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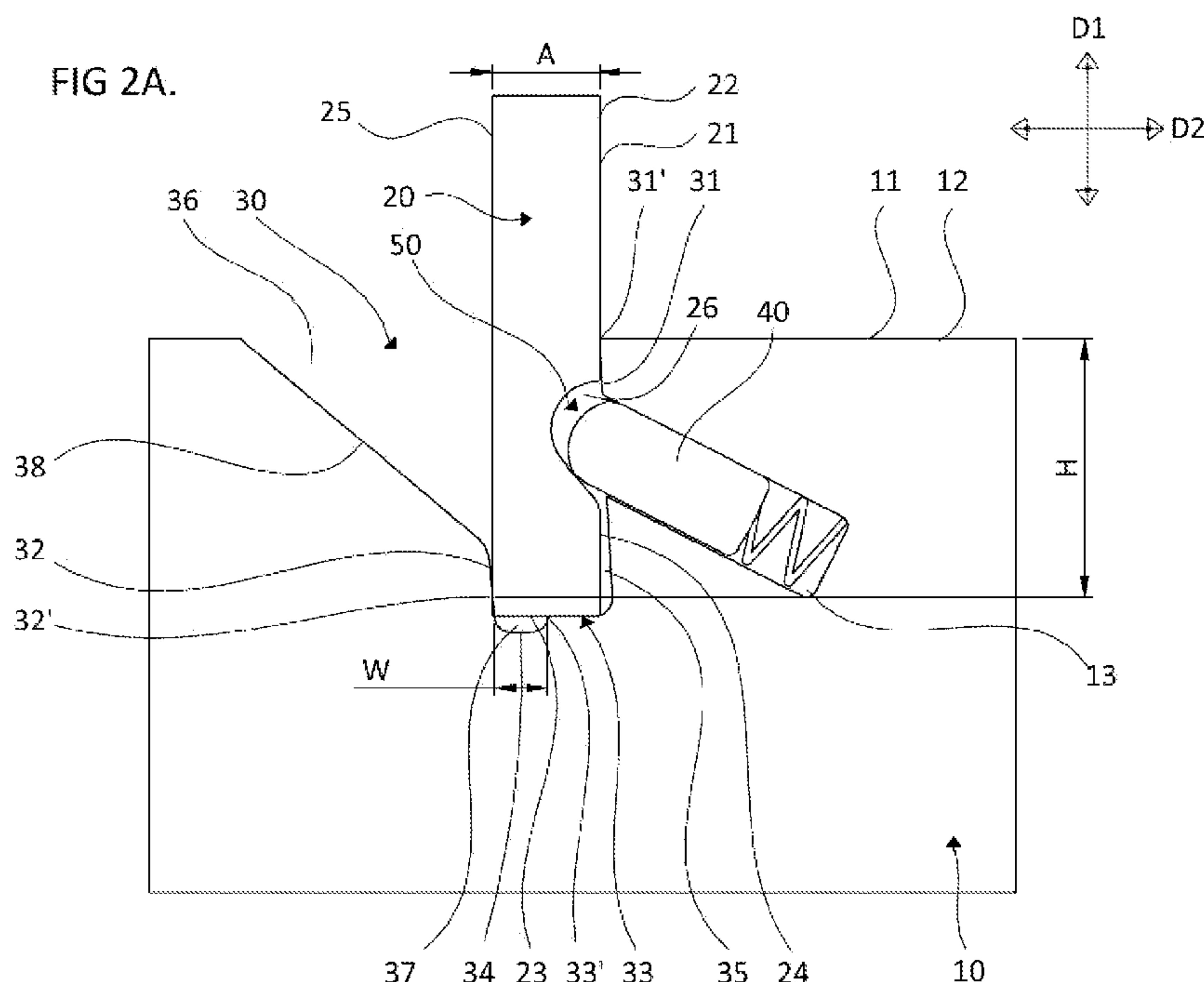
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(54) Title: SET OF PANELS WITH A MECHANICAL LOCKING DEVICE



(57) Abstract: A set of panels including a first panel (10) with a first main plane and a second panel (20) with a second main plane with a second main surface (22). The first main plane is essentially perpendicular to the second main plane in a locked position. The second panel comprises a third main surface (25) at a first distance (A) from the second main surface. The first and the second panel comprises a locking device (50) for locking a first edge of the first panel to a second edge of the second panel. The locking device comprises an edge groove (30) wherein the edge groove comprises a tongue (40), which is configured to cooperate with a tongue groove (26) of the first panel, in a locked position, for locking the first and the second edges in a first direction (D1) which is perpendicular to the first main plain (11). A first groove surface (31) of the edge groove cooperate with second main surface, at a first contact area (31') in a locked position and a second groove surface (32) of the edge groove cooperate with the third main surface, at a second contact area

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SET OF PANELS WITH A MECHANICAL LOCKING DEVICE

Field of the Invention

The present invention relate to panels that may be arranged perpendicular to each other and locked
5 together with a mechanical locking device. The panels may be assembled and locked together to
obtain a furniture product, such as a bookshelf, a cupboard, a wardrobe, a box, a drawer or a
furniture component. The locking device may comprise a flexible tongue.

Background of the Invention

A furniture product provided with a mechanical locking device is known in the art, as evidenced by
10 WO2017/052456. The furniture comprises a first panel connected mainly perpendicular to a second
panel by mechanical locking device. The mechanical locking device can be disassembled by an
angling motion.

Summary of the Invention

It is an object of certain aspects of the present invention to provide an improvement over the above
15 described techniques and known art; particularly to facilitate assembling of panels configured to be
assembled without the need of using any tools. A further object of at least certain aspects of the
present invention is to assemble panels which may show a tighter and more aesthetic connection
between a frame panel and a back piece of a furniture, such as a bookshelf, a cupboard, a wardrobe,
a kitchen fixture, a drawer, or a box for storing or transportation.

20 A further object of at least certain aspects of the present invention may be to manufacture the back
piece comprising a mechanical locking device with fewer production steps and lower cost.

At least some of these and other objects and advantages that will be apparent from the description
have been achieved by a set of panels comprising a first panel with a first main plane with a first main
surface and a second panel with a second main plane with a second main surface, wherein the first
25 main plane is essentially perpendicular to the second main plane in a locked position, wherein the
second panel comprises a third main surface at a first distance from the second main surface
wherein the first and the second panel comprises a locking device for locking a first edge of the first
panel to a second edge of the second panel, wherein the locking device comprises an edge groove at
the first edge of the first panel, said edge groove comprise a first groove surface and a opposite
30 second groove surface and a first bottom surface wherein the locking device comprises a tongue

groove at the second main surface of the second panel, said panel comprises a first edge surface which is facing the first bottom surface in a locked position, the second panel further comprises a second edge surface extending between the tongue groove and the first edge surface, wherein the edge groove comprises a tongue, which is configured to cooperate with the tongue groove in a locked position, for locking the first and the second edges in a first direction which is perpendicular to the first main plain, wherein the first groove surface cooperate with second main surface, at a first contact area in a locked position and the second groove surface cooperate with the third main surface, at a second contact area, to lock the first and second panel in a second direction which is perpendicular to the second main plain wherein the first contact area is positioned, in a locked position, at a second distance from the second contact area, wherein the second distance is greater than the first distance, and that the edge groove at the intersection of the first and third main surface has an open space.

According to an aspect the second distance may be the closest distance in a perpendicular direction to the first main plane between the first and second contact area.

According to an aspect the tongue may protrude from the first groove surface.

According to an aspect the tongue may be a flexible tongue.

According to an aspect the tongue may be arranged in an insertion groove.

According to an aspect the first and second contact area may be positioned at a third distance in a perpendicular direction to the second main plane, wherein the first distance may be greater than the third distance.

According to an aspect the part of the second panel, inserted in edge groove, in locked position, may be bent in a direction, towards the first groove surface.

According to an aspect the locking device may comprise a first space in locked position, between the second edge surface and the first groove surface.

According to an aspect the first groove surface comprises an upper part positioned above the tongue and a lower part positioned below the tongue wherein the lower part is displaced relative the upper part such that a first space may be obtained in the locked position between the second lower part and the second edge surface.

According to an aspect the edge groove may comprise a second bottom surface at a greater depth than the first bottom surface.

According to an aspect the locking device may comprise a second space in locked position, between the first edge surface and second bottom surface.

According to an aspect the first and second contact area may be positioned at a third distance, and the second groove surface and the first bottom surface may be positioned at a fourth distance in a perpendicular direction to the second main plane.

According to an aspect the fourth distance may be within the range of about 0.1 x third distance to 0.9 x third distance, or about 0.25 x third distance to 0.75 x third distance, or more preferably about 0.5 x third distance.

According to an aspect a first angle between the second groove surface and the second main plain may be within the range of about 1-30°, or in the range of 2-20° or more preferably about 5-10°.

According to an aspect a second angle between the first main surface and the first groove surface may be within the range of about 70-89°, or about 88-80°, or more preferably about 85° such that a first space may be obtained in a locked position between the second edge surface and a lower part of the first groove surface.

According to an aspect the first and/or the second panel may comprise a wood fibre based material, such as one or more of HDF, MDF, plywood, solid wood or particleboard, or a reinforced plastic board or a wood fibre composite board.

According to an aspect the first and/or second panel may comprise a decorative layer.

According to an aspect the edge groove may extend along essentially the entire length of the first edge.

According to an aspect the second panel may comprise said tongue groove in at least two of four edges.

According to an aspect the locking device may be configured to be unlocked by an angling motion of the panel relative the adjacent panel, such that a third angle γ between the first and second main plain is increasing.

Another aspect of the invention comprises a set of panels comprising a first panel with a first main plane with a first main surface and a second panel with a second main plane with a second main surface, wherein the first main plane is essentially perpendicular to the second main plane in a locked position, wherein the second panel comprises a third main surface at a first distance from the second main surface, wherein the first panel and the second panel comprise a locking device for locking a first

edge of the first panel to a second edge of the second panel, wherein the locking device comprises an edge groove at the first edge of the first panel, said edge groove comprise a first groove surface and a opposite second groove surface and a first bottom surface, wherein the locking device comprises a tongue groove at the second main surface of the second panel, wherein the second panel comprises
5 a first edge surface which is facing the first bottom surface in a locked position, the second panel further comprises a second edge surface extending between the tongue groove and the first edge surface ,wherein the edge groove comprises a tongue, which is configured to cooperate with the tongue groove in a locked position, for locking the first and the second edges in a first direction which is perpendicular to the first main plain, wherein the first groove surface cooperates with the second main surface, at a
10 first contact area in a locked position and the second groove surface cooperate with the third main surface, at a second contact area, to lock the first and second panel in a second direction which is perpendicular to the second main plain, wherein the first contact area is positioned, in a locked position, at a second distance from the second contact area, wherein the first groove surface comprises an upper part positioned above the tongue and a lower part positioned below the tongue, and wherein a
15 first space extends in the locked position from the tongue to the first edge surface and between second edge surface and the lower part.

According to an aspect a part of the second panel, inserted in edge groove, in locked position, is bent in a direction, towards the first groove surface.

According to an aspect wherein a first angle between the second groove surface and the second main
20 plain, in locked position is within the range of about 1-30°, or in the range of 2-20° or more preferably about 5-10°.

According to an aspect wherein a second angle between the first main surface and the first groove surface is within the range of about 70-89°, or about 88-80°, or more preferably about 85°, such that the first space is obtained.

