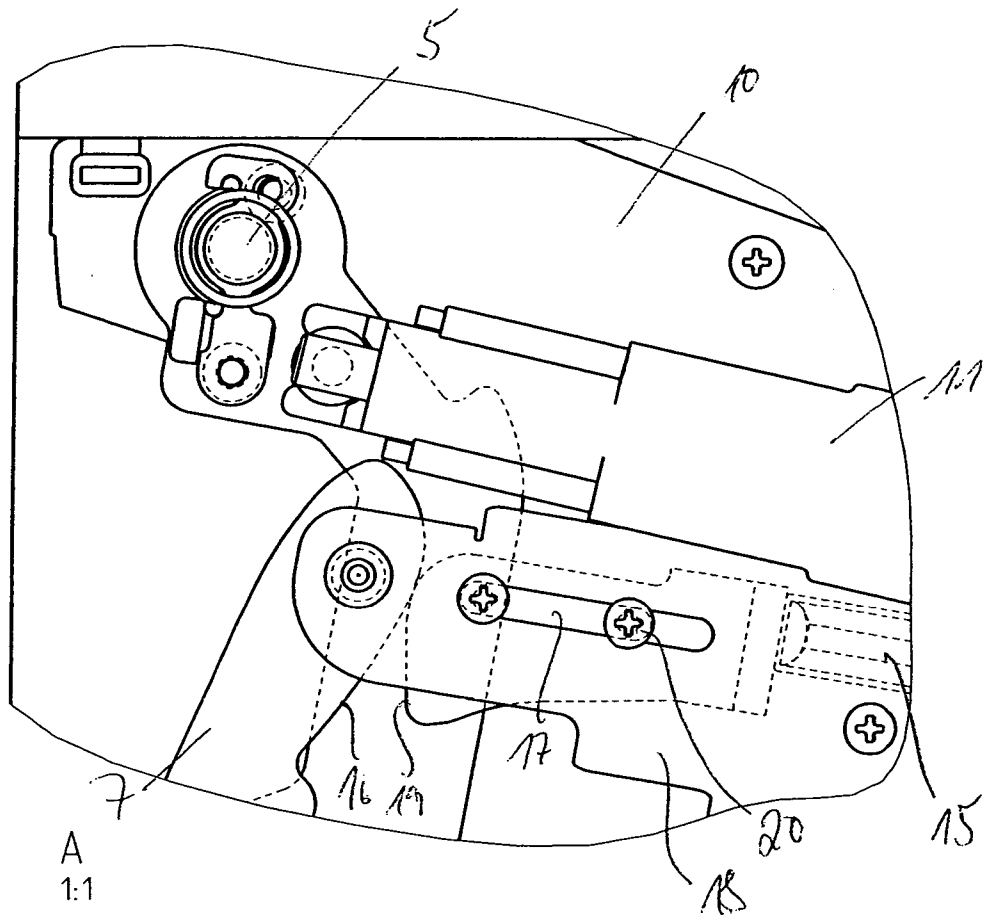


Fig. 7



A
1:1

Fig. 7.1

