

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
01 July 2021 (01.07.2021)



(10) International Publication Number
WO 2021/133241 A1

(51) International Patent Classification:

A47B 96/02 (2006.01) F16B 12/10 (2006.01)
A47B 96/06 (2006.01)

(21) International Application Number:

PCT/SE2020/051247

(22) International Filing Date:

21 December 2020 (21.12.2020)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

1951547-7 23 December 2019 (23.12.2019) SE

(71) Applicant: **ELFA INTERNATIONAL AB** [SE/SE]; Elfagatan 5, 593 87 Västervik (SE).

(72) Inventor: **NILSSON, Peter**; Sandebo, Västerbo 1, 593 92 Västervik (SE).

(74) Agent: **INDUSTRIPATENT I VÄXJÖ AB**; Box 3130, 350 43 Växjö (SE).

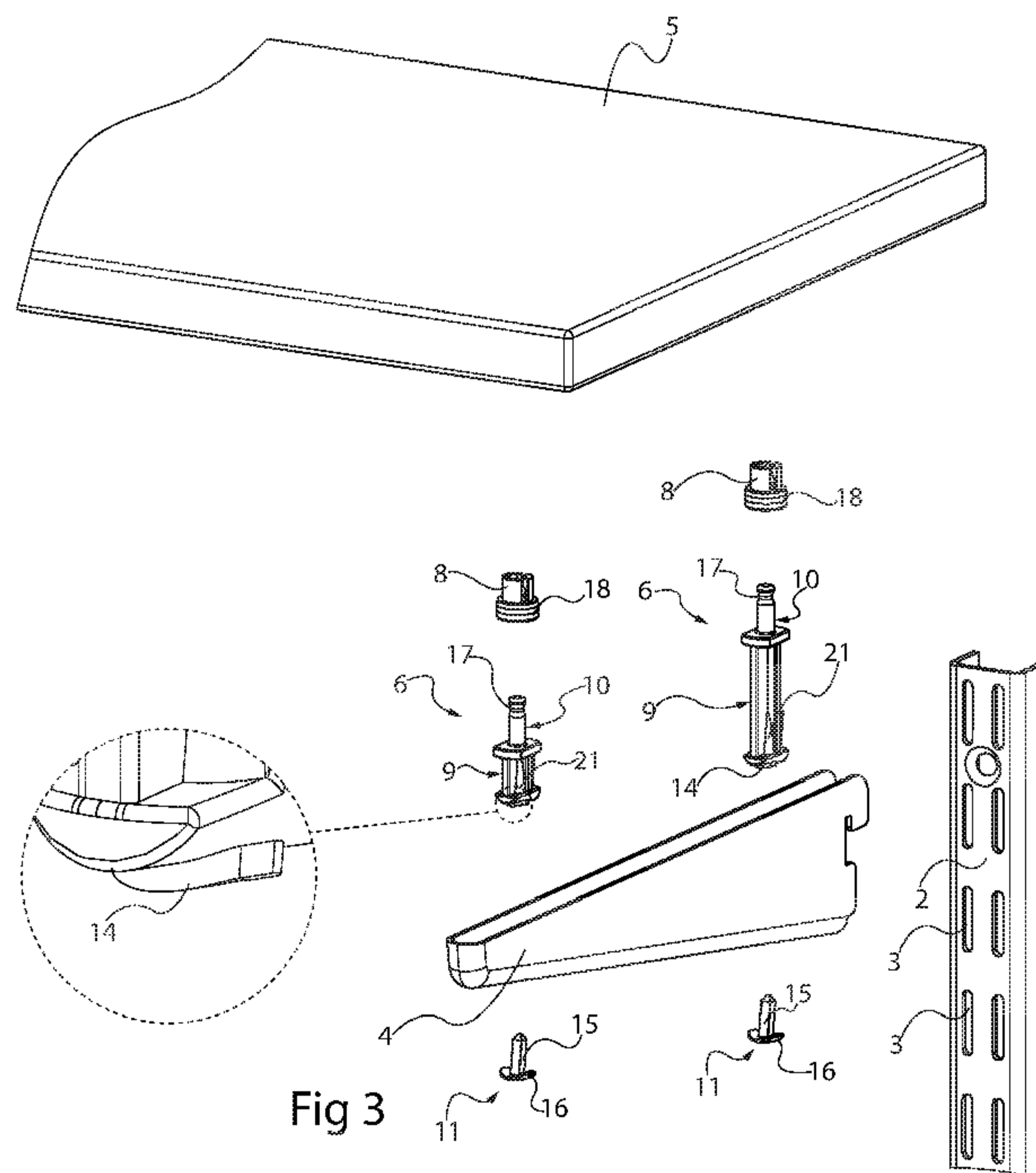
(81) Designated States (unless otherwise indicated, for every

kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every

kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

(54) Title: BRACKET PLUG



(57) Abstract: A storage system comprises a shelf (5) supported by a cantilevered bracket (4) and a connector element (6), connecting the bracket (4) with the shelf (5). The bracket (4) has a U-shaped cross-section. The connector element (6) comprises an insert (9), which is arranged inside the U-shaped cross-section of the bracket (4) and a dowel (10), which extends from the insert (9) into the shelf (5).

[Continued on next page]

WO 2021/133241 A1

Published:

- *with international search report (Art. 21(3))*
- *with amended claims (Art. 19(1))*

BRACKET PLUG

Field of the invention

The present invention relates to a storage system comprising a shelf supported by a cantilevered bracket, having a U-shaped cross-section, and a connector element, connecting the bracket with the shelf.

5 Background

Cantilevered brackets extending from vertically arranged hang standards are well known in the field of the invention. The brackets are arranged in groups of two or more brackets at the same height on parallel hang standards, in order to support a shelf. The shelf is placed on top of the brackets, and optionally a screw or a
10 corresponding fixing element is screwed through the bracket into the shelf.

One problem with the prior art is that separate fixing elements, such as screws, need to be used for establishing the connection between the shelf and the bracket. At least a screwdriver will be needed for the installation of the shelf. In order to avoid scratching the surfaces or otherwise damage the shelf or the bracket,
15 personnel with sufficient skills and experience should be employed.

