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(54) GRIPPER AND METHOD FOR MANUFACTURING A GRIPPER

(57) The invention relates to a gripper for a rapier weaving machine, the gripper (1) comprising a base part (2) and a gripper clamp (3), wherein the base part (2) comprises a bottom structure (20) with a first side (201) and an opposite second side (202), a top structure (23), a first side structure (21) connecting the top structure (23) to the bottom structure (20) at the first side (201) of the bottom structure (20), and a second side structure (22) connecting the top structure (23) to the bottom structure (20) offset to the second side (202) of the bottom structure (20), wherein the gripper clamp (3) is arranged at the bottom structure (20) at a side of the second side structure (22) that is facing away from the first side structure (21), wherein the top structure (23) comprises a rectangular section (230), wherein a length of the rectangular section (230) in a longitudinal direction of the base part (2) is longer than a width of the rectangular section (230) between the first side structure (21) and the second side structure (22), and wherein the second side structure (22) connects the rectangular section (230) of the top structure (23) to the bottom structure (20) at least at a rear end (31) of the rectangular section (230) and at a front end (32) of the rectangular section (230). The invention further relates to a weaving machine and to a method for manufacturing a gripper.

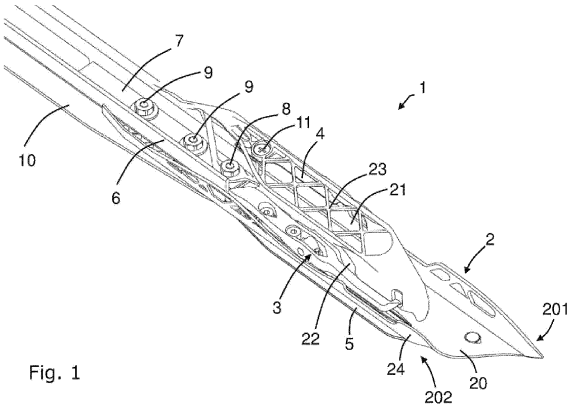

Fig. 1

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Description

TECHNICAL FIELD AND PRIOR ART

[0001] The invention relates to a gripper for a rapier weaving machine, also referred to as gripper weaving machine. More particular, the invention relates to a gripper having a base part and a gripper clamp. The invention further relates to a weaving machine and to a method for manufacturing a gripper.

[0002] As generally known, rapier weaving machines typically comprise two grippers for a transport of weft threads through a weaving shed, referred to for example as drawing gripper and receiving gripper, wherein the drawing grippers are designed to guide a weft thread through the first half of a weaving shed, and the receiving grippers are designed to guide a weft thread through the second half of the weaving shed after having picked up the weft thread from the drawing gripper. Typically, grippers equipped with a hook are used as receiving grippers.

[0003] JP2000119935 shows a gripper comprising a base part that consists of a lower wall, a perpendicularly standing wall provided at one side of the lower wall, a sidewall provided at the other side of the lower wall, an upper wall joined with the sidewall and opposing to the lower wall and a hanging wall hanging from the upper wall, wherein at a lowermost part of the hanging wall, a joining piece is formed, which joining piece is joined and fixed at the upper surface of the lower wall.

SUMMARY OF THE INVENTION

[0004] It is an object of the invention to provide a lightweight and stiff gripper, in particular a drawing gripper, and a method for manufacturing such a gripper.

[0005] These objects are solved by the gripper and the method with the features of claims 1 and 15. Preferred embodiments are defined in the dependent claims.

[0006] According to a first aspect, a gripper, in particular a drawing gripper, for a rapier weaving machine is provided, the gripper comprising a base part and a gripper clamp, wherein the base part comprises a bottom structure with a first side and an opposite second side, a top structure, a first side structure connecting the top structure to the bottom structure at the first side of the bottom structure, and a second side structure connecting the top structure to the bottom structure offset to the second side of the bottom structure, wherein the gripper clamp is arranged at the bottom structure at a side of the second side structure that is facing away from the first side structure, wherein the top structure comprises a rectangular section, wherein a length of the rectangular section in a longitudinal direction of the base part is longer than a width between the first side structure and the second side structure, and wherein the second side structure connects the rectangular section of the top structure to the bottom structure at least at a rear end of the rectangular section and at a front end of the rectangular section.

[0007] In the context of the application, the expression "structure" is used to describe wall parts of the gripper, wherein the wall parts can be in the form of a lattice structure or in the form of a platelike or massive structure. The expression "lattice structure" is defined as a framework made of ribs, also referred to as posts or strip elements, which ribs are arranged for forming the framework while leaving open spaces between the ribs. The lattice structure in embodiments has a repeating pattern, in other embodiments, the lattice structure has no repeating pattern. The base part in embodiments is at least partly manufactured using 3D printing, wherein the structures are at least partly in the form of lattice structures avoiding material accumulation and allowing a formation of light and strong structures.

[0008] In the context of the application, the expressions "first" and "second" are not to be interpreted as defining a serial or numerical limitation but instead are only used to distinguish or identify various members of a group. "A" and "an" are used as indefinite articles and not to be interpreted as "exactly one". Further, terms as "top", "bottom", "vertically", "horizontally", "upper", "lower" and the like are used for describing a conventional arrangement of parts in use of a gripper and are not to be construed as limiting terms.

[0009] At the base part, a circumferentially closed unit, also referred to as tube-shaped unit, comprising the bottom structure, the first side structure, the top structure, and the second side structure is formed, which reinforces the base part and, thus, allows preventing deformations of the base part. The closed unit comprises a rectangular section of the top structure, which is connected via the second side structure to the bottom structure, in particular along its entire length connected via the second side structure to the bottom structure. In embodiments, the rectangular section extends towards a rear end of the base part beyond an area up to which a receiving gripper enters the drawing gripper for picking up a weft thread from the drawing gripper. Hence, the closed or tube-shaped unit is connected over a long distance at the second side structure to the bottom structure allowing for an improved stability.

[0010] According to the application, the gripper clamp is arranged at the side of the second side structure, that is facing away from the first side structure. In other words, the gripper clamp is arranged outside the closed unit formed by the bottom structure, the first side structure, the top structure, and the second side structure. The side of the second side structure facing away from the first side structure is also referred to as outer side of the second side structure. Arranging the gripper clamp at an outer side of the second side structure allows replacing a gripper clamp, for example a worn gripper clamp, and avoids accumulation of dust on the gripper clamp.

[0011] In an embodiment, the rectangular section of the top structure is a lattice structure. A lattice structure allows for a lightweight and stiff construction of the rectangular section. The lattice structure also allows a better

visibility of a receiving gripper inside a drawing gripper.

[0012] In an embodiment, the second side structure is a lattice structure comprising a first rib arrangement arranged at a front end of the rectangular section and a second rib arrangement arranged at a rear end of the rectangular section. In the context of the application, the expression "rib arrangement" describes an arrangement comprising one or more ribs. The ribs of one rib arrangement in embodiments are arranged to converge at a common region at the top structure.

[0013] In an embodiment, the second rib arrangement comprises a rear rib that is arranged slanted with respect to a normal direction of the bottom structure, wherein an upper end of the rear rib is arranged upfront of a lower end of the rear rib. In alternative or in addition, the second rib arrangement in embodiments comprises a straight rib, wherein the straight rib extends in the normal direction of the bottom structure. In alternative or in addition, the second rib arrangement in embodiments comprises a C-curved rib, in particular a C-curved rib facing away from the first side structure (22), wherein an upper end of the C-curved rib is arranged at least essentially above of a lower end of the C-curved rib in the longitudinal direction of the base part. In alternative or in addition, the second rib arrangement in embodiments comprises a forward slanted rib, wherein the forward slanted rib is slanted in a direction opposite to that of the rear rib. Such second rib arrangements have proven to be advantageous for providing a lightweight base part with a high stiffness.

[0014] In an embodiment, the lattice structure of the second side structure comprises additional ribs arranged between the first rib arrangement and the second rib arrangement.