25 According to an aspect the tongue protrudes from the first groove surface.

According to an aspect the tongue is a flexible tongue.

According to an aspect the tongue is arranged in an insertion groove.

According to an aspect the edge groove comprises a second bottom surface at a greater depth than the first bottom surface.

According to an aspect the locking device comprises a second space in locked position, between the first edge surface and second bottom surface.

According to an aspect the first and/or the second panel comprises a wood fibre based material, such as one or more of HDF, MDF, plywood, solid wood or particleboard, or a reinforced plastic board or a wood fibre composite board.

According to an aspect the first and/or second panel comprises a decorative layer.

According to an aspect the edge groove extends along essentially the entire length of the first edge.

According to an aspect the second panel comprises said tongue groove in at least 2 of 4 edges.

According to an aspect the locking device is configured to be unlocked by an angling motion of the panel relative the adjacent panel, such that a third angle between the first and second main plain is increasing.

According to an aspect the first groove surface comprises an upper part positioned above the tongue and a lower part positioned below the tongue wherein the lower part is displaced relative the upper part such that a first space may be obtained in the locked position between second edge surface and the lower part.

Brief Description of the Drawings

These and other aspects, features and advantages of which embodiments of the invention are capable of, will be apparent and elucidated from the following description of embodiments of the present invention, reference being made to the accompanying drawings, in which

FIG 1A shows a 3D-view of a set comprising four of the first panel, forming a cabinet frame and one of the second panel in an assembled state of an embodiment of the invention.

FIG 1B shows a front view of a set comprising four of the first panel, one of the second panel in an assembled state of an embodiment of the invention.

FIG 1C shows a cross-section view, in an assembled state of an embodiment of the invention.

FIG 2A shows a cross sectional view of a set in an assembled state according to an embodiment of the invention.

FIG 2B shows a cross sectional view of a first panel according to an embodiment of the invention.

FIG 3A shows a cross sectional view of a set in an assembled state according to an embodiment of the invention.

FIG 3B shows a cross sectional view of a second panel according to an embodiment of the invention.

FIG 4A-6B shows a cross sectional view of a set according to an assembled state in various embodiments of the invention.

FIG 7A shows a cross sectional view of a set according to an unassembled state in an embodiment
5 of the invention.

FIG 7B-8A shows a cross sectional view of a set in an assembled state in different embodiments of the invention.

Detailed Description

Specific embodiments of the invention will now be described with reference to the accompanying
10 drawings. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. The terminology used in the detailed description of the embodiments illustrated in the accompanying drawings is not intended to be limiting of the invention. In the
15 drawings, like numbers refer to like elements.

The terminology used herein is for the purpose of describing particular aspects of the disclosure only, and is not intended to limit the disclosure. As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise.

It should be noted that the word "comprising" does not necessarily exclude the presence of other
20 elements or steps than those listed and the words "a" or "an" preceding an element do not exclude the presence of a plurality of such elements. It should further be noted that any reference signs do not limit the scope of the claims.

The different aspects, alternatives and embodiments of the invention disclosed herein can be combined with one or more of the other aspects, alternatives and embodiments described herein.

25 Two or more aspects can be combined.

An embodiment of the invention is shown in FIG 1A-1C as an assembled furniture including a set of panels comprising a first panel 10 with a first main plane 11 with a first main surface 12 and a second panel 20 with a second main plane 21 with a second main surface 22, wherein the first main plane 11 may be essentially perpendicular to the second main plane 21 in a locked position. The second panel
30 20 comprises a third main surface 25 at a first distance A from the second main surface 22, wherein

the first and the second panel comprises a locking device 50 for locking a first edge of the first panel 10 to a second edge of the second panel 20.

FIGS 2A, 3A, 4A-8A show enlargements of embodiments of the locking device 50 comprising an edge groove 30 at the first edge of the first panel 10, said edge groove comprise a first groove
5 surface 31 and a opposite second groove surface 32 and a first bottom surface 33.

The locking device 50 comprises a tongue groove 26 at the second main surface 22 of the second panel 20, said panel comprises a first edge surface 23 which is facing the first bottom surface 33 in a locked position, the second panel further comprises a second edge surface 24 extending between the tongue groove 26 and the first edge surface 23, wherein the edge groove 30 comprises a tongue
10 40, which is configured to cooperate with the tongue groove 26 in a locked position, for locking the first and the second edges in a first direction D1 which is perpendicular to the first main plain 11.

The first groove surface 31 cooperate with second main surface 22, at a first contact area 31' in a locked position and the second groove surface 32 cooperate with the third main surface 25, at a second contact area 32', to lock the first and second panel in a second direction D2 which may be
15 perpendicular to the second main plain 21. The first contact area 31' is positioned, in a locked position, at a second distance H from the second contact area 32'.

An embodiment of the first groove surface 31 comprises an upper part positioned above the tongue 40 and a lower part 38 positioned below the tongue 40.

An embodiment of the locking device 50 comprises in the locked position a first space 35 between
20 second edge surface 24 and the lower part 38.

An embodiment of the of the first space 35 extends in the locked position from the tongue 40 to the first edge surface 23.

FIG 2B discloses an enlargement of a part of an embodiment of the first panel 10 in un-assembled state.

25 FIG 3A discloses an enlargement of an embodiment of the locking device 50 wherein an upper part of the first groove surface 31 positioned above the tongue 40 and a lower part 38 of the first groove surface 31 positioned below the tongue 40 may be parallel and displaced such that a first space 35 may be obtained in the locked position between the second edge surface 24 and the lower part 38 of the first groove surface 38.

Embodiments of the locking device 50 comprises an embodiment of the edge groove 30 comprising an open space 36 at the intersection of the first and third main surface 12, 25.

FIG 3B discloses an enlargement of a part of an embodiment of the second panel 20 in an unassembled state of the invention. In this embodiment the second panel comprises no guide
5 chamfers.

FIG 4A discloses an enlargement of an embodiment of the locking device 50 wherein the second edge surface 24 is displaced from the second main surface 22 such that a first space 35 may be obtained in the locked position at between second edge surface 24 and the lower part 38 of the first groove surface 38.

10 According to an embodiment of the invention the second distance H may be greater than the first distance A.

According to an embodiment of the invention the second distance H may be the closest distance in a perpendicular direction to the first main plane 11 between the first and second contact area 31', 32'.

According an embodiment of the invention the first groove surface 31 may comprise a protruding
15 tongue 40.

FIG 4B discloses an enlargement of an embodiment of the locking device 50 wherein the tongue 40 may be formed from the first panel 10, preferably by milling.

According to an embodiment of the invention the locking device 50 may comprise a flexible tongue 40.

20 The locking device 50 may comprise a tongue 40, arranged in an insertion groove 13. The tongue may comprise a polymer material which may be reinforced with filler, such as glass fibre.

According to an embodiment the first and second contact area 31', 32' may be positioned at a third distance C in a perpendicular direction to the second main plane 21, the first distance A may be greater than the third distance C. For example, the first distance A may be at least 3% greater than
25 the third distance C, at least 5% greater than the third distance C, at least 10% greater than the third distance C, or at least 15% greater than the third distance C.

FIG 8A discloses a set according an embodiment of the invention. A portion of the second panel 20, inserted in edge groove 30, in locked position, may be bent in a direction B, towards the first groove surface 31, preferably towards the lower part 38 of the first groove surface 31.

The thickness of the second panel 20 may vary, due to production tolerances in the panel production process. The bending B of the second panel 20 may compensate for thickness variations. A thicker panel causes a bigger degree of bending, consequently a thinner panel causes less degree of bending. The above described bending enables the exclusion of a production step where the first
5 distance A of the second panel 20 is set by a calibration cut, such a milling with a profiling tool.

The bending B may result in a compressive force between the second main surface 22 of the second panel 20 and the first contact area 31' of the edge groove 30 of the first panel 10. The compressive force may create a tight and more aesthetic connection between the first and second panel.

According to an embodiment of the invention the locking device 50 may comprise a first space 35 in
10 locked position, between the second edge surface 24 and the first groove surface 31.

The first space 35 may facilitate the bending B.

The first space 35 may facilitate angling of the second panel 20 during disassembly of a set.

FIG 5A disclose an enlargement of an embodiment of the locking device 50 wherein the second panel 20 may comprise a guide chamfer 28.

15 According to an embodiment of the invention the tongue groove 26 may comprise a guide chamfer 27 to improve the installation sequence of the first panel 10 and second panel 20.

According to an embodiment of the invention the second panel 20 may comprise a guide chamfer 29 and/or 28 to further improve the installation of the first panel 10 and second panel 20.

The above described guide chamfers may be an improvement in at least one installation sequence
20 where the second panel 20 is displaced parallel to the second main plane 21 towards the first panel 10 in a perpendicular direction to the first main plane 11 where the second panel 20 is inserted into the edge groove 30 and locked together by the locking device 50.

FIG 5B disclose an enlargement of an embodiment of the locking device 50 wherein the first contact area 31' may be positioned below the tongue 40.

25 FIG 6A disclose an enlargement of an embodiment of the locking device 50 wherein the first contact area 31' may be positioned below the flexible tongue 40.

According to an embodiment of the invention the edge groove 30 may comprise a second bottom surface 34 at a greater depth than the first bottom surface 33.

According an embodiment of the invention the locking device 50 comprises a second space 37 in locked position, between the first edge surface 23 and second bottom surface 34. The second space 37 may facilitate an easier disassembly of a set.

FIG 6B disclose an enlargement of an embodiment of the locking device 50 wherein a lower part of the first space 35 has a greater width than an upper part of the first space 35.

According to an embodiment of the invention the first and second contact areas 31',32' may be positioned at a third distance C, and the second groove surface 32 and the first bottom surface 33 are positioned at a fourth distance W in a perpendicular direction to the second main plane 21.

According to an embodiment of the invention the fourth distance W may be within the range of about 0.1xC to 0.9xC, or about 0.25xC to 0.75xC, or more preferably about 0.5xC.

According to an embodiment of the invention a first angle α between the second groove surface 32 and the second main plain 21, in locked position, may be within the range of about 1-30°, or in the range of 2-20° or more preferably about 5-10°.

According to an embodiment of the invention a second angle β between the first main surface 12 and the first groove surface 31 may be within the range of about 70-89°, or about 88-80°, or more preferably about 85° such that a first space 35 may be obtained in a locked position between the second edge surface 24 and a lower part 38 of the first groove surface 31.

According to an embodiment of the invention the first and/or the second panel may comprise a wood fibre based material, such as one or more of HDF, MDF, plywood, solid wood or particleboard, or a reinforced plastic board or a wood fibre composite board.

According to an embodiment of the invention the first and/or second panel may comprise a decorative layer.

According to an embodiment of the invention the edge groove 30 may extend along essentially the entire length of the first edge.

According to an embodiment of the invention the second panel 20 may comprise said tongue groove 26 in at least two of four edges. For example, the second panel 20 could include the tongue groove on two opposite edges, and be free of the tongue groove on the remaining two opposite edges.

FIG 7A discloses an enlargement of an embodiment of the locking device 50 wherein the locking device may be configured to be unlocked by an angling motion 60 of the panel 20 relative the

adjacent panel 10, such that a third angle γ between the first and second main plain 11,21 is increasing.

FIG 7B disclose an enlargement of an embodiment of the locking device 50 wherein the first and second panel 10,20 may be locked by friction.