Another difficulty is that rearrangement of the shelves may demand a loosening of the screws from the brackets. The screw holes in the shelf may be worn after repeated unscrewing and rescrewing of the screws, and the life span of the shelf may be reduced by repeated rearrangements.

20 A further disadvantage is that the screws need to be tightened from the bottom side of the shelf, thereby demanding an uncomfortable working position for the person assembling the storage system. As an alternative, the shelves may be temporarily turned for an easier fastening of the brackets thereon, but such a proceeding will place high demands on measuring and precision in order to ensure
25 that the brackets are fixed in a correct position for cooperation with the hang standards.

An even further disadvantage is that the head of the screw will extend from the outer surface of the bracket to a certain degree. This may be considered as a visual disadvantage. Also, there is a small risk that a user or other physical objects will
30 receive minor scratches from unintentional contact with the head of the screw.

Summary

It is an object of the present invention to solve, or at least mitigate, parts, or all of, the abovementioned problems. To this end, there is provided a connector element comprising an insert arranged inside the U-shaped cross-section of the bracket and a
5 dowel extending from the insert into the shelf.

Hereby the effect of providing a bracket system with a limited number of components that do not need any tools for assembly is attained. The shelf will be secured to the bracket by means that are mainly hidden from view in the assembled state, thereby creating an aesthetically pleasing impression. The assembly,
10 mounting, and remounting of the brackets and the shelf supported thereon may easily be performed by an unskilled person.

In an embodiment the insert of the connector element extends between a curved bottom portion of the bracket and a top portion with two sides of the cross section of the U-shaped bracket.

15 The technical effect of these features is that the insert is adapted to the inner shape of the bracket, thereby creating a stable connection between the bracket and the shelf supported thereon.

In a further embodiment, the dowel extends in the longitudinal direction of the connector element.

20 The dowel will provide an alignment of the bore of the shelf and the connector element, thereby keeping the shelf in its place on the bracket.

In a further embodiment, a bore in the shelf is provided with a coupling sleeve for receiving the dowel, extending in the longitudinal direction of the connector element.

25 The technical effect of this is that the coupling sleeve extends upwards in its mounted position and is in a position where it is ready to be inserted into bores in the shelf that is to be mounted on the bracket.

In a still further embodiment, the coupling sleeve comprises circumferentially extending ribs for contact with the inside of the bore in the supported shelf.

The technical effect of the ribs is that the coupling sleeve may stay in its position in the bore in the shelf, after it has been inserted therein. Thereby an easy dismounting of a mounted shelf will be possible without the use of any particular tools. Also, the wear on the shelf and the holes therein will be reduced.

5 In an even further embodiment, the coupling sleeve comprises a number of longitudinally extending tabs, which are spaced apart circumferentially.

The technical effect is that the coupling sleeve is not completely rigid in its circumferential direction. It may be slightly compressed, if the tabs are bent slightly inwards, and the tabs may spring back into their original positions after the temporary
10 compression. The tabs may then accommodate an inserted dowel and provide a satisfactory interaction therewith.

In another embodiment the coupling sleeve comprises a bead on each tab and the dowel comprises a narrowed region for snap-fastening interaction with the tabs.

A dowel which has been inserted into a bore which is lined with a coupling
15 sleeve may reach a very good interaction with the coupling sleeve, and thereby with the shelf, while at the same time the interconnection is easily reversible, in case of a need for rearrangement of one or more shelves.

In a further embodiment, the insert has laterally extending flanges with an outer shape which is complementary to the inside shape of the sides of the bracket.

20 The laterally extending flanges serve several purposes. One object is to limit the thickness of the material, since the insert, as well as other components in the system may be manufactured from plastics by injection molding. An even thickness of the material in plastic components allows for a speedy manufacture, due to speedy cooling, as well as for a minimized risk for deformation during cooling when the
25 manufactured component has been released from its mold.

In an even further embodiment, a first end of the insert has an outer shape, which is complementary to the curved inside shape of the bottom of the U-shaped bracket.

Hereby the insert may provide an alignment of the shelf in relation to the
30 bracket. When the insert is in a stable position, guided by the inner contours of the

bracket, the dowel may also be aligned with the intended position of the bore in the shelf.

In a further embodiment a first end of the insert, at the bottom of the bracket, has a receiving socket for a lock plug.

5 Hence the insert may be kept in its position in the longitudinal direction of the bracket. Also, the insert may not be lifted in its longitudinal direction, out of the bracket. Thereby the shelf may also be kept in its intended position.

In a yet further embodiment, the receiving socket is arranged in a direction which is a normal to the bottom portion of the bracket.

10 The lock plug may then have a symmetrical disposition, so that it may be insertable into the socket with any of several orientations. Yet, if the bottom of the bracket is arranged at an angle with the plane of the shelf supported thereon, the outer part of the lock plug may be arranged as snug as possible with the outer surface of the bracket. The outer part of the lock plug may hence be curved along
15 one axis, so that it may fit snugly along the curved outer surface of the bracket.

In even further embodiments the receiving socket is surrounded by a protruding area, the outer profile of the protruding area being complementary to a fixing hole in the bracket.

20 The protruding area will contribute to aligning the insert with the hole. This is especially the case if the protruding area is not rotatable in the fixing hole.

Further embodiments disclose that the lock plug comprises a shaft and a head, the head having a curvature corresponding to the outer curvature of the bottom of the U-shaped bracket.

25 With such a shape of the head, the lock plug may conform even closer to the outer curvature of the bracket.

Finally, there are embodiments wherein one or more of the components, including the connection element, the coupling sleeve, and the lock plug is manufactured by injection molding.

It is noted that embodiments of the invention may be embodied by all possible combinations of features recited in the claims. Further, it will be appreciated that the various embodiments described for the device are all combinable with the method as defined in accordance with the second aspect of the present invention, and vice versa.