[0015] In other embodiments, an open space is provided between the first rib arrangement and the second rib arrangement. It has been the findings of the inventor, that a sufficient stiffness of the base part can be achieved when connecting the rectangular section exclusively via the first rib arrangement and the second rib arrangement to the bottom structure. This allows providing a large open space between the first rib arrangement and the second rib arrangement. A receiving gripper entering the closed unit for picking-up a weft thread from the drawing gripper, is moved along a movement path extending in a longitudinal direction of the drawing gripper. Due to forces acting on the gripper and/or a receiving gripper, the receiving gripper can be shifted sideways out of a movement path. The large open space in the second side structure of the gripper allows avoiding or at least reducing a contact of the drawing gripper with a receiving gripper shifted sideways, despite the long second side structure connecting the rectangular section to the bottom structure.

[0016] In an embodiment, the top structure comprises a rear tapered section arranged at the rear end of the rectangular section, wherein the rear tapered section is pointing towards the first side structure. In embodiments, the first side structure connects the rear tapered section and at least an adjoining part of the rectangular section to the bottom structure. In embodiments, the first side structure connects about 10% to 70% of the rectangular section to the bottom structure, wherein the remaining part of the rectangular section is not connected to the first side structure allowing a weft thread picked-up by the gripper to enter between the top structure and the first side structure.

[0017] In embodiments, the base part comprises a ring-shaped connecting part arranged between the rear tapered section of the top structure and the bottom structure, wherein the ring-shaped connecting part is adapted for connecting the base-part to a rail arranged between the bottom structure and the ring-shaped connecting part, and wherein outer corner regions of the rear tapered section are connected via ribs, in particular via slanted ribs, to the ring-shaped connecting part. The ring-shaped connecting part is in embodiments fixed to the bottom structure using a bolt, wherein the rail is arranged between the bottom structure and the ring-shaped connecting part. The ribs, in particular slanted ribs, further increase a stability of the closed or tube-shaped unit.

[0018] In alternative, in embodiments outer corner regions of the rear tapered section are connected via ribs, in particular via slanted ribs, to the bottom structure.

[0019] In alternative or in addition to the rear tapered section, in embodiments the top structure comprises a front tapered section arranged at a front end of the rectangular section, wherein the front tapered section is pointing towards the second side structure, and wherein the front tapered section is not connected to the bottom structure. As the front tapered section is not connected to the bottom structure, a weft thread picked-up by the gripper can enter between the front tapered section and the bottom structure. In embodiments, the front tapered section is provided with downward pointing guiding portions for guiding the weft threads. In alternative or in addition, the first side structure in embodiments has an entry recess for a weft thread at the region of the front tapered section.

[0020] In an embodiment, the top structure comprises a shielding rib protruding from the top structure, which shielding rib extends along the rectangular section at a side of the rectangular section facing the first side structure. The shielding rib shields a weft thread from warp threads when the gripper is moved into a shed.

[0021] In an embodiment, a weft thread picked-up by the gripper extends between the gripper clamp and a slot provided between the first side structure and the top structure opposite the gripper clamp. In alternative or in addition, in embodiments an ancillary gripper clamp is provided at the region of the first side structure. In embodiments, the ancillary gripper clamp is attached to the inner side of the top structure in a region of the first side structure via a mounting assembly comprising a first part arranged at the top structure and a second part connected to the top structure, wherein a slit for receiving the ancillary gripper clamp is formed between the first part and the second part. The mounting assembly allows an

ancillary gripper clamp to be mounted without difficulty to the inner side of the top structure, i.e., a side of the top structure facing the bottom structure, despite the closed or tubular-shaped unit.

[0022] In embodiments, the gripper further comprises a guide plate, which guide plate is provided below the bottom structure.

[0023] According to a second aspect, a weaving machine comprising a gripper, in particular a drawing gripper, with a base part having a closed or tubular-shaped unit is provided.

[0024] According to a third aspect, a method for manufacturing a gripper, in particular a drawing gripper, with a base part having a closed or tubular-shaped unit is provided, wherein the base part is an integral part formed using 3D printing. When using 3D printing for manufacturing the base part, a lightweight base part having a high stiffness due to a large closed or tube-shaped unit comprising at least one lattice structure can be provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] In the following, embodiments of the invention will be described in detail with reference to the drawings. Throughout the drawings, the same elements will be denoted by the same reference numerals.

Fig. 1 shows an embodiment of a gripper comprising a base part and a gripper clamp mounted on a rapier in a first perspective view.

Fig. 2 shows in isolation the base part of the gripper of Fig. 1 in the first perspective view.

Fig. 3 shows in isolation the base part of the gripper of Fig. 1 in a second perspective view.

Fig. 4 shows in isolation the base part of the gripper of Fig. 1 in a third perspective view.

Fig. 5 shows a gripper assembly comprising the gripper of Fig. 1 and a rail for connecting the gripper to a rapier in a front view.

Fig. 6 shows the gripper of Fig. 1 in another perspective view.

Fig. 7 shows the gripper of Fig. 1 mounted on a rapier in another perspective view.

Fig. 8 shows the base part of the gripper of Fig. 1 in a front view.

Fig. 9 shows a detail of the gripper of Fig. 1 in a sectional view.

Fig. 10 shows the gripper of Fig. 1 mounted on a rapier in another perspective view.

Fig. 11 shows the gripper of Fig. 1 in an exploded view.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0026] Fig. 1 shows a gripper 1 for a rapier weaving machine (not shown). The gripper 1 shown is a drawing gripper designed to guide a weft thread (not shown) through the first half of a weaving shed.

[0027] The gripper 1 shown in Fig. 1 comprises a base part 2, a gripper clamp 3, an ancillary gripper clamp 4, and a guide plate 5.

[0028] Figs. 2 to 4 show the base part 2 of the gripper 1 of Fig. 1 in several views in isolation.

[0029] The base part 2 comprises a bottom structure 20 with a first side 201 and an opposite second side 202, a first side structure 21, a second side structure 22 (in Fig. 1 partly hidden by the gripper clamp 3), and a top structure 23. In the embodiment shown, the base part 2 further comprises a third side structure 24. The base part 2 is manufactured as an integral part by 3D printing, wherein the bottom structure 20, the first side structure 21, the second side structure 22, the top structure 23, and the third side structure 24 are at least partly designed as lattice structures so that a lightweight base part 2 having a sufficient stiffness is formed.

[0030] The first side structure 21 connects the top structure 23 to the bottom structure 20 at the first side 201 of the bottom structure 20. The second side structure 22 connects the top structure 23 to the bottom structure 20 offset to the second side 202 of the bottom structure 20. The third side structure 24 is arranged at the second side 202 of the bottom structure 20 and protrudes upwards from the bottom structure 20.

[0031] The gripper clamp 3 is arranged at the bottom structure 20 at an outer side of the second side structure 22 between the second side structure 22 and the third side structure 24.

[0032] In the embodiment shown, the top structure 23 comprises a rectangular section 230 arranged between the first side structure 21 and the second side structure 22, a rear tapered section 231 arranged at a rear end 31 of the rectangular section 230, wherein the rear tapered section 231 is pointing towards the first side structure 21, and a front tapered section 232 arranged at a front end 32 of the rectangular section 230, wherein the front tapered section 232 is pointing towards the second side structure 22.

[0033] The bottom structure 20, the first side structure 21, the top structure 23, and the second side structure 22 form a closed or tubular-shaped unit.

[0034] As best seen in Fig. 3, a length of the rectangular section 230 in a longitudinal direction of the base part 2 is longer than a width of the rectangular section 230 between the first side structure 21 and the second side structure 22. The rectangular section 230 extends towards a back end 200 of the base part 2 beyond an area up to which a receiving gripper (not shown) enters the drawing gripper 1 for picking up a weft thread from the drawing gripper 1. Hence, a large top structure 23 extending over a long distance in the longitudinal direction is provided.

[0035] The second side structure 22 connects the rectangular section 230 of the top structure 23 to the bottom structure 20 at the rear end 31 of the rectangular section 230 and at a front end 32 of the rectangular section 230.

The second side structure 22 extends over a long distance and also extends beyond the area up to which the receiving gripper (not shown) enters the drawing gripper 1 for picking up a weft thread from the drawing gripper 1. In other words, the top structure 23 is supported via the second side structure 22 at a region arranged beyond the area up to which the receiving gripper enters the drawing gripper 1 for picking up a weft thread from the drawing gripper 1. Thereby, a stability of the base part 2 is improved.