- 5 According to an embodiment of the invention an assembled furniture may include four first panels 10 and one second panel 20. In an embodiment, all four first panels 10 include the same type of locking device, to enable locking to all four edges of the second panel 20. In an embodiment, two of the four first panels include the same type of locking device, with a tongue configured to lock with a tongue groove on the second panel, and the remaining two first panels may not include a locking device or
- 10 may include a locking device that is locked by friction, such as shown in FIG 7B.

The different aspects, embodiments and alternatives described above could be combined with one or more of the other described aspects, embodiments and alternatives.

CLAIMS

1. A set of panels comprising a first panel (10) with a first main plane (11) with a first main surface (12) and a second panel (20) with a second main plane (21) with a second main surface (22), wherein the first main plane (11) is essentially perpendicular to the second main plane (21) in a locked position,
- 5 wherein the second panel (20) comprises a third main surface (25) at a first distance (A) from the second main surface (22),
- wherein the first panel and the second panel comprise a locking device (50) for locking a first edge of the first panel (10) to a second edge of the second panel (20),
- wherein the locking device (50) comprises an edge groove (30) at the first edge of the first panel (10),
- 10 said edge groove comprise a first groove surface (31) and a opposite second groove surface (32) and a first bottom surface (33),
- wherein the locking device comprises a tongue groove (26) at the second main surface (22) of the second panel (20),
- wherein the second panel (20) comprises a first edge surface (23) which is facing the first bottom surface (33) in a locked position, the second panel further comprises a second edge surface (24)
- 15 extending between the tongue groove (26) and the first edge surface (23),
- wherein the edge groove (30) comprises a tongue (40), which is configured to cooperate with the tongue groove (26) in a locked position, for locking the first and the second edges in a first direction (D1) which is perpendicular to the first main plain (11),
- 20 wherein the first groove surface (31) cooperates with the second main surface (22), at a first contact area (31') in a locked position and the second groove surface (32) cooperate with the third main surface (25), at a second contact area (32'), to lock the first and second panel in a second direction (D2) which is perpendicular to the second main plain (21)
- wherein the first contact area (31') is positioned, in a locked position, at a second distance (H) from the
- 25 second contact area (32') characterized in:
- that the second distance (H) is greater than the first distance (A)
 - that the edge groove (30) at the intersection of the first and third main surfaces (12, 25) has an open space (36).

2. The set of panels as claimed in claim 1, wherein the second distance (H) is the closest distance in a perpendicular direction to the first main plane (11) between the first and second contact area (31', 32').
3. The set of panels as claimed in any one of the preceding claims, wherein the tongue (40) protrudes
5 from the first groove surface (31).
4. The set of panels as claimed in any one of the preceding claims, wherein the tongue (40) is a flexible tongue.
5. The set of panels as claimed in in any one of the preceding claims, wherein the tongue (40) is arranged in an insertion groove (13).
- 10 6. The set of panels as claimed in any one of the preceding claims, wherein the first and second contact area (31', 32') are positioned at a third distance (C) in a perpendicular direction to the second main plane (21), wherein the first distance (A) is greater than the third distance (C).
7. The set of panels as claimed in any one of the preceding claims, wherein a part of the second panel (20), inserted in edge groove (30), in locked position, is bent in a direction (B), towards the first groove
15 surface (31), preferably towards a lower part (38) of the first groove surface 31.
8. The set of panels as claimed in any one of the preceding claims wherein the locking device (50) comprises a first space (35) in locked position, between the second edge surface (24) and first groove surface (31).
9. The set of panels as claimed in any one of the preceding claims, wherein the edge groove (30)
20 comprises a second bottom surface (34) at a greater depth than the first bottom surface (33).
10. The set of panels as claimed in claim 9, wherein the locking device (50) comprises a second space (37) in locked position, between the first edge surface (23) and second bottom surface (34).
11. The set of panels as claimed in claim 10, wherein the first and second contact areas (31', 32') are positioned at a third distance (C) in a perpendicular direction to the second main plane (21), and the
25 second groove surface (32) and the first bottom surface (33) are positioned at a fourth distance (W) in a perpendicular direction to the second main plane (21).
12. The set of panels as claimed in claim 11, wherein (W) is within the range of about $0.1 \times C$ to $0.9 \times C$, or about $0.25 \times C$ to $0.75 \times C$, or more preferably about $0.5 \times C$.

13. The set of panels as claimed in any one of the preceding claims, wherein a first angle (α) between the second groove surface (32) and the second main plane (21), in locked position is within the range of about 1-30°, or in the range of 2-20° or more preferably about 5-10°.
14. The set of panels as claimed in any one of the preceding claims, wherein a second angle (β)
5 between the first main surface (12) and the first groove surface (31) is within the range of about 70-89°, or about 88-80°, or more preferably about 85°, such that a first space (35) is obtained in a locked position between the second edge surface (24) and a lower part (38) of the first groove surface (31).
15. The set of panels as claimed in any one of the preceding claims, wherein the first and/or the second panel comprises a wood fibre based material, such as one or more of HDF, MDF, plywood, solid wood
10 or particleboard, or a reinforced plastic board or a wood fibre composite board.
16. The set of panels as claimed in any one of the preceding claims, wherein the first and/or second panel comprises a decorative layer.
17. The set of panels as claimed in any one of the preceding claims, wherein the edge groove (30) extends along essentially the entire length of the first edge.
- 15 18. The set of panels as claimed in any one of the preceding claims, wherein the second panel (20) comprises said tongue groove (26) in at least 2 of 4 edges.
19. The set of panels as claimed in any one of the preceding claims, wherein the locking device is configured to be unlocked by an angling motion (60) of the panel (20) relative the adjacent panel (10), such that a third angle (γ) between the first and second main plane (11,21) is increasing.
- 20 20. The set of panels as claimed in any one of the preceding claims, wherein the first groove surface (31) comprises an upper part positioned above the tongue (40) and a lower part (38) positioned below the tongue (40) wherein the lower part (38) is displaced relative the upper part such that a first space (35) may be obtained in the locked position between second edge surface (24) and the lower part (38).
21. A set of panels comprising a first panel (10) with a first main plane (11) with a first main surface (12) and a second panel (20) with a second main plane (21) with a second main surface (22), wherein
25 the first main plane (11) is essentially perpendicular to the second main plane (21) in a locked position, wherein the second panel (20) comprises a third main surface (25) at a first distance (A) from the second main surface (22),
- wherein the first panel and the second panel comprise a locking device (50) for locking a first edge of
30 the first panel (10) to a second edge of the second panel (20),

wherein the locking device (50) comprises an edge groove (30) at the first edge of the first panel (10), said edge groove comprise a first groove surface (31) and a opposite second groove surface (32) and a first bottom surface (33)

5 wherein the locking device comprises a tongue groove (26) at the second main surface (22) of the second panel (20),

wherein the second panel (20) comprises a first edge surface (23) which is facing the first bottom surface (33) in a locked position, the second panel further comprises a second edge surface (24) extending between the tongue groove (26) and the first edge surface (23),

10 wherein the edge groove (30) comprises a tongue (40), which is configured to cooperate with the tongue groove (26) in a locked position, for locking the first and the second edges in a first direction (D1) which is perpendicular to the first main plain (11),

wherein the first groove surface (31) cooperates with the second main surface (22), at a first contact area (31') in a locked position and the second groove surface (32) cooperate with the third main surface (25), at a second contact area (32'), to lock the first and second panel in a second direction (D2) which
15 is perpendicular to the second main plain (21)

wherein the first contact area (31') is positioned, in a locked position, at a second distance (H) from the second contact area (32') characterized in:

that the first groove surface (31) comprises an upper part positioned above the tongue (40) and a lower part (38) positioned below the tongue (40), and

20 that a first space (35) extends in the locked position from the tongue (40) to the first edge surface (23) and between second edge surface (24) and the lower part (38).

22. The set of panels as claimed in claim 2, wherein a part of the second panel (20), inserted in edge groove (30), in locked position, is bent in a direction (B), towards the first groove surface (31).

23. The set of panels as claimed in any one of the preceding claims, wherein a first angle (α) between
25 the second groove surface (32) and the second main plain (21), in locked position is within the range of about 1-30°, or in the range of 2-20° or more preferably about 5-10°.

24. The set of panels as claimed in any one of the preceding claims, wherein a second angle (β) between the first main surface (12) and the first groove surface (31) is within the range of about 70-89°, or about 88-80°, or more preferably about 85°, such that the first space (35) is obtained.

25. The set of panels as claimed in any one of the preceding claims, wherein the tongue (40) protrudes from the first groove surface (31).
26. The set of panels as claimed in any one of the preceding claims, wherein the tongue (40) is a flexible tongue.
- 5 27. The set of panels as claimed in in any one of the preceding claims, wherein the tongue (40) is arranged in an insertion groove (13).
28. The set of panels as claimed in any one of the preceding claims, wherein the edge groove (30) comprises a second bottom surface (34) at a greater depth than the first bottom surface (33).
29. The set of panels as claimed in claim 28, wherein the locking device (50) comprises a second space
10 (37) in locked position, between the first edge surface (23) and second bottom surface (34).
30. The set of panels as claimed in any one of the preceding claims, wherein the first and/or the second panel comprises a wood fibre based material, such as one or more of HDF, MDF, plywood, solid wood or particleboard, or a reinforced plastic board or a wood fibre composite board.
31. The set of panels as claimed in in any one of the preceding claims, wherein the first and/or second
15 panel comprises a decorative layer.
32. The set of panels as claimed in any one of the preceding claims, wherein the edge groove (30) extends along essentially the entire length of the first edge.
33. The set of panels as claimed in any one of the preceding claims, wherein the second panel (20) comprises said tongue groove (26) in at least 2 of 4 edges.
- 20 34. The set of panels as claimed in any one of the preceding claims, wherein the locking device is configured to be unlocked by an angling motion (60) of the panel (20) relative the adjacent panel (10), such that a third angle (γ) between the first and second main plain (11,21) is increasing.
35. The set of panels as claimed in any one of the preceding claims, wherein the first groove surface (31) comprises an upper part positioned above the tongue (40) and a lower part (38) positioned below
25 the tongue (40) wherein the lower part (38) is displaced relative the upper part such that a first space (35) may be obtained in the locked position between second edge surface (24) and the lower part (38).