Brief description of the drawings

The above, as well as additional objects, features and advantages of the present invention, will be better understood through the following illustrative and non-limiting detailed description of preferred embodiments of the present invention, with reference to the appended drawings, where the same reference numerals will be used for similar elements, wherein:

Fig. 1 is a view in perspective of a storage system according to the present disclosure;

Fig. 2 is a perspective view of the storage system as seen from below;

Fig. 3 is an exploded view of a part of the storage system;

Fig. 4 is a section of a part of the storage system; and

Fig. 5 is a section of a coupling sleeve included in the storage system.

All the figures are schematic, not necessarily to scale, and generally only show parts which are necessary in order to elucidate the embodiments, wherein other parts may be omitted.

Detailed description of the exemplary embodiments

In Fig 1 a storage system 1 according to the present disclosure is shown in general. The storage system 1 comprises at least two hang standards 2, i. e. upright tracks with a series of slots 3, wherein cantilevered brackets 4, or other supporting devices, are mountable. The hang standards 2 are typically profiled, made of a metallic material, and often surface treated, e.g. coated. Shelves 5 are arranged on the brackets 4 in Fig. 1, although other load-carrying components, such as rails, baskets, rods etc. may be included in the storage system 1 and arranged on or in connection with the brackets 4. In Fig. 1 each shelf 5 is supported by two brackets 4,

but, depending on the width of the shelves 5, three or more brackets 4 and hang standards 2 may be used for supporting each shelf 5.

In order to optionally secure each shelf 5 on its associated brackets 4, at least one connector element 6 extends, according to the present disclosure, from each
5 bracket 4 into the shelf 5, as seen in Fig. 2. In order to keep the upper side of the shelf 5 as smooth as possible, the connector element 6 is advantageously arranged from the bottom side of the shelf 5. Instead of arranging screws through the brackets 4 and into the bottom side of the shelf 5, the connector element 6 is arranged by
10 preparation of bores in the shelf 5, advantageously at the manufacturing site, so that both proper alignment and conformity with the hang standards 2 are ensured.

The brackets 4 have, in the disclosed embodiments, such a profile that their inner ends, closest to the hang standards, are deeper than their outer ends near the edges of the shelves 5, i. e. the brackets 4 are tapering towards their outer ends extending away from the hang standard 2.

15 The bores 7 are, in the embodiments disclosed in Figs. 3 to 5, lined with coupling sleeves 8. The coupling sleeves 8 are arranged in the bores 7 either at the manufacturing site or at the installation site by the person performing the assembly and installation of the storage system 1.

A number of connector elements 6 are arranged in each bracket 4, as shown
20 in fig. 3, where two connector elements 6 are provided to connect the bracket 4 with the shelf 5. The connector elements 6 are of mutually different lengths, adapted to their respective intended positions in the bracket 4, and conforming to the gradually varying depth of the bracket 4.

Each connector element 6 comprises an insert 9 and a dowel 10. Each insert
25 9 is elongated and its length optionally corresponds to the depth of the bracket 4 in the region of the intended position of the connector element 6, i. e. corresponding to the depth at the location of one of the bores 7 in the shelf 5.

The insert 9 comprises a series of lateral flanges 12, which extend from the center of the insert 9. Their respective thicknesses are selected such that an even
30 thickness of material in the insert 9 is attained, since an even thickness is advantageous during the manufacture of the connector element 6, i. e. by injection

molding. The outer profiles of the flanges are complementary to the inner cross section of the bracket 4 in the intended position of the respective connector element 6.

One end 13 of the insert 9 has a curved cross section thereby conforming to the inner cross section of the bracket 4 in its bottom region, where it is U-shaped. In a direction transversal to the U-shaped cross section, the end 13 of the insert 9 is slanting, thereby conforming to the varying depth of the bracket 4. A close conformity between the outer profile of the insert 9 and the inner profile of the bracket 4 results in a positioning of the insert 9 in the bracket 4, and consequently in a positioning of the shelf 5 in relation to the bracket 4.

In the disclosed examples, the positioning end 13 of the insert has a socket 21 for a lock plug 11, which is provided to extend from the outside of the bracket 4, through a bore in its curved bottom region and into the curved end 13 of the insert 9. Hereby the insert 9 is fixed in relation to the bracket 4, both in the longitudinal direction of the bracket 4 and in the transversal direction thereof, i. e. the insert 9 is fixed both in its longitudinal and transversal directions.

The socket 21 is in the examples arranged at an angle to the longitudinal direction of the insert 9. When the insert 9 is positioned in the bracket 4, the direction of the socket 21 is transversal to the bottom portion of the bracket 4, in some embodiments approximately normal thereto.

A further positioning of the insert 9 in the bracket 4 may be attained by providing the positioning end 13 of the insert 9 with a protruding area 14 around the socket 21 for the lock plug 11.

The lock plug 11 may advantageously comprise a shaft 15 and a head 16. The lock plug 11 may then have the general appearance of a thumb tack with a curved head portion. The shaft 15 preferably has a non-circular cross section, such as square, oval, rhomboid, etc. so that it will remain in the same position as inserted. The head 16 has a curvature corresponding to the outer curvature of the bottom of the U-shaped bracket. Hence the visual impression will be aesthetically pleasing, and the head 16 will be smooth and not pose a risk for injuries or damages to objects.

The dowel 10 extends from the insert 9 in the longitudinal direction of the connector element 6. When the shelf 5 is to be connected with the bracket 4, the dowel 10 extends into the bore 7 in the shelf 5. In the embodiment shown in figures 3 to 5, there is a coupling sleeve 8 inserted into the bore 7, and the dowel 10 will interact with the coupling sleeve 8, in order to attain a reliable fixation of the shelf 5 on the bracket 4. The dowel 10 has a narrow portion 17, which interacts with parts of the coupling sleeve 8 for a snap-fastening therein.

The coupling sleeve 8 is in the disclosed examples provided with circumferential ribs 18, which have an outer circumference virtually corresponding to that of the bore 7, so that the outer edges of the ribs 18 may cut into the inner walls of the bore 7, and the coupling sleeve 8 may remain securely in the bore 7.