[0036] In the embodiment shown in Figs. 1 to 7, in particular in Fig. 2, the second side structure 22 is a lattice structure comprising a first rib arrangement 221 arranged at a front end 32 of the rectangular section 230 and a second rib arrangement 222 arranged at a rear end 31 of the rectangular section 230. An open space 220 is provided between the first rib arrangement 221 and the second rib arrangement 222. The open space 220 allows a limited lateral movement (i.e. sideways to the longitudinal direction) of a receiving gripper (not shown) entering the drawing gripper 1 while avoiding or at least reducing the risk that the receiving gripper is contacting the second side structure 22 of the drawing gripper 1.

[0037] In the embodiment shown in Figs. 1 to 7, as best seen in Fig. 2, the second rib arrangement 222 comprises a rear rib 223, a forward slanted rib 225 and a C-curved rib 224. The rear rib 223 is arranged slanted with respect to a normal direction of the bottom structure 20, wherein an upper end of the rear rib 223 is arranged upfront of a lower end of the rear rib 223. The C-curved rib 224 extends essentially in the normal direction of the bottom structure 20, wherein an upper end of the C-curved rib 224 is arranged at least essentially above of a lower end of the C-curved rib 224. The C-curved rib 224 is curved away from the first side structure 22 for avoiding or at least reducing that the receiving gripper is contacting the C-curved rib 224. The forward slanted rib 225 is slanted in a direction opposite to that of the rear rib 223. In the embodiment shown, the C-curved rib 224 is arranged upfront of the forward slanted rib 225. The first rib arrangement 221 comprises a wide rib 226 extending in the longitudinal direction of the gripper 1. The wide rib 226 allows to counteract the forces exerted by the front tapered section 232.

[0038] As best seen in Figs. 2 to 4 and 10, in the embodiment shown, the first side structure 21 connects the rear tapered section 231 and an adjoining part of the rectangular section 230 of the top structure 23 to the bottom structure 20.

[0039] The front tapered section 232 and an adjoining part of the rectangular section 230 are not connected via the first side structure 21 to the bottom structure 20. Further, the front tapered section 232 is also not connected via the second side structure 22 to the bottom structure 20. This allows taking-up a weft thread (not shown) between the front tapered section 232 and the bottom structure 20 for guiding the weft thread towards the gripper clamp 3 and the ancillary gripper clamp 4 and/or - in particular in the absence of an ancillary gripper clamp 4 - into a slot 26 arranged in an area of the first side structure 21 and the top structure 23. In the embodiment shown, the rectangular section 230 is connected over almost its entire length to the bottom structure 20.

[0040] For securely guiding the weft thread towards the gripper clamp 3, in the embodiment shown, the front tapered section 232 is provided with downward pointing guiding portions 234, 235.

[0041] Further, for securely guiding the weft thread towards the ancillary gripper clamp 4 and/or the slot 26, the first side structure 21 has an entry recess 210 for the weft thread at the region of the front tapered section 232. As shown in Fig. 7, in case the ancillary gripper clamp 4 is attached to the base part 2, a protruding end 40 of the ancillary gripper clamp 4 protrudes from the base part 2 via the entry recess 210.

[0042] As best seen in Figs. 3 to 6, in the embodiment shown, the base part 2 comprises a ring-shaped connecting part 25 arranged between the rear tapered section 231 of the top structure 23 and the bottom structure 20. As best seen in Fig. 6, outer corner regions 238, 239 of the rear tapered section 232 are connected via ribs 251, 252 to the ring-shaped connecting part 25 for increasing a stability of the base part 2. The ribs 251, 252 are slanted in the longitudinal direction and transverse to the longitudinal direction of the gripper 1.

[0043] As shown in Figs. 7 and 8, the ring-shaped connecting part 25 is adapted for connecting the base-part 2 to a rail 6, which rail 6 is arranged between the bottom structure 20 and the ring-shaped connecting part 25. In the embodiment shown, in addition a lamella 7 is arranged between the rail 6 and the ring-shaped connecting part 25. A bolt 8 is inserted in the ring-shaped connecting part 25 for connecting the base part 2 and the rail 6. The rail 6 is fixed onto a rapier 10 (see Fig. 7 and 11) via a number of bolts 9 and connects the gripper 1 with the rapier 10. The bolts 8 and 9 can cooperate with nuts and washers.

[0044] In an alternative embodiment (not shown), the outer corner regions 238, 239 of the rear tapered section are connected via slanted ribs to the bottom structure 20.

[0045] In the embodiment shown in Figs. 1 to 8, the ancillary gripper clamp 4 is provided, wherein the ancillary gripper clamp 4 can be attached to the inner side of the top structure 23, i.e., a side of the top structure 23 facing the bottom structure 20, in a region of the first side structure 21.

[0046] For attaching the ancillary gripper clamp 4 to the inner side of the top structure 23, in the embodiment shown a mounting assembly 27 is provided.

[0047] Fig. 9 shows a detail of the gripper 1 shown in Figs. 1 to 8 including the mounting assembly 27 in a sectional view. The mounting assembly 27 comprises a first part 271 arranged at the top structure 23, in particular in the region of the rear tapered section 231, and a second part 272 connected to the top structure 23 and protruding towards the second side structure 22. A slit 273 for re-

ceiving the ancillary gripper clamp 4 is formed between the first part 271 and the second part 272. The first part 271 is provided with a through hole 274 and the second part 272 is provided with a threaded hole 275 aligned with the through hole 274. As best seen in Fig. 11, the ancillary gripper clamp 4 is provided with a through slit 41 and an end slit 42. Hence, after inserting the ancillary gripper clamp 4 into the slit 273, the end slit 42 can interact with a positioning part 276 arranged at the slit 273 and a bolt 11 can be inserted via the through hole 274 of the first part 271 and the through slit 41 of the ancillary gripper clamp 4 and threaded into the threaded hole 275 for fixing the ancillary gripper clamp 4 to the base part 2.

[0048] Fig. 10 shows the gripper 1 seen from the first side structure 21 showing the arrangement of the slot 26 and a shielding rib 237. The shielding rib 237 is protruding from the top structure 23, which shielding rib 237 extends along the rectangular section 230 at a side of the rectangular section 230 facing the first side structure 21.

[0049] Fig. 11 shows the gripper 1 of Fig. 1 in an exploded view, allowing a better visibility of the parts of the gripper 1. In the embodiment shown, the gripper clamp 3 comprises a base lamella 50 and a lever 51 urged by a spring 52 towards each other. The lever 51 is connected via an axis 53 to a support part 54, wherein the support part 54 is fixed with bolts 55 to the gripper body 2. The bolts 55 can cooperate with threaded openings 57 provided in the gripper body 2. Between the base lamellae 50 and the base part 2 distance elements 56 are provided. The guide plate 5 is clipped to the base part 2. A further bolt 58 is arranged between het base lamellae 50 and the support part 54.

[0050] As described above, the rail 6 is fixed onto the rapier 10 via a number of bolts 9 and connects the gripper 1 with the rapier 10. Further, in the embodiment shown, the bolt 8 is inserted in the ring-shaped connecting part 25 for connecting the base part 2 and the rail 6.

[0051] In alternative embodiments (not shown), in contrast to the embodiment shown, no ring-shaped connection part 25 is provided.

[0052] In alternative or in addition, in a further embodiment (not shown), the first rib arrangement 221 can comprise two ribs extending in a normal direction to the bottom structure 20 and/or the second rib arrangement 222 can comprises a triangular shaped rib.

[0053] In still a further embodiment (not shown), no open space is provided between the first rib arrangement 221 and the second rib arrangement 222 and/or in the place of the open space additional ribs are provided.

Claims

1. A gripper for a rapier weaving machine, the gripper (1) comprising a base part (2) and a gripper clamp (3), wherein the base part (2) comprises a bottom structure (20) with a first side (201) and an opposite second side (202), a top structure (23), a first side structure (21) connecting the top structure (23) to the bottom structure (20) at the first side (201) of the bottom structure (20), and a second side structure (22) connecting the top structure (23) to the bottom structure (20) offset to the second side (202) of the bottom structure (20), and wherein the gripper clamp (3) is arranged at the bottom structure (20) at a side of the second side structure (22) that is facing away from the first side structure (21), **characterized in that** the top structure (23) comprises a rectangular section (230), wherein a length of the rectangular section (230) in a longitudinal direction of the base part (2) is longer than a width of the rectangular section (230) between the first side structure (21) and the second side structure (22), and wherein the second side structure (22) connects the rectangular section (230) of the top structure (23) to the bottom structure (20) at least at a rear end (31) of the rectangular section (230) and at a front end (32) of the rectangular section (230).