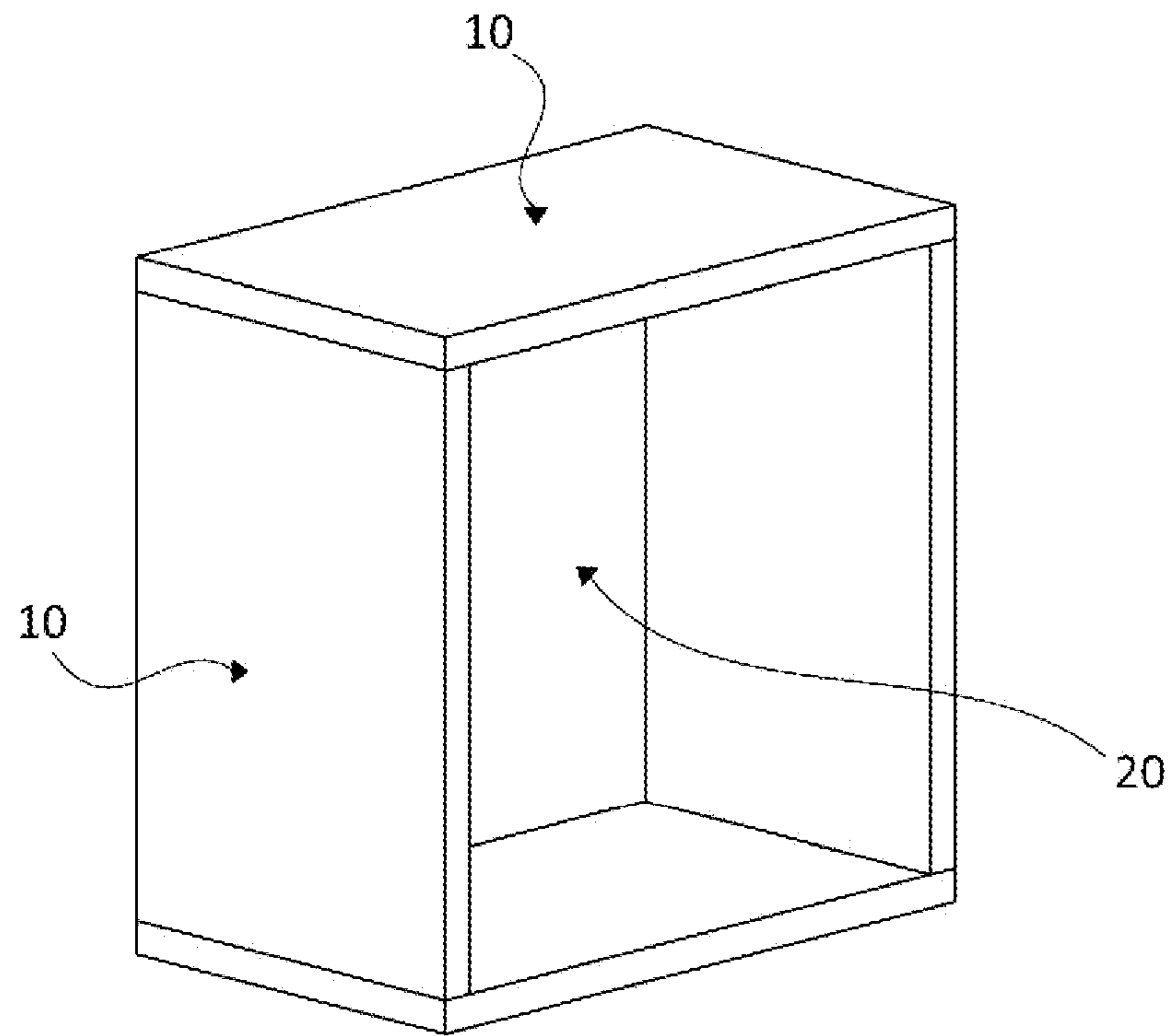


FIG 1B.

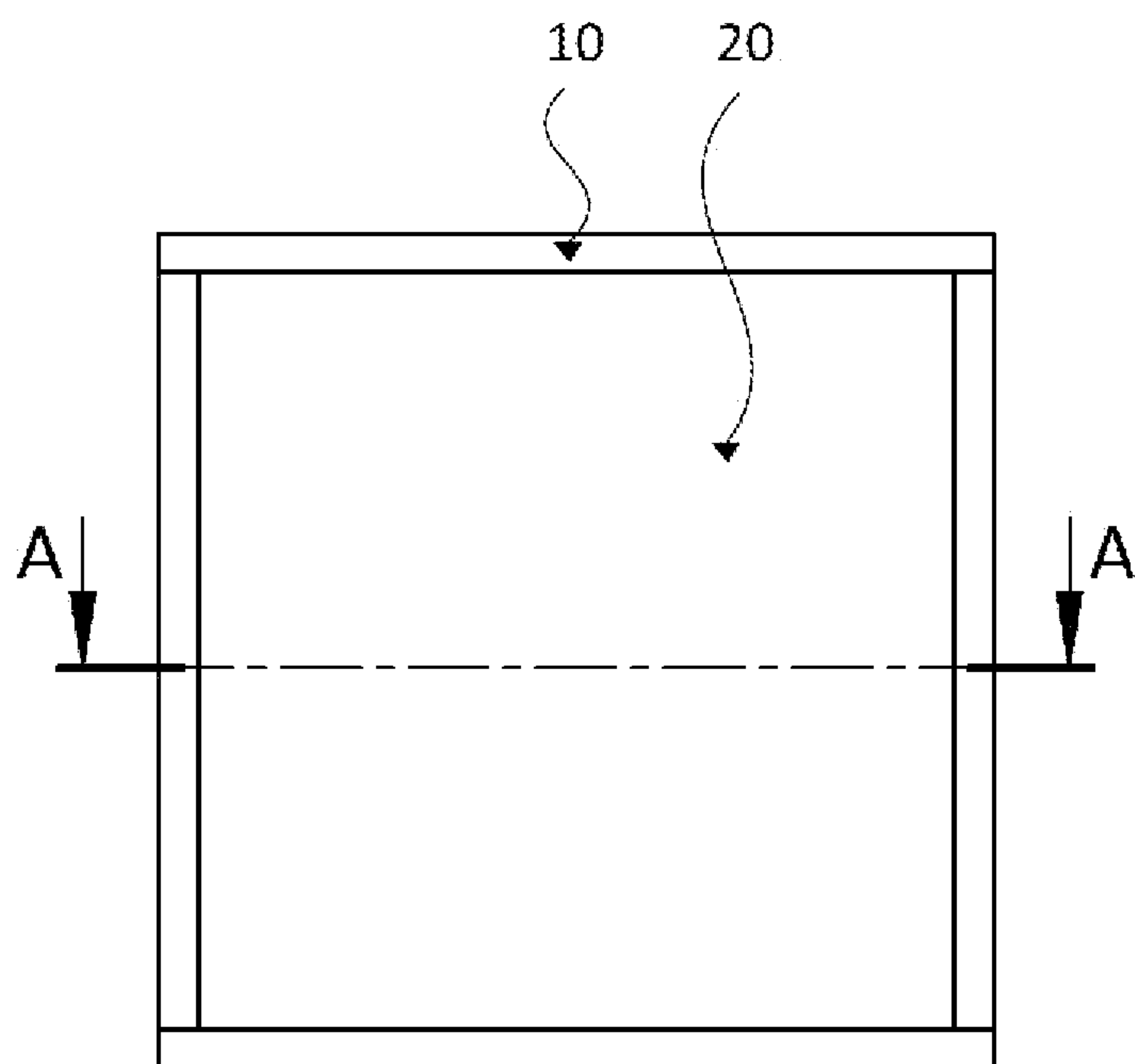
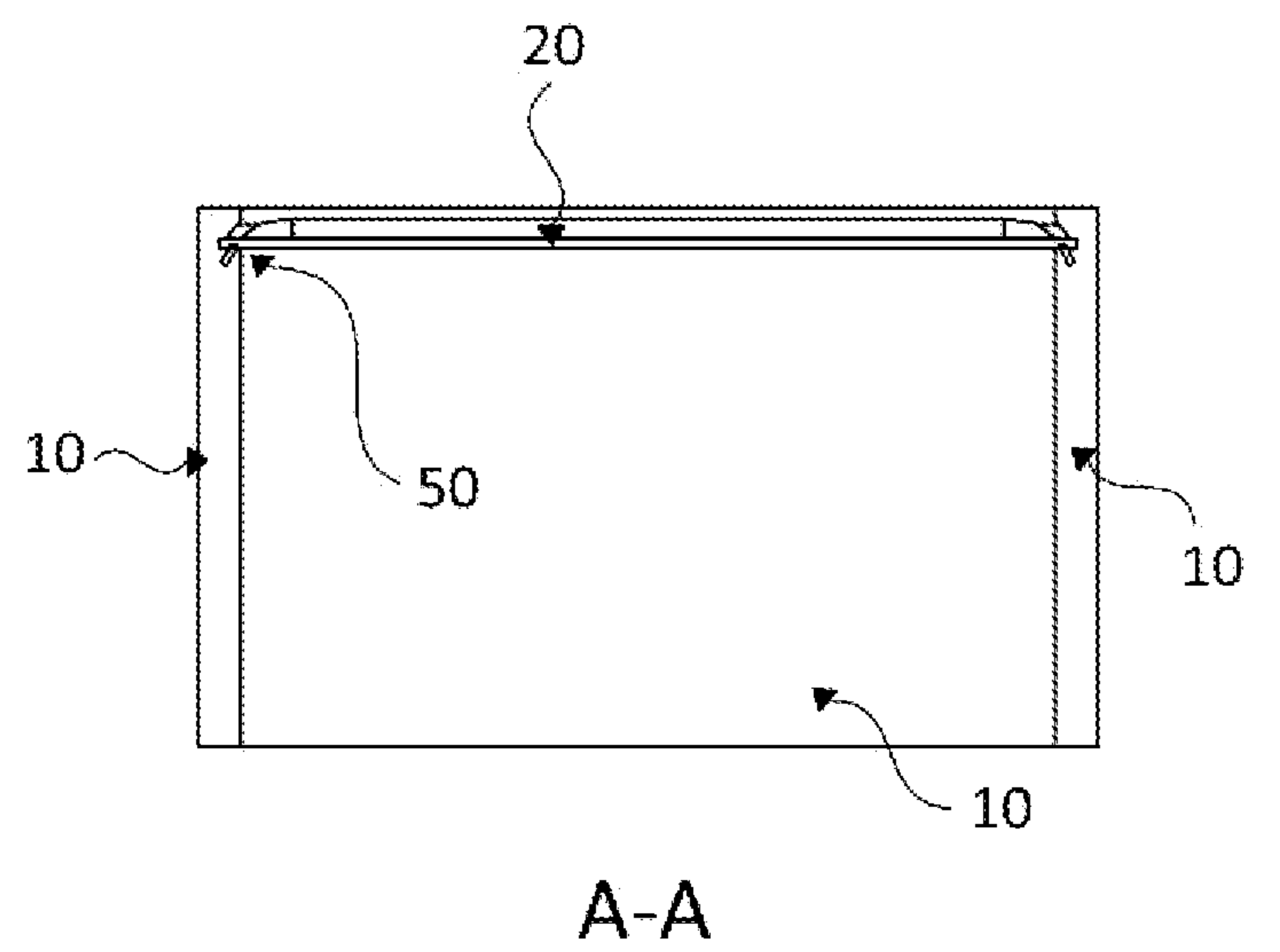


FIG 1C.