The provision of a coupling sleeve 8 is advantageous in that while the bracket 4 is hereby able to carry loads in a direction approximately at a normal to the plane of the shelf 5, the coupling sleeve 8 and the dowel 10 interact to prevent movements of the shelf 5 in the plane thereof.

In at least some of the examples herein, an advantageous configuration of the upper surface of the insert 9 is disclosed. In these examples the upper surface is arranged to be aligned with the upper ends of the U-shaped bracket 4, so that an even surface is obtained as a support for the shelf 5.

In the disclosed examples, the coupling sleeve 8 is also provided with one or more tabs 19, which are mutually spaced apart around the circumference of the coupling sleeve 8. The tabs 19 are slightly flexible, and when a dowel 10 is introduced centrally between them, they will spring back slightly in order to let it pass. The inward sides of the tabs 19 are provided with beads 20, which come into contact with an introduced dowel 10. The beads 20 cooperate with the narrow portion 17 of the dowel 10, thereby providing a snap-fastening function between the shelf 5 and the bracket 4.

The provision of the coupling sleeve 8 and the dowel 10 may render unnecessary the use of any screws for fastening the shelf 5 to the bracket 4.

The invention has mainly been described above with reference to a few embodiments. However, as is readily appreciated by a person skilled in the art, other

embodiments than the ones disclosed above are equally possible within the scope of the invention, as defined by the appended patent claims.

For example, the dowel 10 has been shown and described as a pin-like portion which is insertable into the coupling sleeve 8 in the bore 7 in the shelf 5. In alternative embodiments the coupling sleeve 8 may be omitted, and the dowel 10 may be wider than shown, thereby cooperating directly with the inner wall of the bore 7. Especially, the dowel 10 may be designed in such a way that its outer contours correspond to the outer contours of the coupling sleeve 8 described above.

In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality.