2. The gripper according to claim 1, **characterized in that** the rectangular section (230) of the top structure (23) is a lattice structure.

3. The gripper according to claim 1 or 2, **characterized in that** the second side structure (22) is a lattice structure comprising a first rib arrangement (221) arranged at a front end (32) of the rectangular section (230) and a second rib arrangement (222) arranged at a rear end (31) of the rectangular section (230).

4. The gripper according to claim 3, **characterized in that** the second rib arrangement (222) comprises a rear rib (223) that is arranged slanted with respect to a normal direction of the bottom structure (20), wherein an upper end of the rear rib (223) is arranged upfront of a lower end of the rear rib (223).

5. The gripper according to claim 3 or 4, **characterized in that** the second rib arrangement (222) comprises a straight rib, wherein the straight rib extends in the normal direction of the bottom structure (20), and/or **in that** a rear rib (223) that is arranged slanted with respect to a normal direction of the bottom structure (20), wherein an upper end of the rear rib (223) is arranged upfront of a lower end of the rear rib (223), and/or **in that** the second rib arrangement (222) comprises a C-curved rib (224), in particular a C-curved rib (224) facing away from the first side structure (22), wherein an upper end of the C-curved rib (224) is arranged at least essentially above of a lower end of the C-curved rib (224) in the longitudinal direction of the base part (2), and/or **in that** the second rib arrangement (222) comprises a forward slanted rib (225), wherein the forward slanted rib (225) is slanted in a direction opposite to that of the rear rib (223).

6. The gripper according to claim 3, 4 or 5, **characterized in that** an open space (220) is provided between the first rib arrangement (221) and the second rib arrangement (222).

7. The gripper according to any one of claims 1 to 6, **characterized in that** the top structure (23) comprises a rear tapered section (231) arranged at the rear end (31) of the rectangular section (230), wherein the rear tapered section (231) is pointing towards the first side structure (21), and wherein in particular the first side structure (21) connects the rear tapered section (231) and at least an adjoining part of the rectangular section (230) to the bottom structure (20).

8. The gripper according to claim 7, **characterized in that** the base part (2) comprises a ring-shaped connecting part (25) arranged between the rear tapered section (231) of the top structure (23) and the bottom structure (20), wherein the ring-shaped connecting part (25) is adapted for connecting the base-part (2) to a rail (6), which rail (6) is arranged between the bottom structure (20) and the ring-shaped connecting part (25), and wherein outer corner regions (238, 239) of the rear tapered section (231) are connected via ribs (251, 252), in particular slanted ribs, to the ring-shaped connecting part (25).

9. The gripper according to any one of claims 1 to 8, **characterized in that** the gripper is a drawing gripper designed to guide a weft thread through a first half of a weaving shed.

10. The gripper according to any one of claims 1 to 9, **characterized in that** the top structure (23) comprises a front tapered section (232) arranged at a front end (32) of the rectangular section (230), wherein the front tapered section (232) is pointing towards the second side structure (22), and wherein the front tapered section (232) is not connected to the bottom structure (20), and in particular wherein the front tapered section (232) is provided with downward pointing guiding portions (234, 235) for guiding weft threads, and/or wherein the first side structure (21) has an entry recess (210) for a weft thread at a region of the front tapered section (232).

11. The gripper according to any one of claims 1 to 10, **characterized in that** the top structure (23) comprises a shielding rib (237) protruding from the top structure (23), which shielding rib (237) extends along the rectangular section (230) at a side of the rectangular section (230) facing the first side structure (21).

12. The gripper according to any one of claims 1 to 11, **characterized in that** an ancillary gripper clamp (4) is provided, wherein in particular the ancillary gripper clamp (4) is attached to the inner side of the top structure (23) in a region of the first side structure (21) via a mounting assembly (27) comprising a first part (271) arranged at the top structure (23) and a second part (272) connected to the top structure (23), wherein a slit (273) for receiving the ancillary gripper clamp (4) is formed between the first part (271) and the second part (272).

13. The gripper according to any one of claims 1 to 12, **characterized in that** a guide plate (5) is provided below the bottom structure (20).

14. Weaving machine, **characterized in that** the weaving machine comprises a gripper (1) according to any one of claims 1 to 13.

15. Method for manufacturing a gripper according to any one of claims 1 to 13, wherein the base part (2) is an integral part formed using 3D printing.