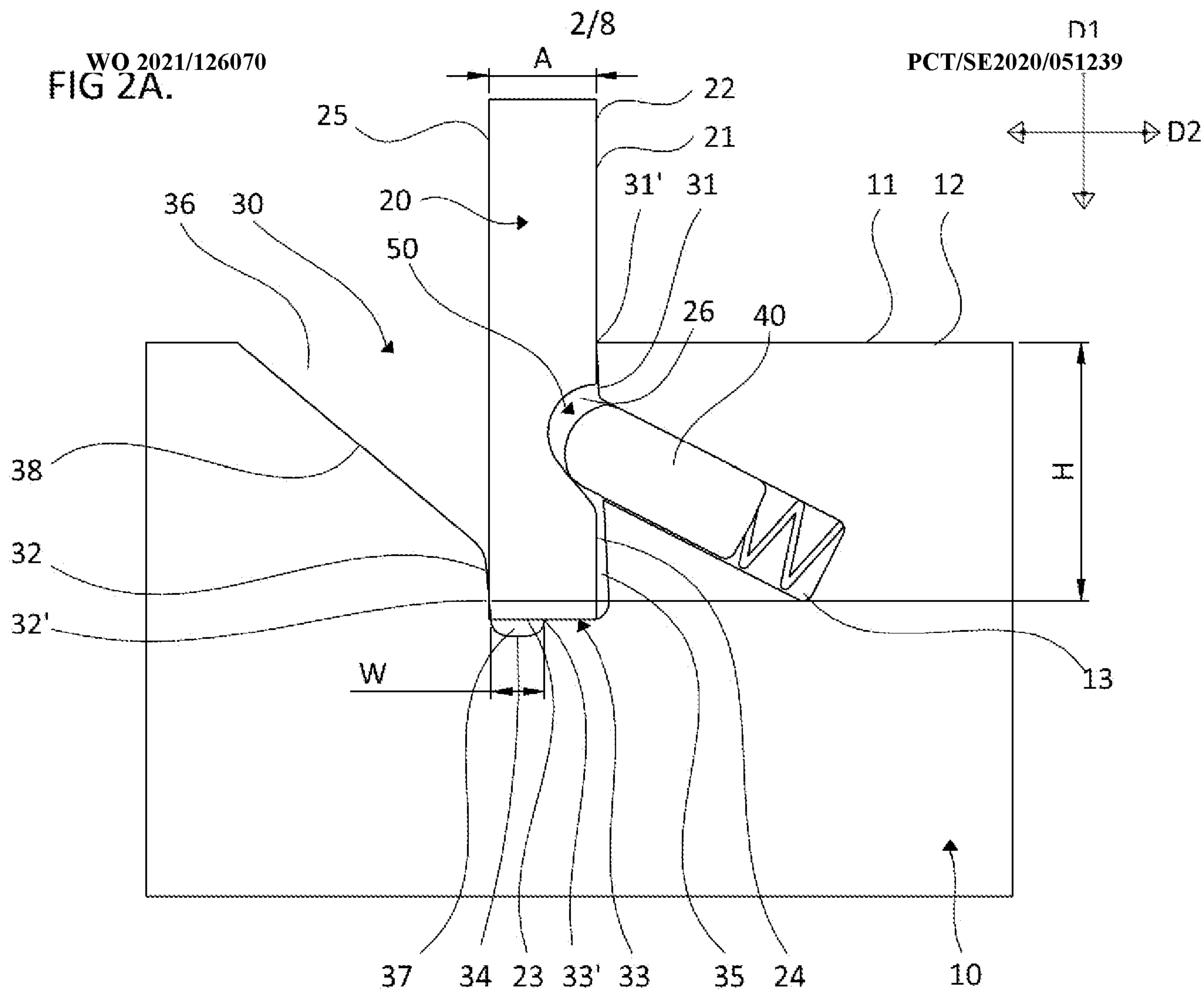
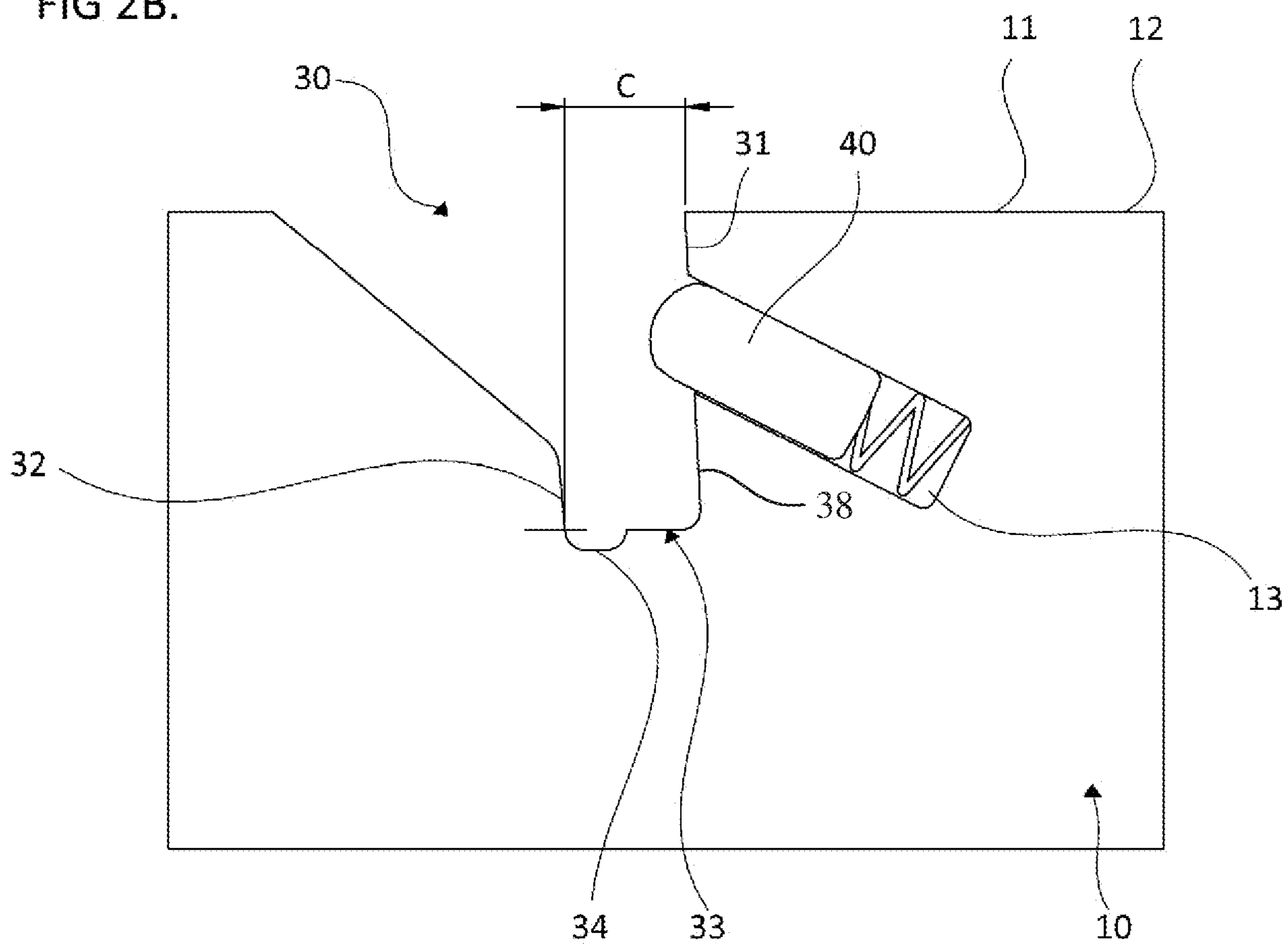


FIG 2B.