Claims

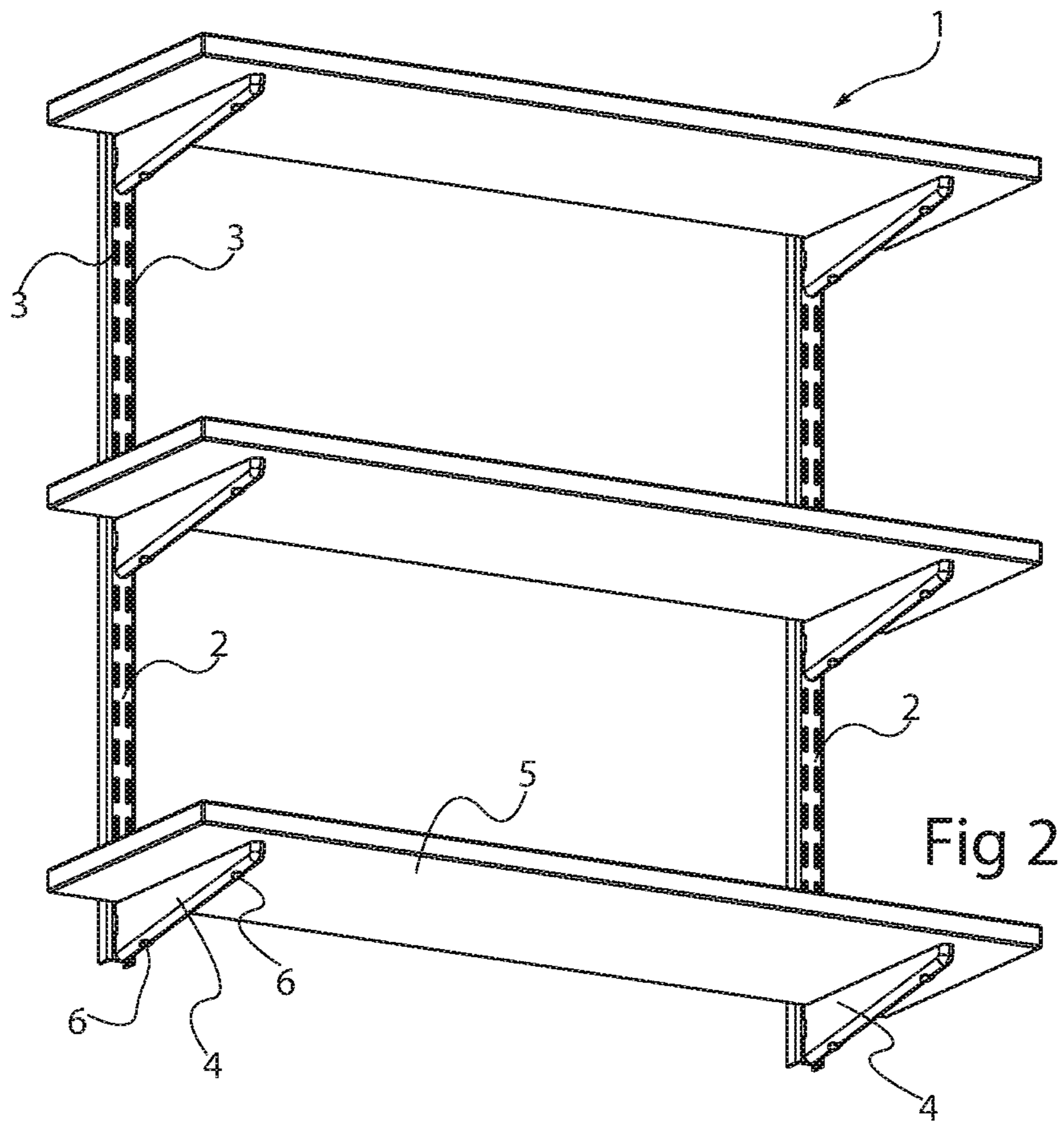
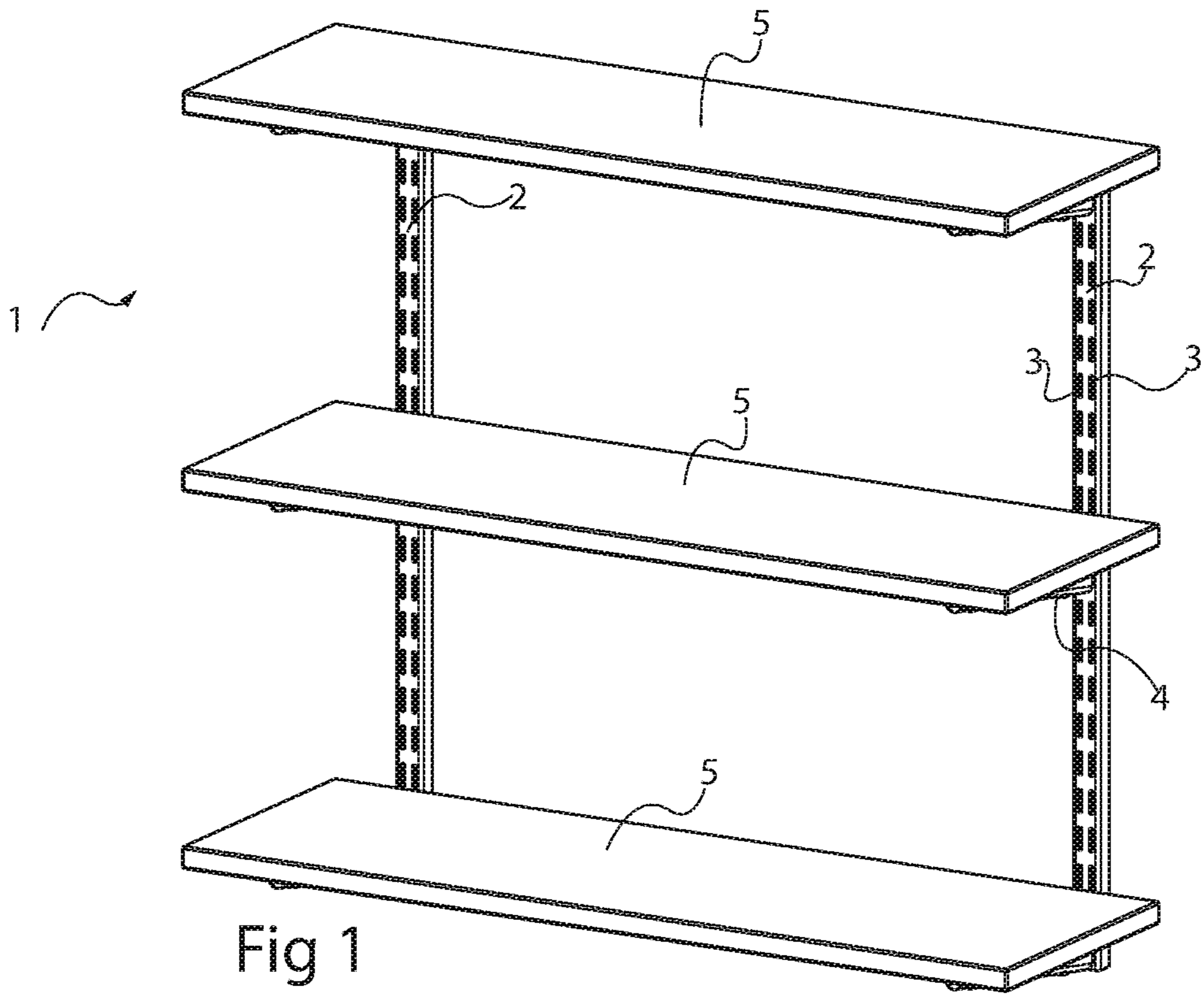
1. Storage system comprising a shelf (5) supported by a cantilevered bracket (4), having a U-shaped cross-section, and a connector element (6), connecting the bracket (4) with the shelf (5), **characterized by** the connector element (6) comprising an insert (9) arranged inside the U-shaped cross-section of the bracket (4) and a dowel (10) extending from the insert (9) into the shelf (5).
2. Storage system according to claim 1, wherein the insert of the connector element (6) extends between a curved bottom portion of the bracket (4) and a top portion with two sides of the cross section of the U-shaped bracket (4).
3. Storage system according to claim 1 or claim 2, wherein the dowel (10) extends in the longitudinal direction of the connector element (6).
4. Storage system according to any of the preceding claims, wherein a bore (7) in the shelf (5) is provided with a coupling sleeve (8) for receiving the dowel (10), extending in the longitudinal direction of the connector element (6).
5. Storage system according to claim 4, wherein the coupling sleeve (8) comprises circumferentially extending ribs (18) for contact with the inside of the bore (7) in the supported shelf (5).
6. Storage system according to claim 5, wherein the coupling sleeve (8) comprises a number of longitudinally extending tabs (19), which are spaced apart circumferentially.
7. Storage system according to claim 6, wherein the coupling sleeve (8) comprises a bead (20) on each tab (19) and the dowel (10) comprises a narrowed region (17) for snap-fastening interaction with the tabs (19).
8. Storage system according to any of the preceding claims, wherein the insert (9) has laterally extending flanges (12) with an outer shape which is complementary to the inside shape of the sides of the bracket (4).
9. Storage system according to any of the preceding claims, wherein a first end (13) of the insert (9) has an outer shape which is complementary to the curved inside shape of the bottom of the U-shaped bracket (4).

10. Storage system according to any of the preceding claims, wherein a first end (13) of the insert (9), at the bottom of the bracket (4), has a receiving socket (21) for a lock plug (11).
11. Storage system according to claim 10, wherein the receiving socket (21) is arranged in a direction which is a normal to the bottom portion of the bracket (4).
12. Storage system according to claim 10 or claim 11, wherein the receiving socket (21) is surrounded by a protruding area (14), such that the insert (9) is guided into a position in a fixing hole in the bracket (4).
13. Storage system according to any of claims 10-12, wherein the lock plug (11) comprises a shaft (15) and a head (16), the head (16) having a curvature corresponding to the outer curvature of the bottom of the U-shaped bracket (4).
14. Storage system according to any of the preceding claims, wherein one or more of the components, including the connector element (6), a coupling sleeve (8), and a lock plug (11) is manufactured by injection molding.