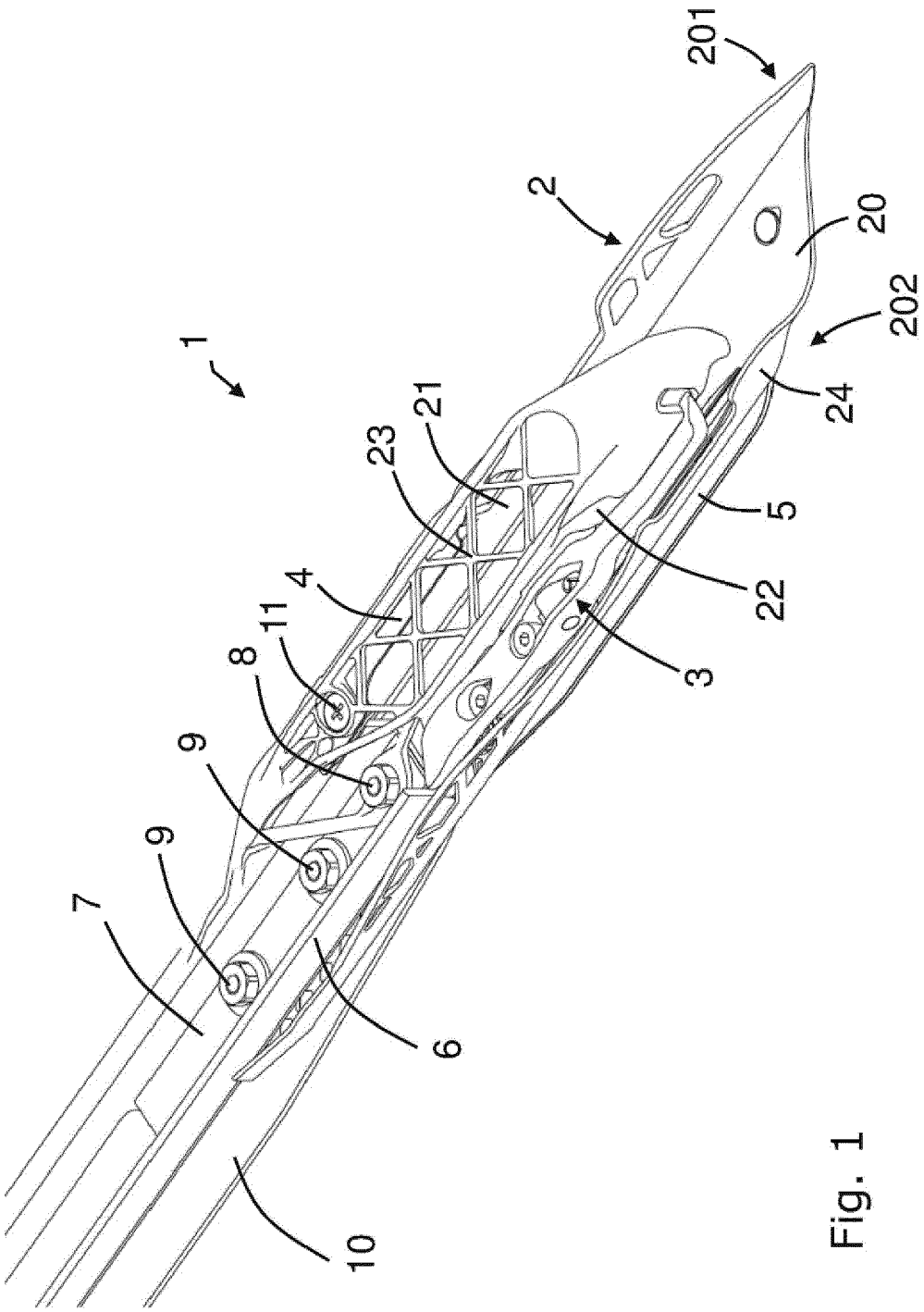

Fig. 1

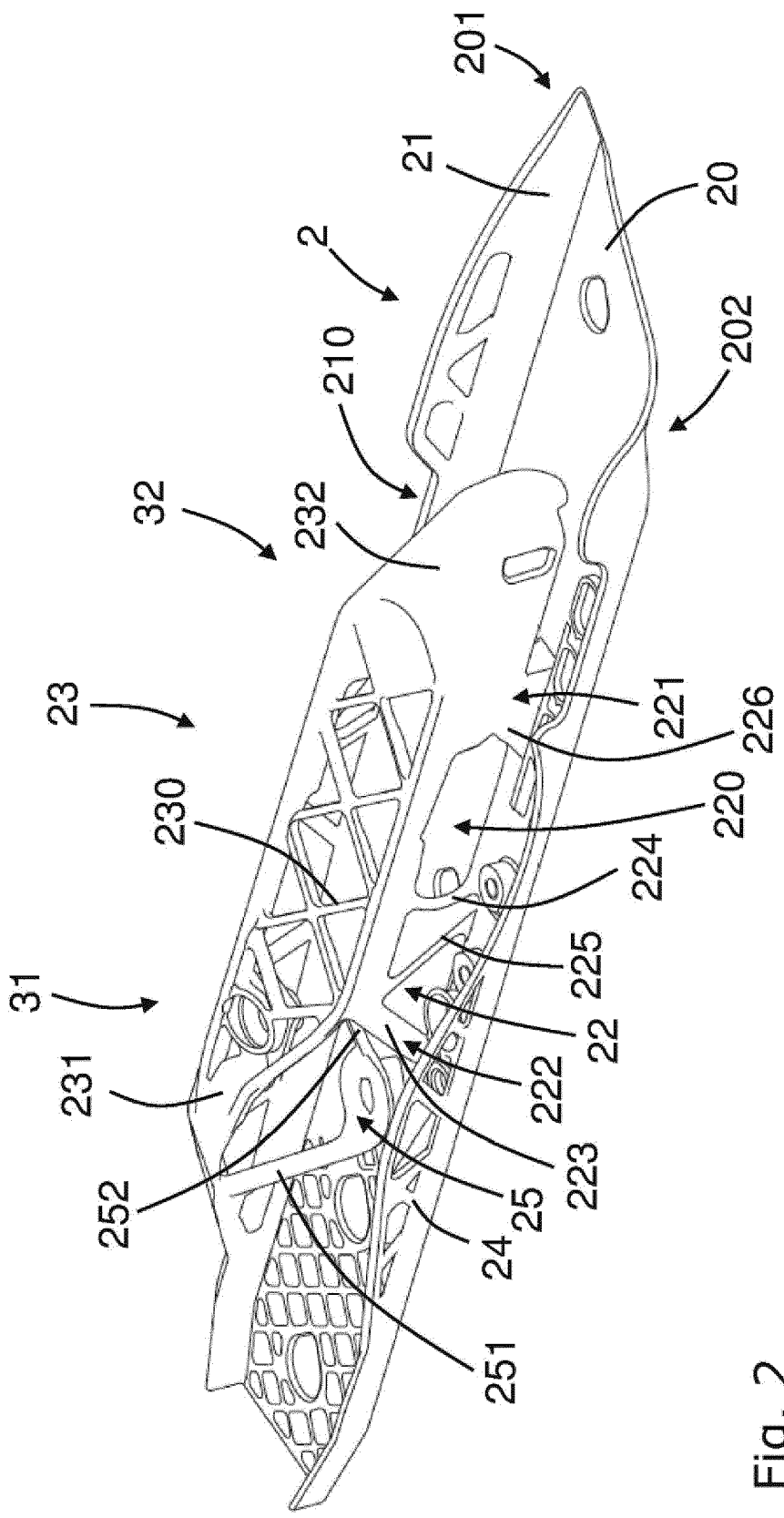
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Fig. 2