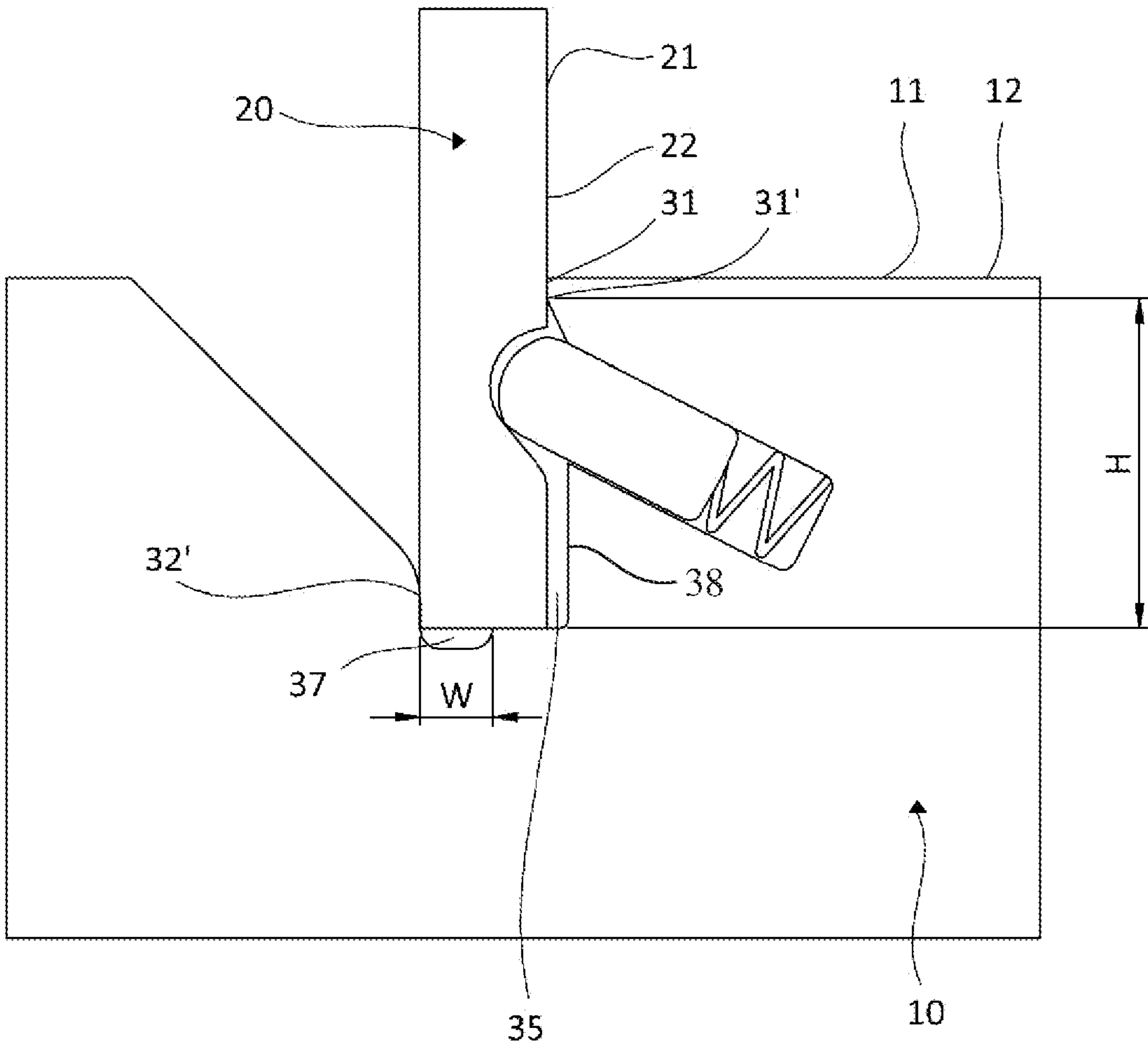
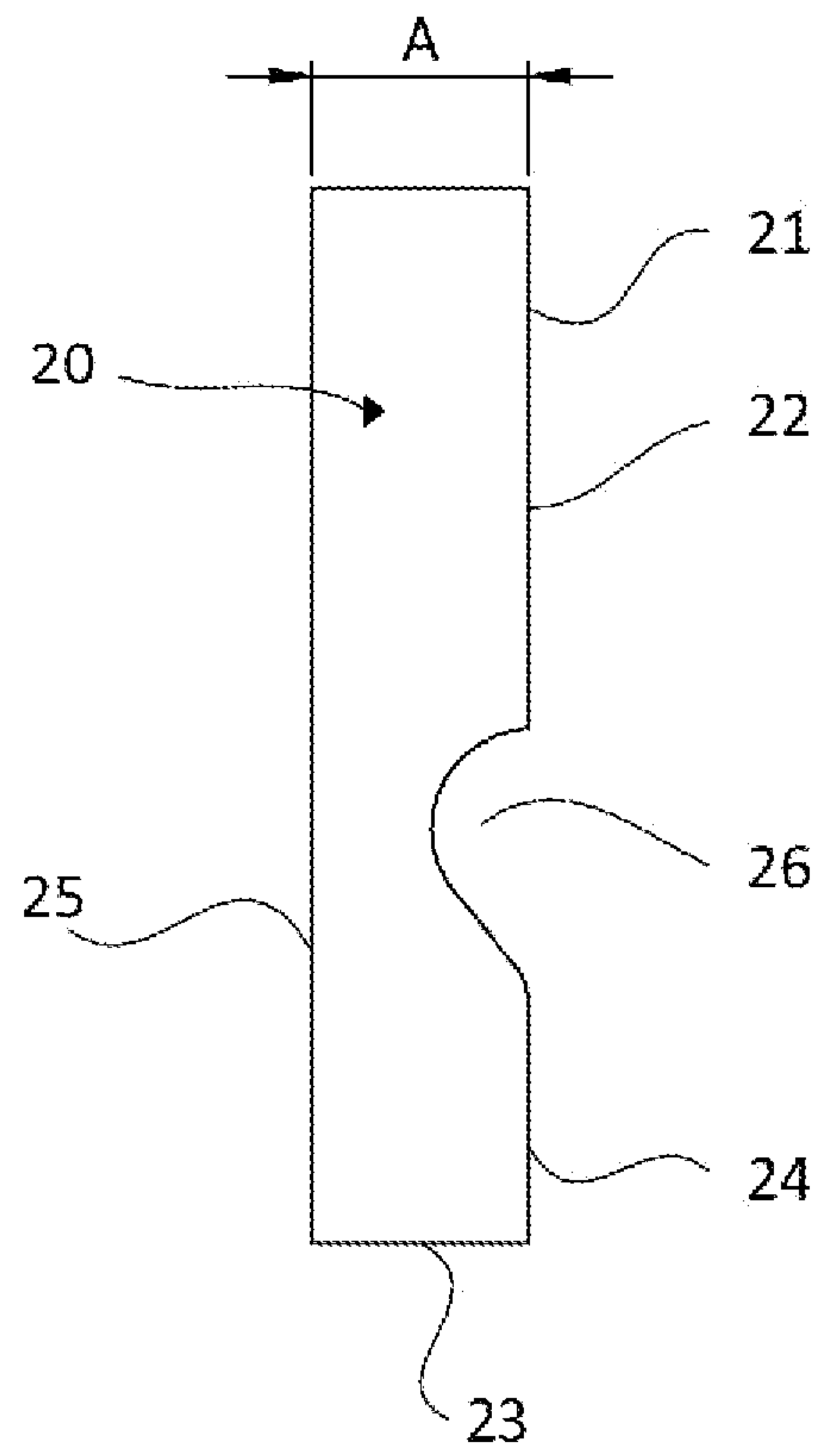
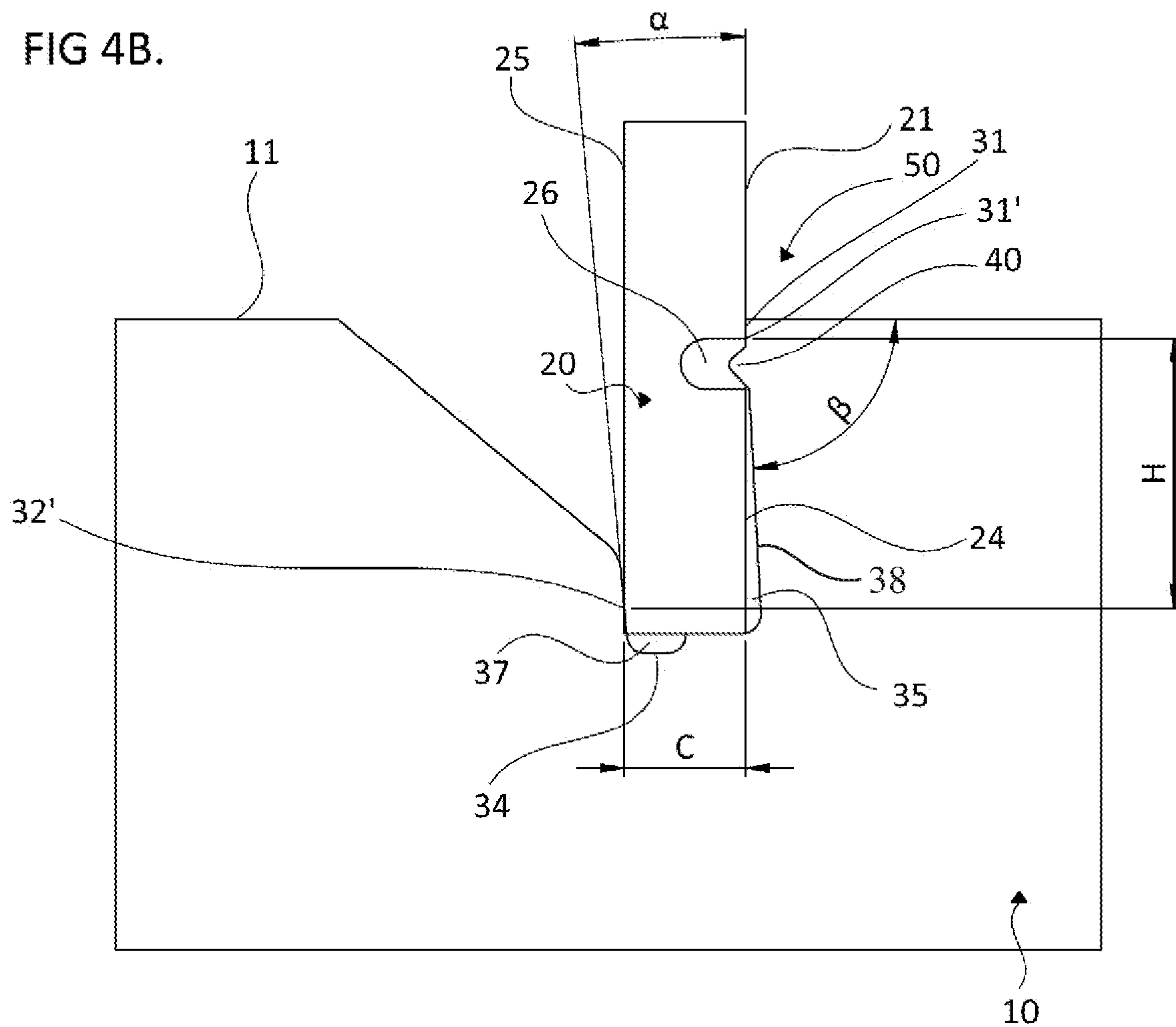


FIG 3B.



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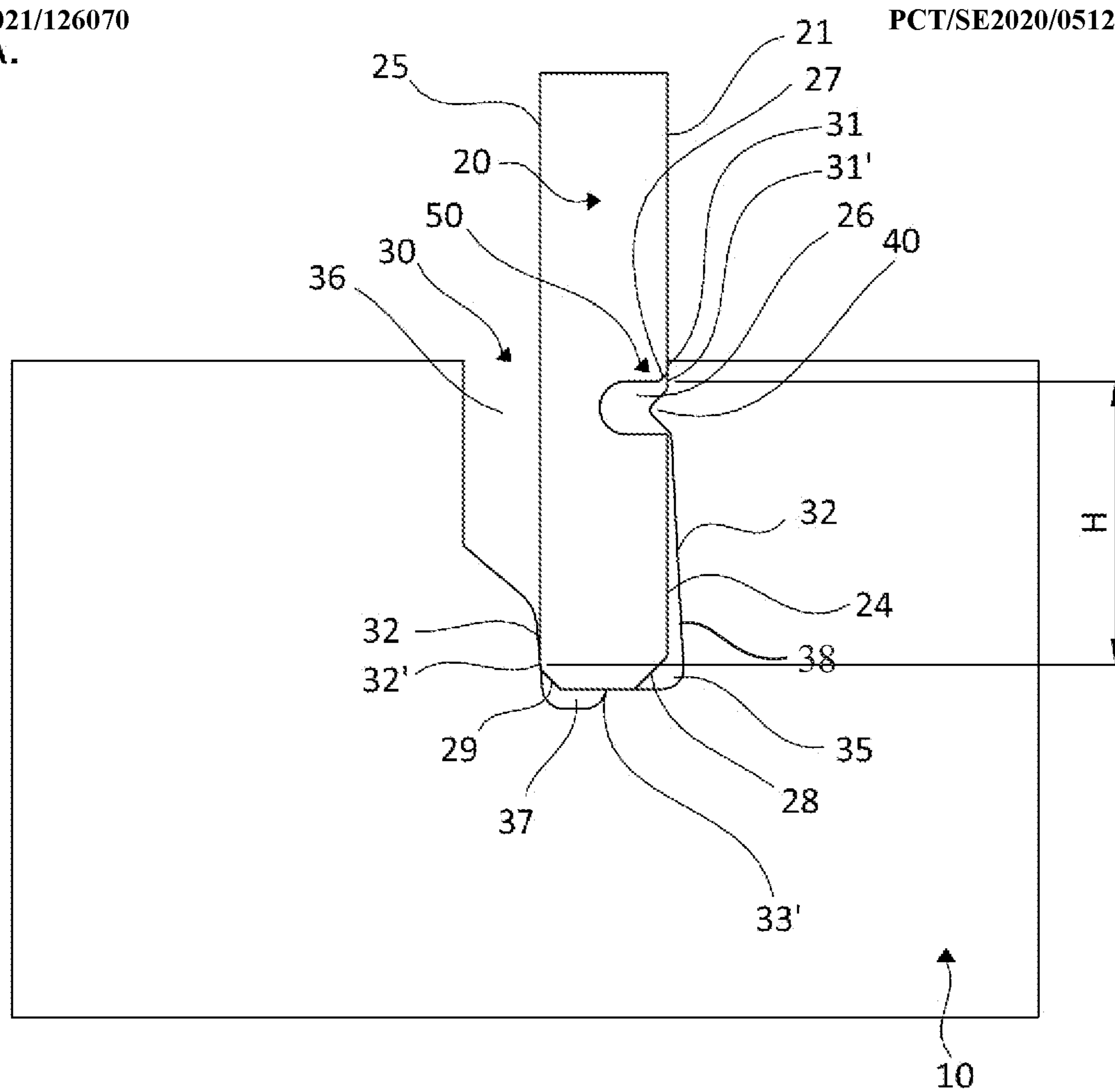
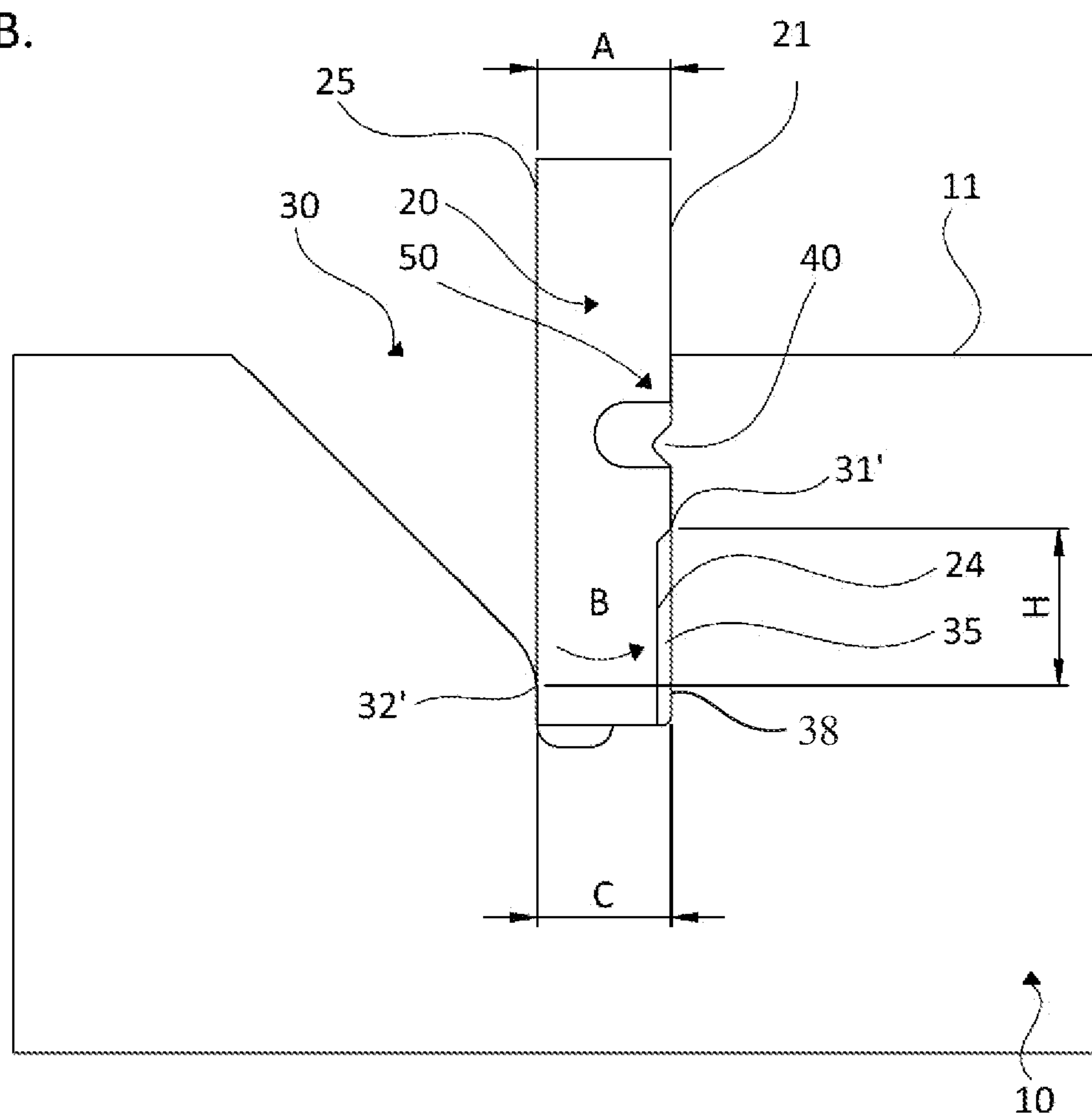