AMENDED CLAIMS**received by the International Bureau on 21 April 2021 (21.04.2021)****Claims**

1. Storage system comprising a shelf (5) supported by a cantilevered bracket (4), having a U-shaped cross-section, and a connector element (6), connecting the bracket (4) with the shelf (5), **characterized by** the connector element (6) comprising an insert (9) arranged inside the U-shaped cross-section of the bracket (4) and a dowel (10) extending from the insert (9) into the shelf (5).
2. Storage system according to claim 1, wherein the insert of the connector element (6) extends between a curved bottom portion of the bracket (4) and a top portion with two sides of the cross section of the U-shaped bracket (4).
3. Storage system according to claim 1 or claim 2, wherein the dowel (10) extends in the longitudinal direction of the connector element (6).
4. Storage system according to any of the preceding claims, wherein a bore (7) in the shelf (5) is provided with a coupling sleeve (8) for receiving the dowel (10), extending in the longitudinal direction of the connector element (6).
5. Storage system according to claim 4, wherein the coupling sleeve (8) comprises circumferentially extending ribs (18) for contact with the inside of the bore (7) in the supported shelf (5).
6. Storage system according to claim 5, wherein the coupling sleeve (8) comprises a number of longitudinally extending tabs (19), which are spaced apart circumferentially.
7. Storage system according to claim 6, wherein the coupling sleeve (8) comprises a bead (20) on each tab (19) and the dowel (10) comprises a narrowed region (17) for snap-fastening interaction with the tabs (19).
8. Storage system according to any of the preceding claims, wherein the insert (9) has laterally extending flanges (12) with an outer shape which is complementary to the inside shape of the sides of the bracket (4).
9. Storage system according to any of the preceding claims, wherein a first end (13) of the insert (9) has an outer shape which is complementary to the curved inside shape of the bottom of the U-shaped bracket (4).

10. Storage system according to any of the preceding claims, wherein a first end (13) of the insert (9), at the curved bottom region of the bracket (4), has a receiving socket (21) for a lock plug (11).
11. Storage system according to claim 10, wherein the receiving socket (21) is arranged in a direction which is a normal to the curved bottom region of the bracket (4).
12. Storage system according to claim 10 or claim 11, wherein the receiving socket (21) is surrounded by a protruding area (14), such that the insert (9) is guided into a position in a fixing hole in the bracket (4).
13. Storage system according to any of claims 10-12, wherein the lock plug (11) comprises a shaft (15) and a head (16), the head (16) having a curvature corresponding to the outer curvature of the bottom of the U-shaped bracket (4).
14. Storage system according to any of the preceding claims, the system including at least a lock plug (11), for keeping the connector element (6) in place, and a coupling sleeve (8), for receiving the dowel (10), wherein one or more of the components, including the connector element (6), the coupling sleeve (8), and the lock plug (11) is manufactured by injection molding.