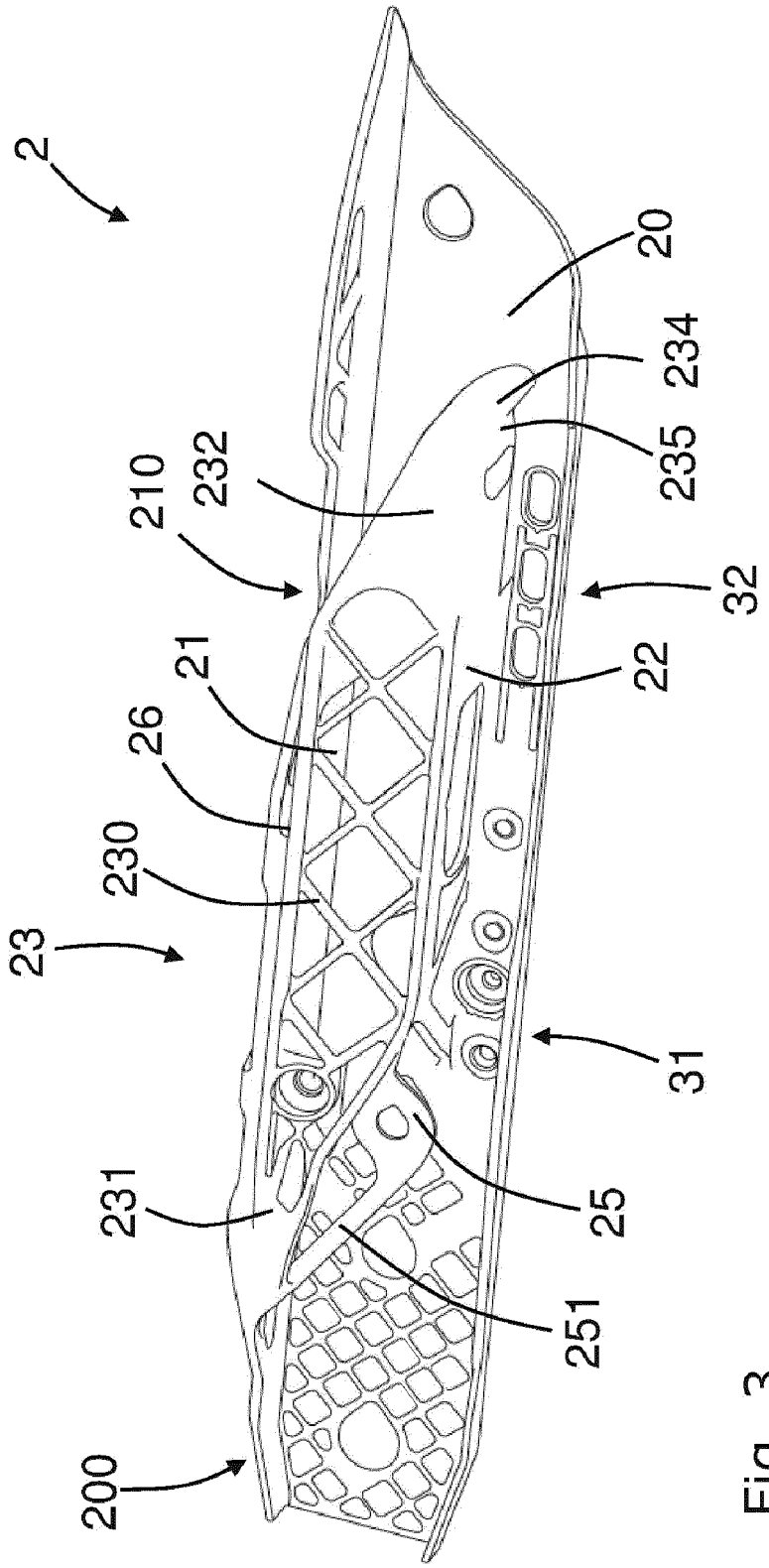

Fig. 3

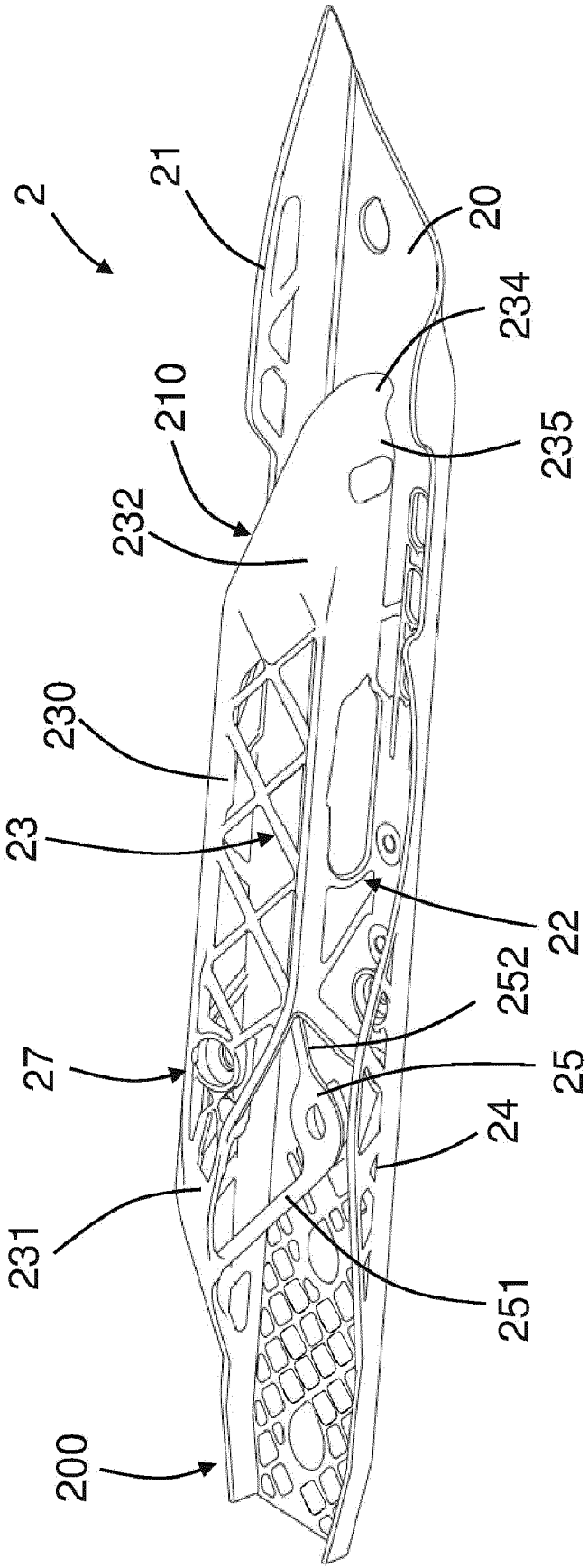

Fig. 4

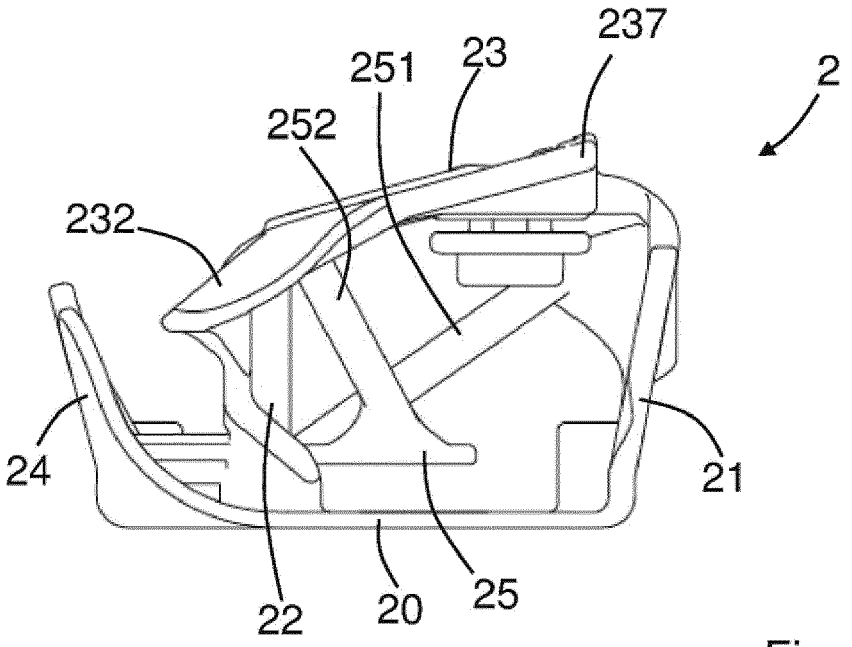

Fig. 5

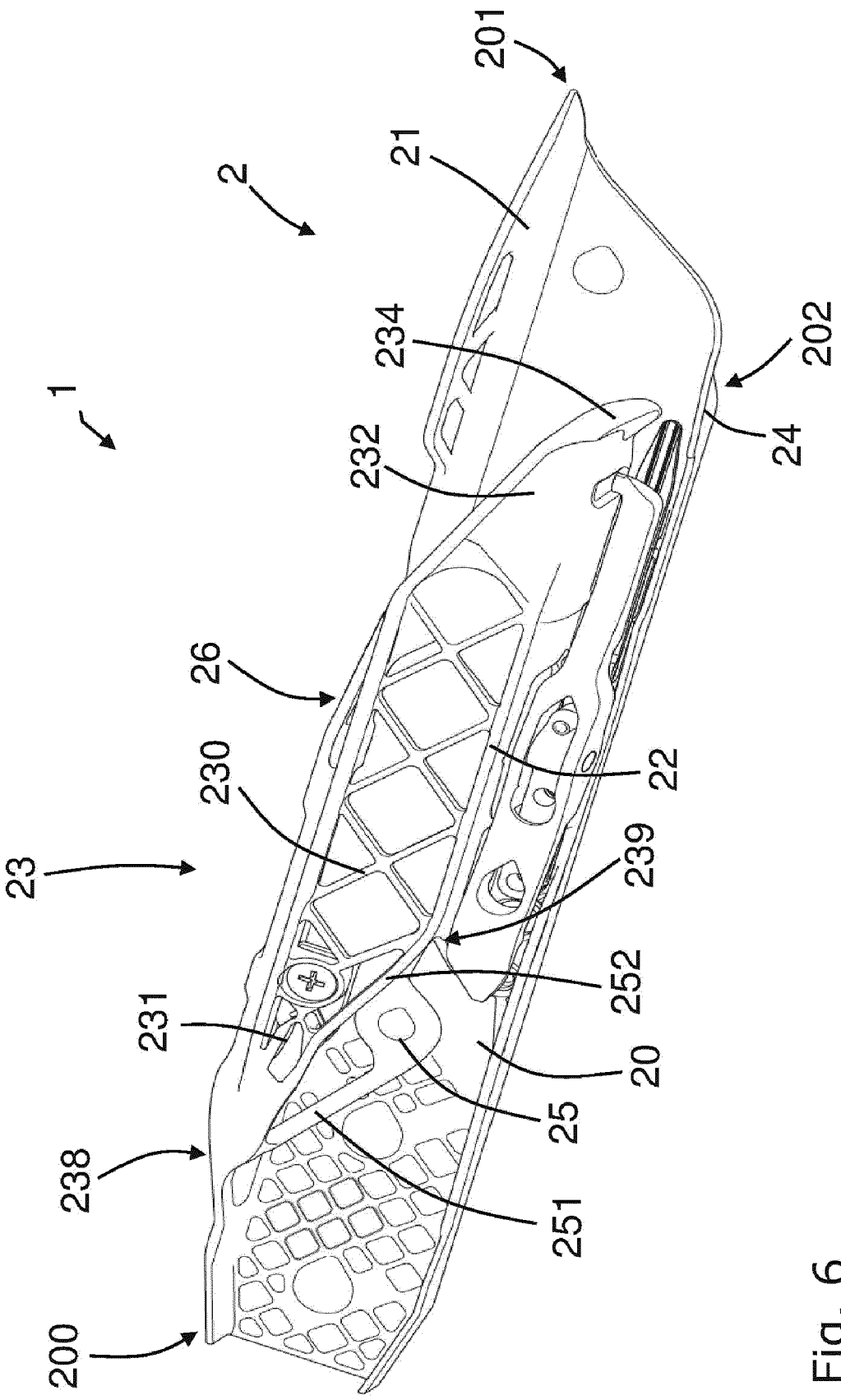

Fig. 6

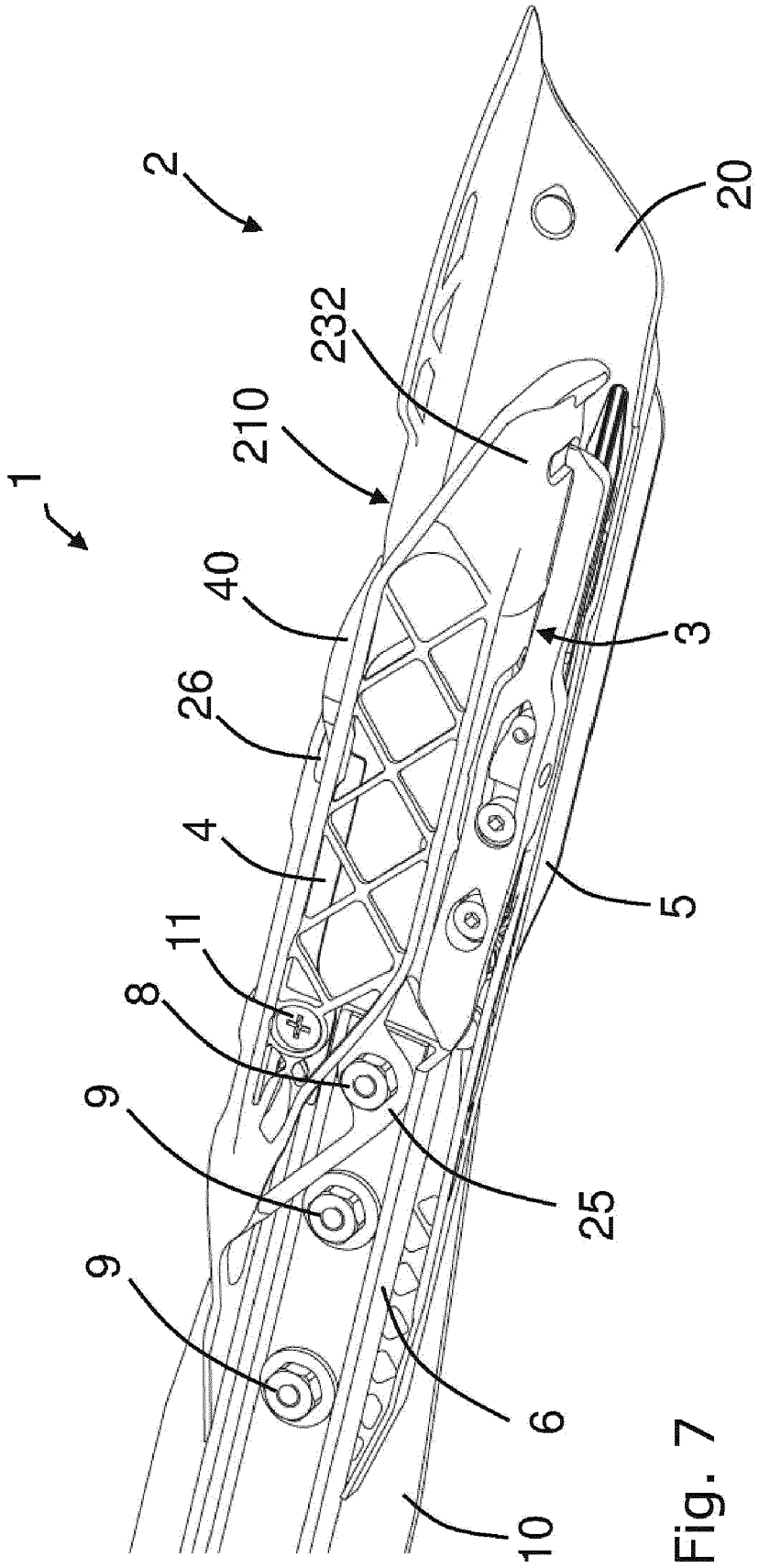