FIG 5B.



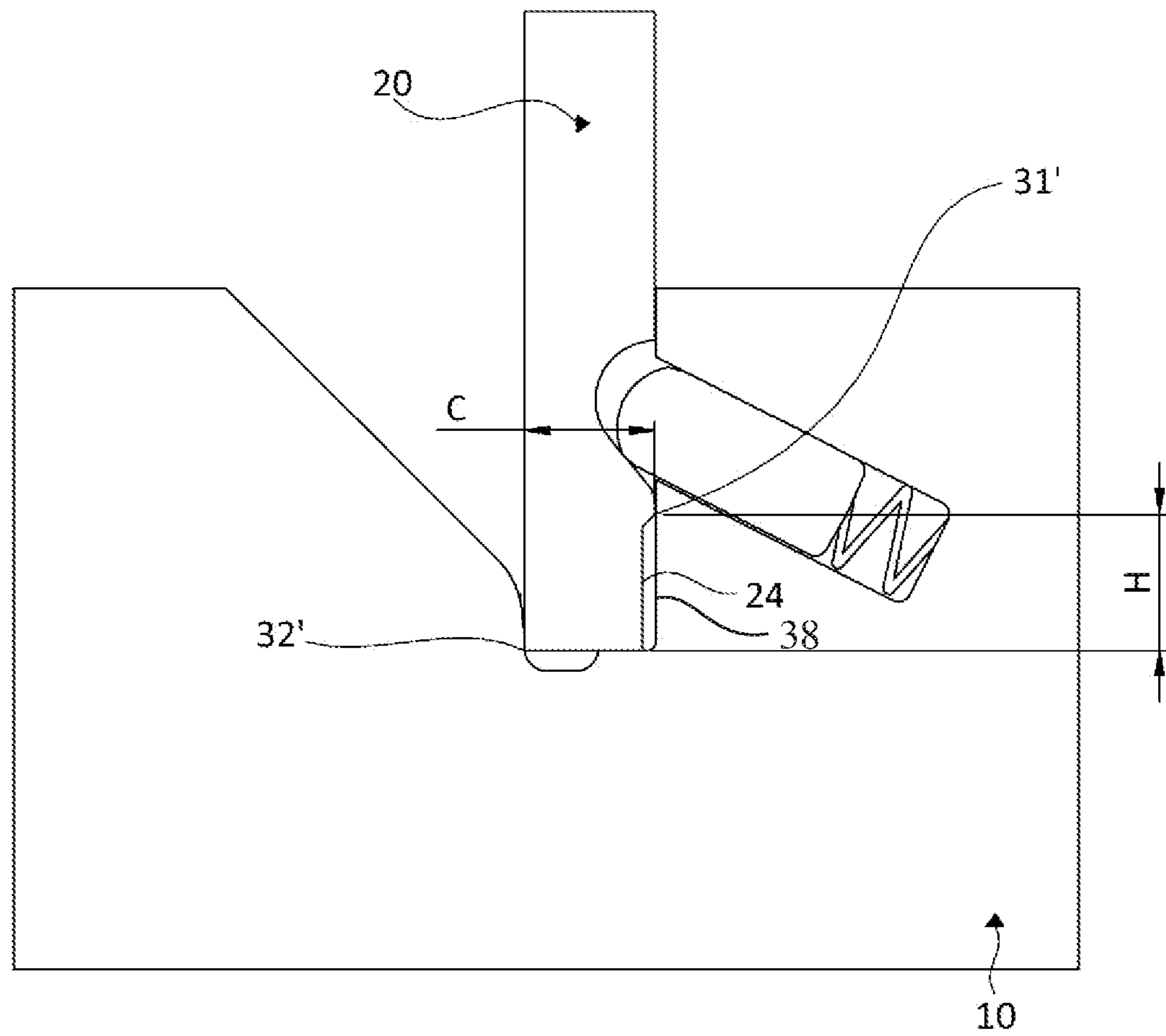
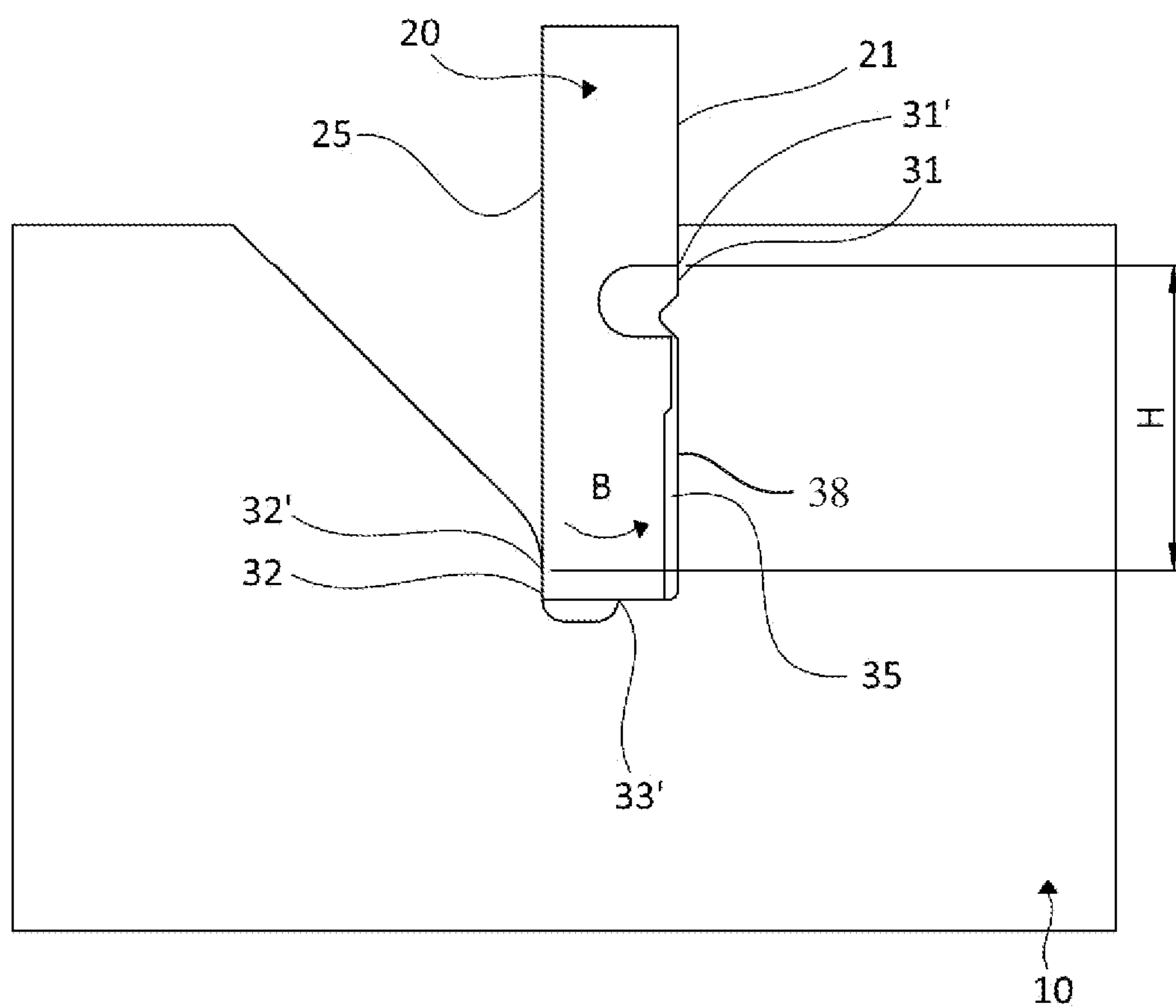


FIG 6B.