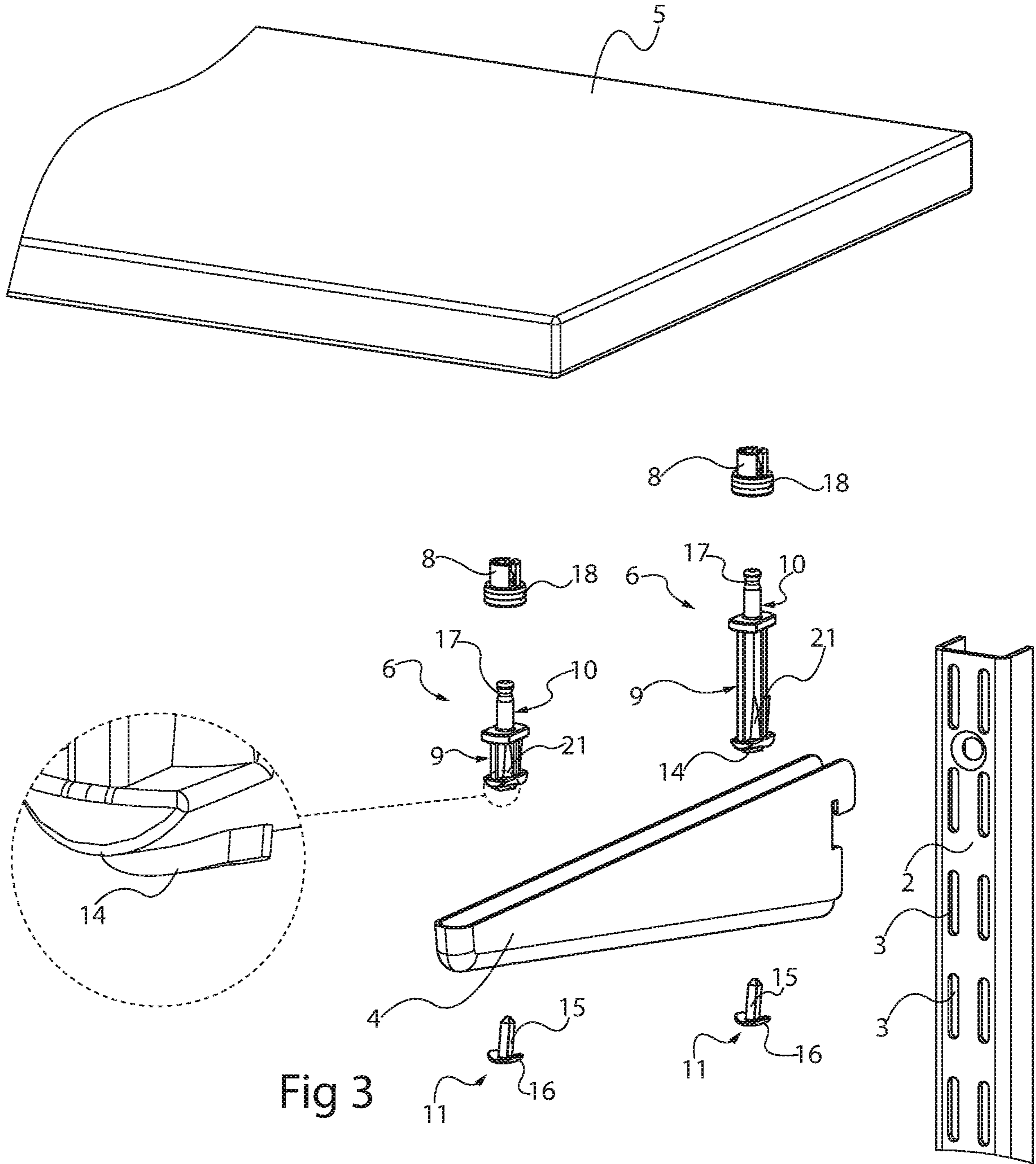


Fig 3

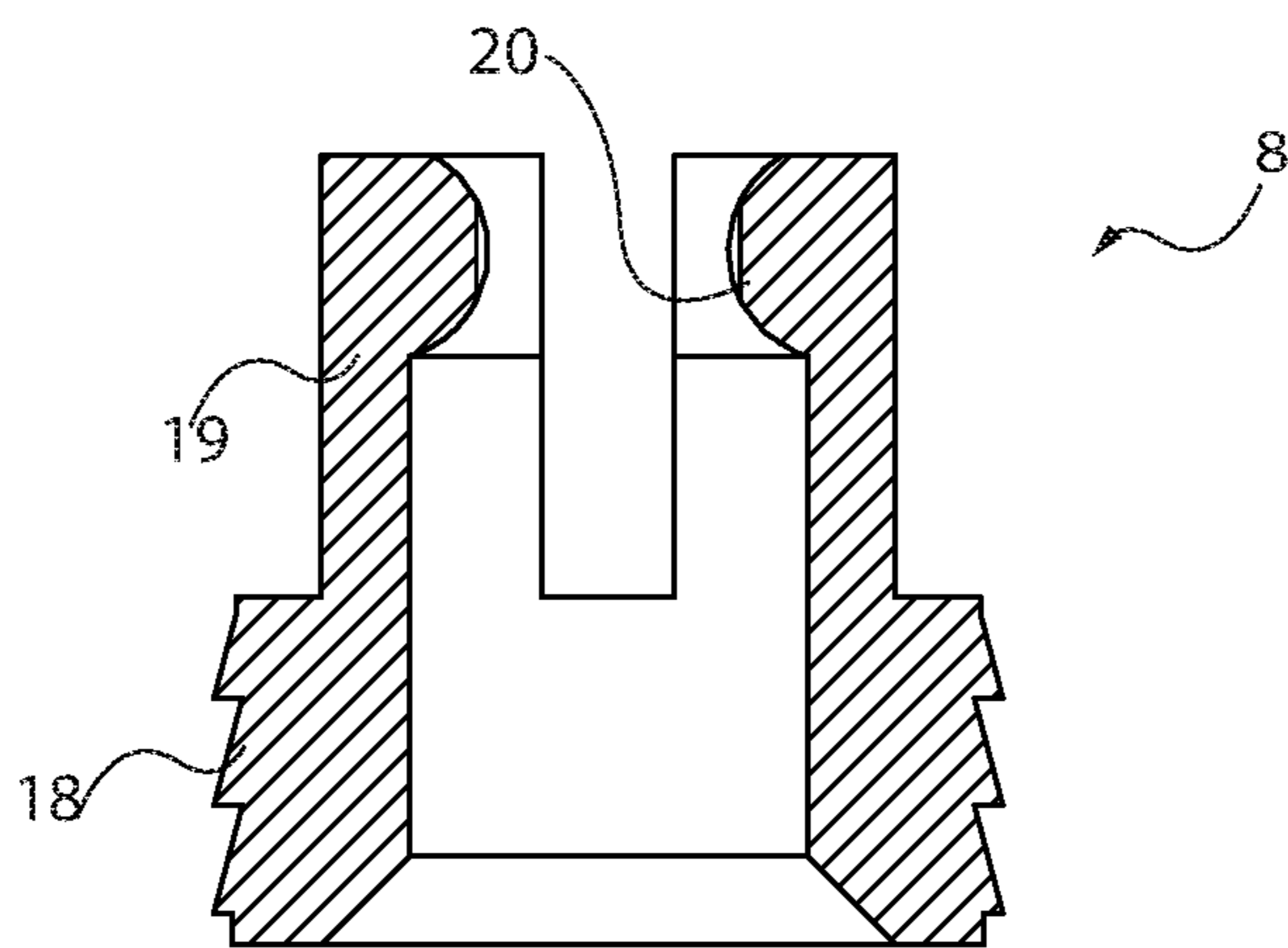
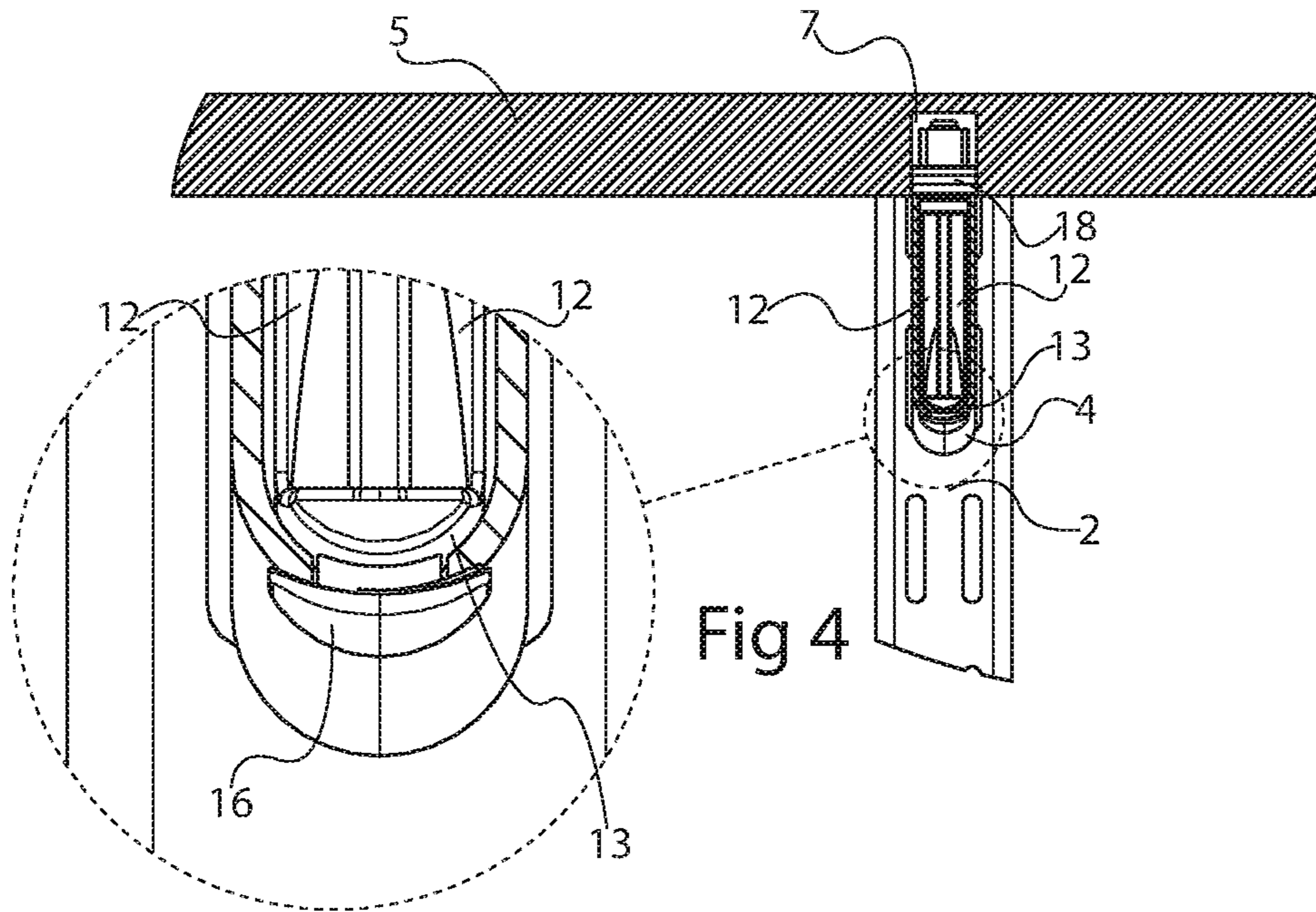