Fig. 7

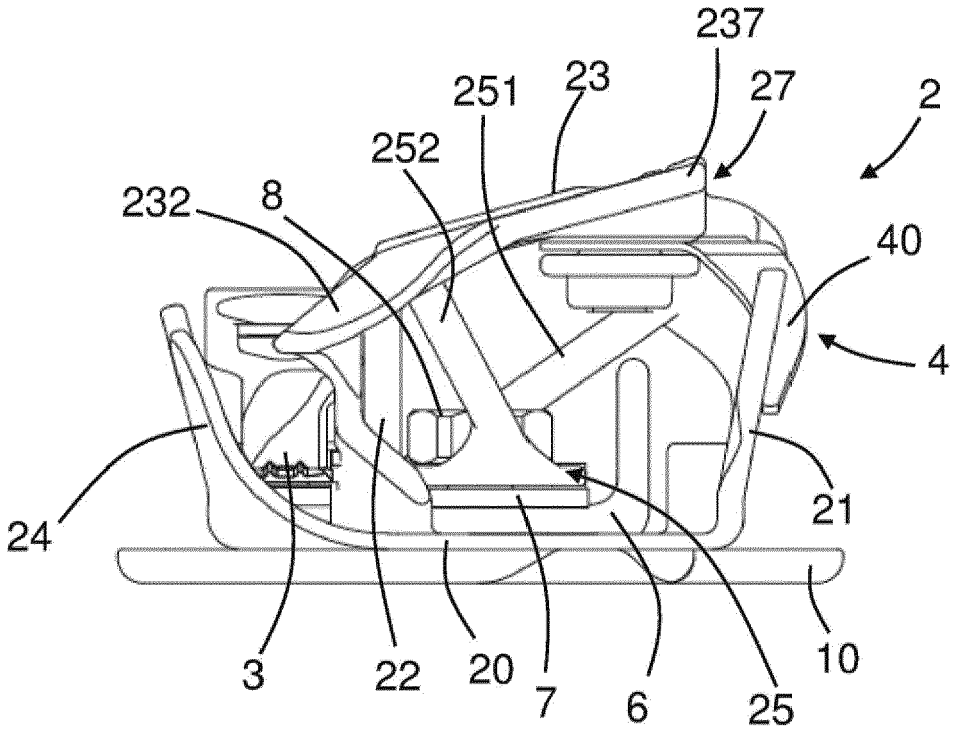
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Fig. 8

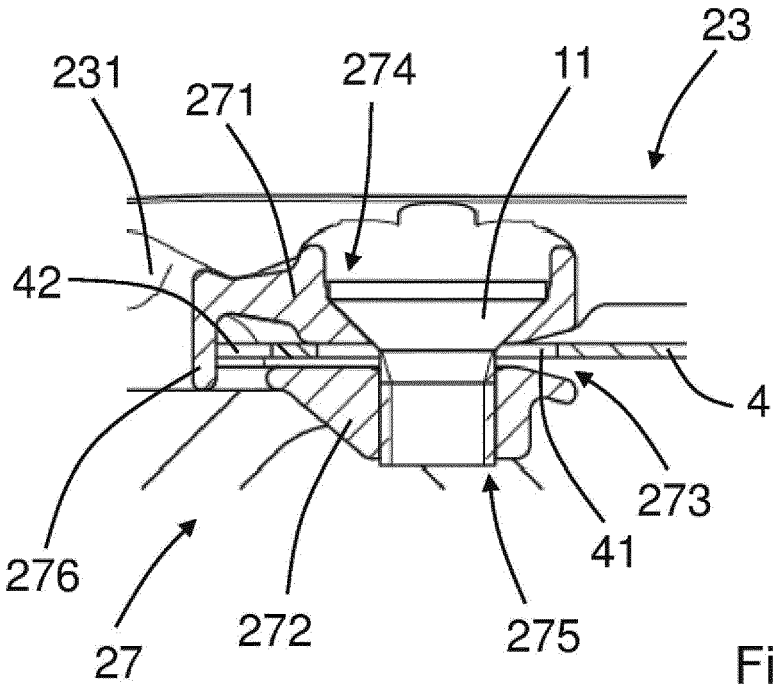
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Fig. 9