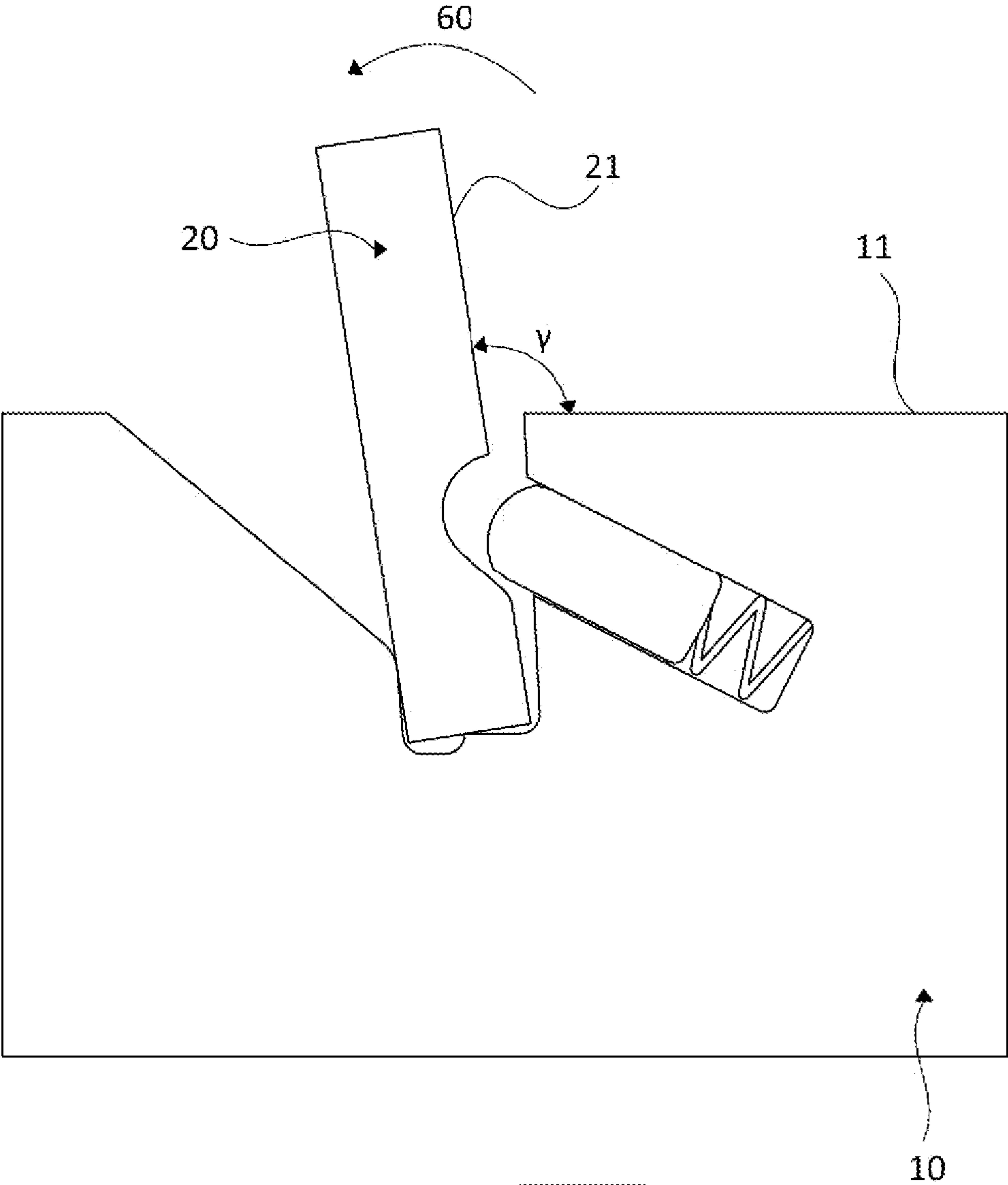
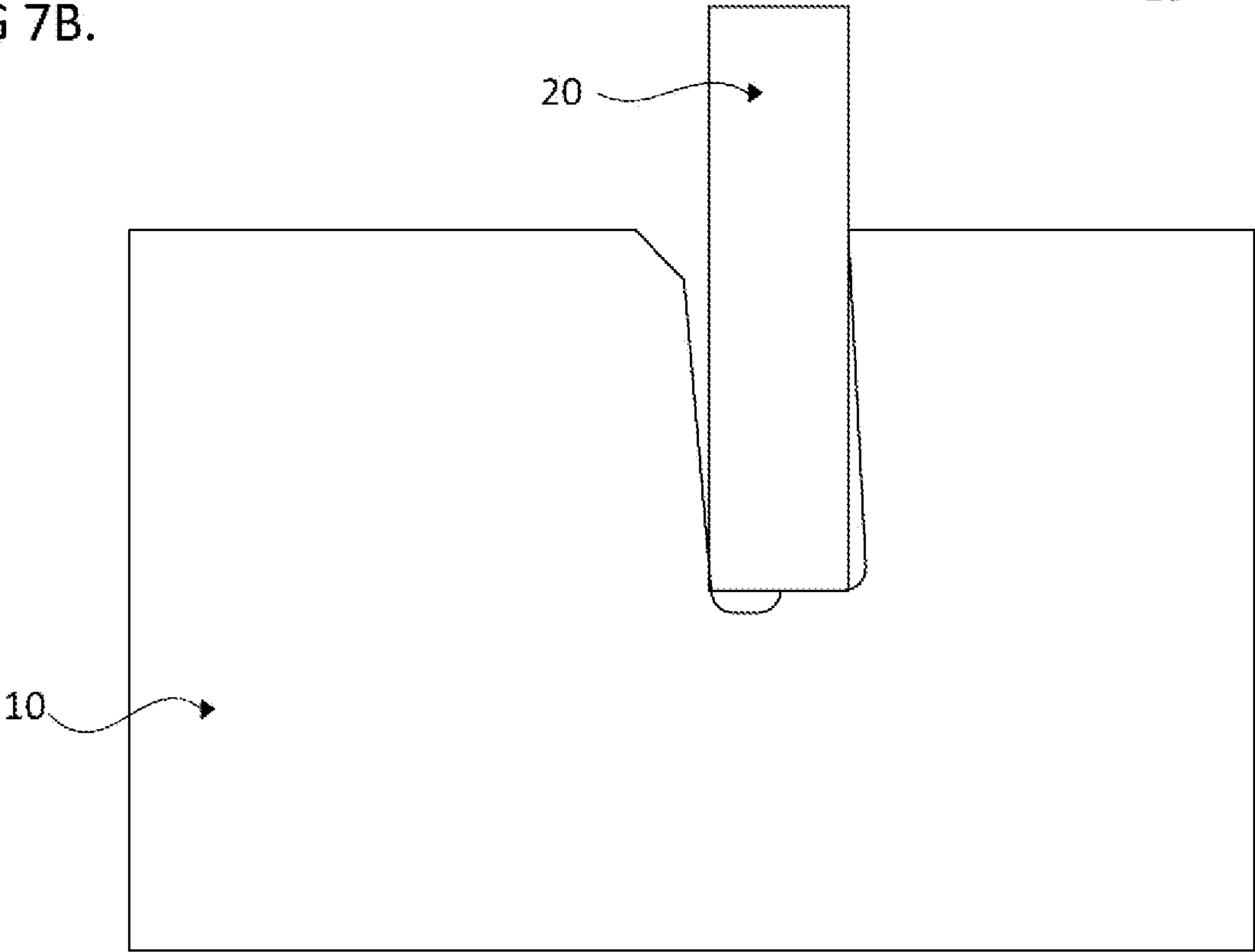
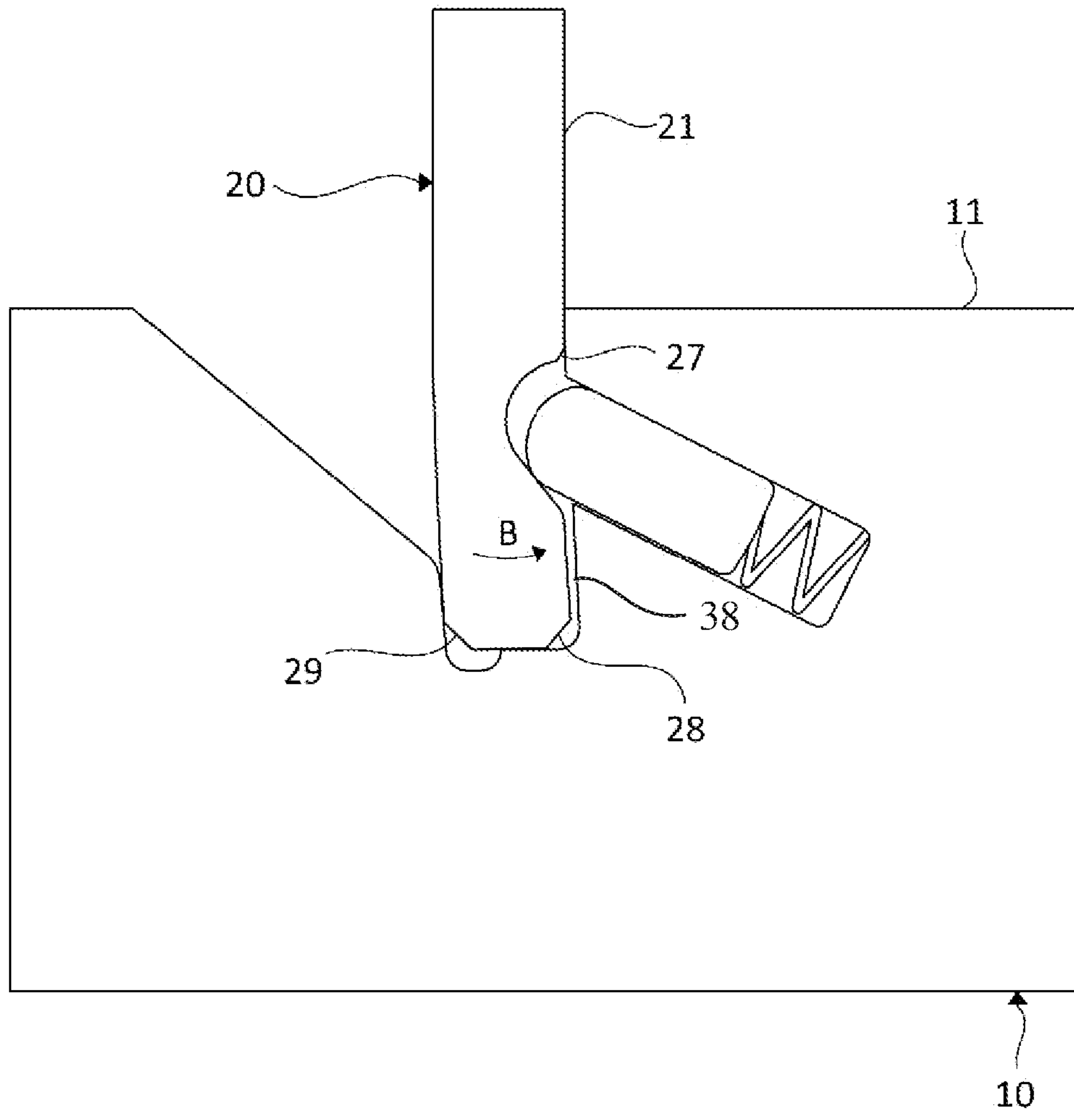


FIG 7B.





INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2020/051239

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, InnoQ+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
D, X	WO 2017052456 A1 (VÅLINGE INNOVATION AB), 30 March 2017 (2017-03-30); page 6, line 18 - page 8, line 2; figures 1A, 1B --	1-20
X	US 20120279161 A1 (HAKANSSON NICLAS ET AL), 8 November 2012 (2012-11-08); paragraphs [0036]-[0038]; figures 1A-1C --	21-35
A	DE 3244398 A1 (TEAM FORM AG), 7 June 1984 (1984-06-07); pages 11-14; figure 1 --	1-35

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

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
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"E" earlier application or patent but published on or after the international filing date	"&" document member of the same patent family
"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	

Date of the actual completion of the international search
11-01-2021

Date of mailing of the international search report
11-01-2021

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2020/051239

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	US 20180202160 A1 (DERELÄV PETER), 19 July 2018 (2018-07-19); abstract; figure 1 -- -----	1-35

Continuation of: second sheet
International Patent Classification (IPC)

- A47B 47/04 (2006.01)
- A47B 96/20 (2006.01)
- F16B 12/12 (2006.01)
- F16B 12/24 (2006.01)
- F16B 12/26 (2006.01)
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Information on patent family members

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