Fig 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2020/051247

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A47B, F16B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 20030233965 A1 (BRAZIER KEITH), 25 December 2003 (2003-12-25); whole document; paragraphs [0031], [0034], [0035]; figures 2,5 --	1-14
A	GB 2393226 A (NEWTECH HARDWARE LTD), 24 March 2004 (2004-03-24); whole document; page 6, paragraph [0003]; figures 1-5 --	1-14
A	DE 10354114 A1 (G & G BESCHLAEUGE GMBH), 26 August 2004 (2004-08-26); paragraphs [0006], [0014]-[0015]; figures 1-3 --	1-14

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

15-02-2021

Date of mailing of the international search report

15-02-2021

Name and mailing address of the ISA/SE

Patent- och registreringsverket
Box 5055
S-102 42 STOCKHOLM
Facsimile No. + 46 8 666 02 86

Authorized officer

Elina Staaf

Telephone No. + 46 8 782 28 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2020/051247

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3826207 A (SUTHERLAN W), 30 July 1974 (1974-07-30); column 3, paragraph [0004]; figures 12,14 --	1-14
A	US 20090139943 A1 (FERNANDEZ JULIO A ET AL), 4 June 2009 (2009-06-04) --	10-13
A	US 20170159691 A1 (PELC JR ROBERT J), 8 June 2017 (2017-06-08) --	10-13
A	US 20180031020 A1 (CHEN PING-KUN ET AL), 1 February 2018 (2018-02-01) --	4, 5, 10-13
A	US 3921280 A (KING JR JOHN O), 25 November 1975 (1975- 11-25) --	4-6
A	US 4836729 A (BISPING HEINZ ET AL), 6 June 1989 (1989- 06-06) --	4-6
A	GB 320487 A (JOHN EPHRAIM HILL), 17 October 1929 (1929-10-17); column 2, paragraph [0002]; figures 1-3 --	1-14
A	US 5069408 A (BESSINGER WALTER L), 3 December 1991 (1991-12-03); figures 1,10 -- -----	1-14

Continuation of: second sheet

International Patent Classification (IPC)

A47B 96/02 (2006.01)

A47B 96/06 (2006.01)

F16B 12/10 (2006.01)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/SE2020/051247

US	20030233965	A1	25/12/2003	NONE		
GB	2393226	A	24/03/2004	IE	S20030591	A2 28/01/2004
DE	10354114	A1	26/08/2004	DE	20302306	U1 12/06/2003
US	3826207	A	30/07/1974	CA	978144	A 18/11/1975
				JP	49125170	A 29/11/1974
US	20090139943	A1	04/06/2009	US	7900783	B2 08/03/2011
US	20170159691	A1	08/06/2017	NONE		
US	20180031020	A1	01/02/2018	JP	2018017303	A 01/02/2018
				JP	6058197	B1 11/01/2017
US	3921280	A	25/11/1975	NONE		
US	4836729	A	06/06/1989	AU	601920	B2 20/09/1990
				AU	1401588	A 13/10/1988
				CA	1302748	C 09/06/1992
				DE	3712463	A1 27/10/1988
				DK	194488	A 14/10/1988
				EP	0287505	A1 19/10/1988
				FI	881669	A 14/10/1988
				HU	T47707	A 28/03/1989
				HU	203914	B 28/10/1991
				JP	63261032	A 27/10/1988
				NO	881575	L 14/10/1988
				ZA	882121	B 28/12/1988
GB	320487	A	17/10/1929	NONE		
US	5069408	A	03/12/1991	NONE		