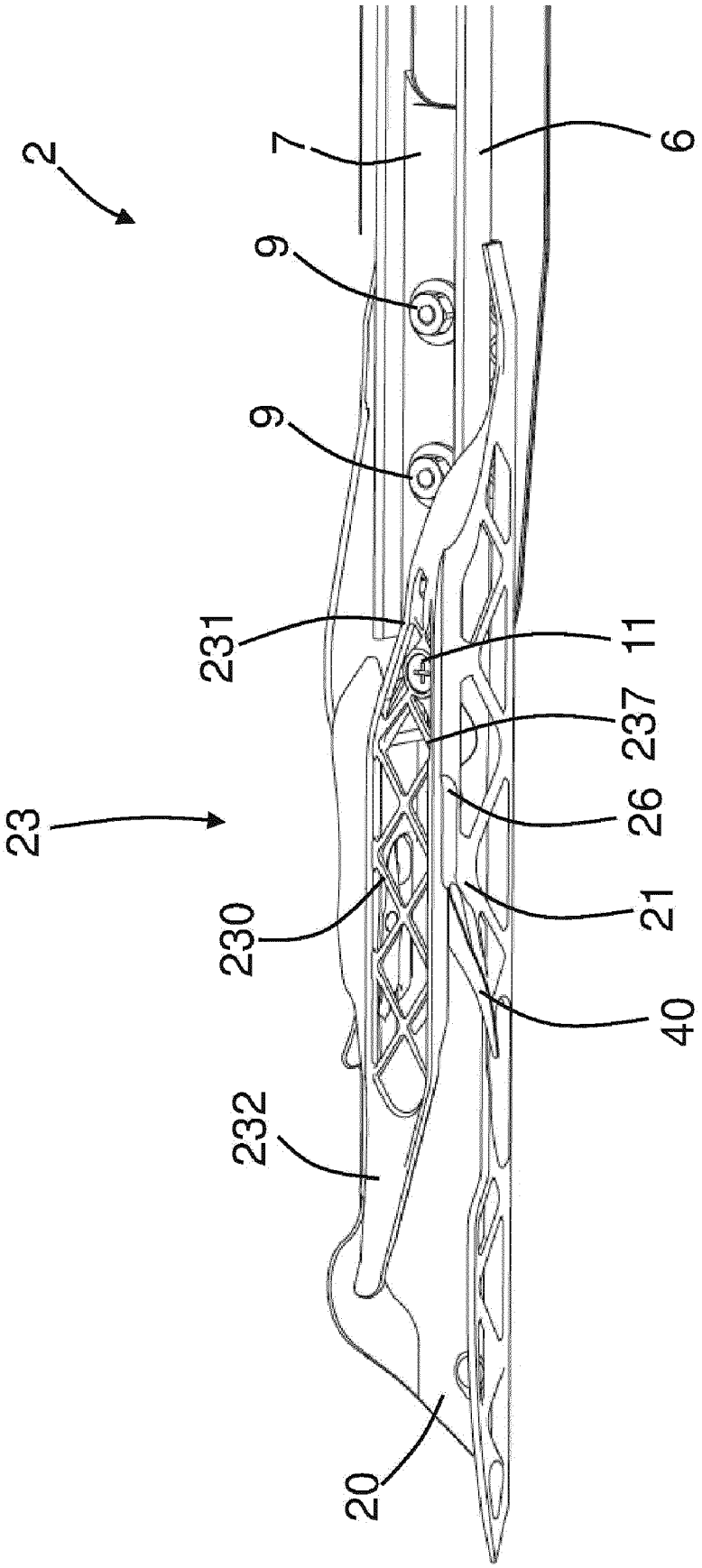

Fig. 10

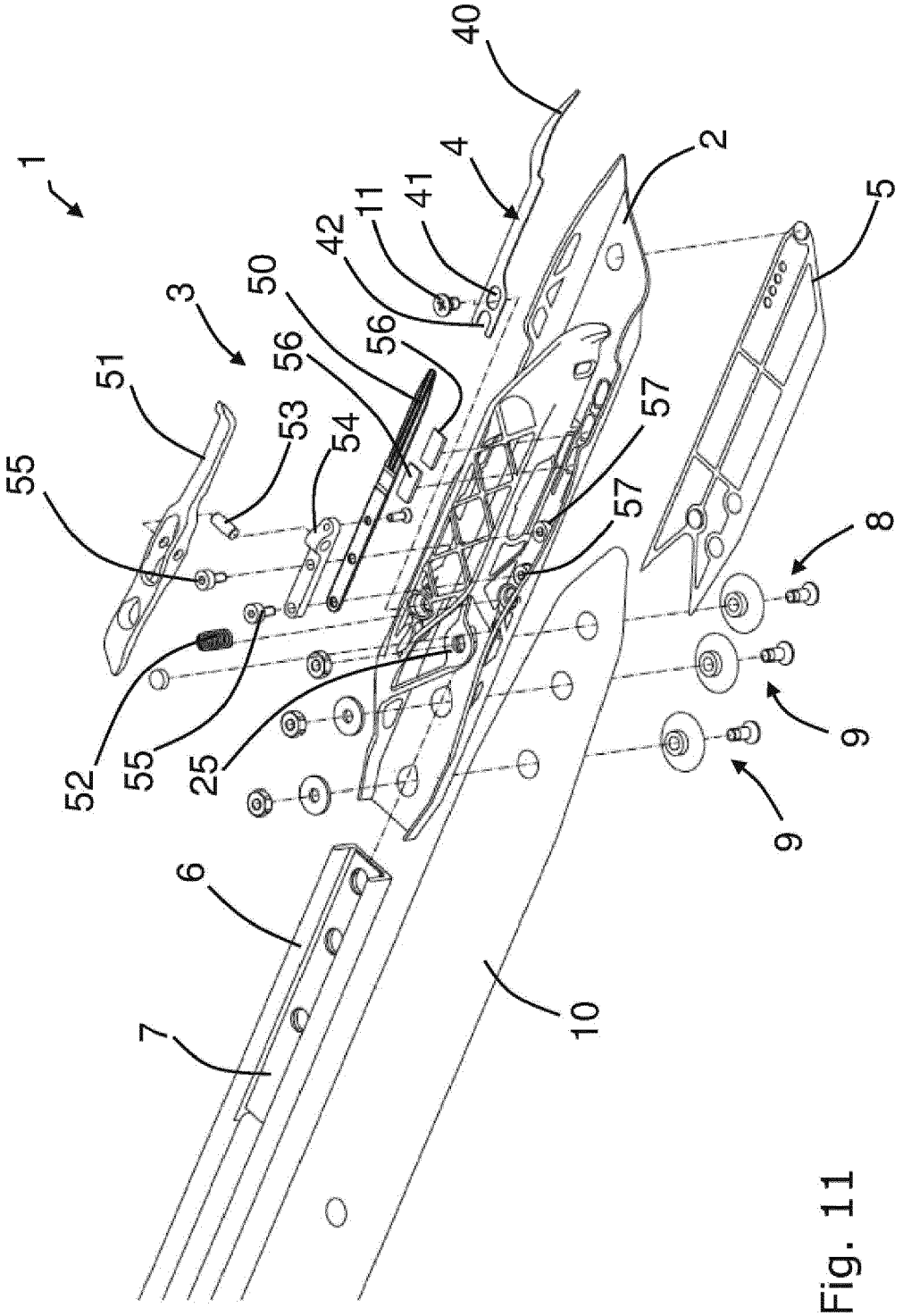

Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 23 17 2525

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	JP 2000 119935 A (TOYODA AUTOMATIC LOOM WORKS) 25 April 2000 (2000-04-25) * figures 1-9 * * paragraph [0013] - paragraph [0036] *	1-15	INV. D03D47/23
A	CN 107 587 243 A (ZHEJIANG JUJIAN TEXTILE MACHINERY CO LTD) 16 January 2018 (2018-01-16) * claims 1-7 * * figures 1-4 *	1-15	
A	WO 2019/244068 A1 (VANDEWIELE NV [BE]) 26 December 2019 (2019-12-26) * page 9, line 10 - page 11, line 25 * * figures 1-18 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC) D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 October 2023	Hausding, Jan

CATEGORY OF CITED DOCUMENTS

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25-10-2023

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CN 107587243 A	16-01-2018	NONE	
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		WO 2019244068 A1	26-12-2019

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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