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(72) **Inventeurs/Inventors:**
HOLLER, FRANK, DE;
SCHUMACHER, FRIEDRICH-WILHELM, DE

(73) **Propriétaire/Owner:**
GEBR. SCHUMACHER
GERAETEBAUGESELLSCHAFT MBH, DE

(74) **Agent:** RIDOUT & MAYBEE LLP

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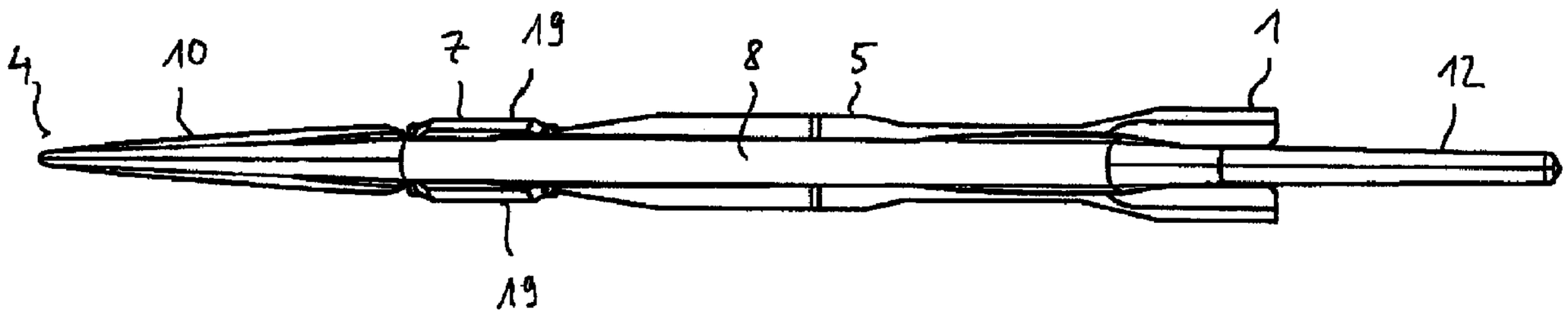

(57) **Abrégé/Abstract:**
The invention relates to a crop lifter for a mower of a harvesting machine comprising a support bar attachable on the mower, wherein the support bar has a carrier, and wherein a lifter rod is provided for the detachable mounting on the carrier, wherein the lifter rod is connectable at a multitude of positions, distanced in the longitudinal direction of the lifter rod, to the carrier.

Abstract

The invention relates to a crop lifter for a mower of a harvesting machine comprising a support bar attachable on the mower, wherein the support bar has a carrier, and wherein a lifter rod is provided for the detachable mounting on the carrier, wherein the lifter rod is connectable at a multitude of positions, distanced in the longitudinal direction of the lifter rod, to the carrier.

Crop lifter

Description

The invention relates to a crop lifter for a mower of a harvesting machine comprising a support bar attachable on the mower, wherein the support bar has a carrier and wherein a lifter rod is provided on the carrier, or wherein the lifter rod is connected to the support bar.

From the State of the Art a so-called grain lifter is known, which slides with the front part of the support bar, on which a halm lifter is attached, over the ground or moves slightly above the ground and picks up the halms of the crops lying on the ground with the halm lifter, so that these can be cut by the cutter of the mower and thus the heads can, for example, be transported to a threshing device. DE 23 25 916 A shows such a grain lifter, in which the halm lifter consists of a continuously U-shaped part, the legs of which increasingly get shorter starting from the weld seam of the halm lifter at the support bar to the free end of the halm lifter.

Concerning crops, which carry the fruits not at the top of comparably long stems, as it is the case with grains, but which grow on bushes, as for example pulses, the fruit or husks are distributed within the whole bush, also in the area of the bush close to the ground. From this, the requirement results to cut such crops especially close to the ground and to lift them by means of special lifters such, that possibly no fruits are destroyed by the mower. For this for example, the above described grain lifter is used with the modification, that the leading tip of the halm lifter projects downwards so far, to be guided in an ideal manner directly above the field surface. The grain lifters are however often damaged by stones in the ground and have to be exchanged or repaired in a laborious manner. WO 2006/072158 A1 discloses a grain lifter, wherein it is proposed, to arrange a lifter rod detachably on a supporting structure, so that the lifter rod is separately exchangeable and an exchange of the whole grain lifter is prevented. A disadvantage is, that an exchange of the supporting structure, if this is necessary, is laborious and that the frequency of failures of the lifter itself is not reduced.

It is an objective of the invention to provide a crop lifter, which is less failure-prone and/or is repairable with less effort.

The objective is accomplished by a crop lifter according to one of the independent claims 1, 11 and 12, as well as by a lifter rod according to claim 8.

The term crop lifter does not mean any limitation to a specific crop, like grains or pulses. The crop lifters according to the invention are suitable for any type of crops. Specifics in the processing of certain special crops are described separately if necessary.

The crop lifter for a mower of a harvesting machine according to the invention comprises a support bar attachable on the mower, the support bar having a carrier for a lifter rod, generally at the front end of the support bar, when seen in a working direction. The working direction generally corresponds to the driving direction of the harvesting machine. The lifter rod is provided for detachable mounting on the profile carrier. An advantage of the crop lifter according to the invention is, that the lifter rod is detachable and exchangeable separately from the carrier. When damaged, this exchange can quickly and simply be carried out. The replacement parts in the form of the separate lifter rods are distinctly smaller and lighter and cheaper than a complete one-piece grain lifter.

According to the invention, the lifter rod is connectable at a multitude of positions, distanced in the longitudinal direction of the lifter rod, to the carrier. The longitudinal direction corresponds to a main extension direction of the lifter rod, which generally is essentially rod-like or blade-like. The crop lifter according to the invention enables in an advantageous manner an adjustment of the lifter rod in the longitudinal direction and offers thus a possibility to especially accurately adjust the height of the leading tip of the lifter rod above the ground and to guide it with the smallest possible distance to the ground. Furthermore, according to the invention, the connection is

achievable at discrete positions along the lifter rod and is, furthermore, especially preferred by a form-fitting connection. Thus, a form-fitting connection between the lifter rod and the carrier is meant in the longitudinal direction of the lifter rod, as in this direction the largest force acts on the connection. The adjustability at discrete positions, i.e. at finite, countable positions, has the advantage, compared to a continuous adjustability, that at a known distance of the positions to each other an adjustment to a specific measure without the use of measuring means is enabled.

According to another preferred embodiment it is provided, that the lifter rod has a connection portion, wherein the connection portion extends in the longitudinal direction along the lifter rod and wherein attachment means on the carrier interact with the connection portion. The attachment means have especially preferred a clamping jaws arrangement and/or a serration. Especially the serration on the carrier is preferably provided on one clamping jaw. The corresponding clamping jaw can for example be manufactured integrally with a serration, especially as a casting or injection moulding part. Alternatively, the serration can be formed on at least one insert, wherein at least one clamping jaw of the carrier accommodates form-fittingly an insert.

According to a further preferred embodiment it is provided, that the lifter rod has in the connection portion a counter serration, wherein the counter serration interacts with the serration on the carrier.

According to a further preferred embodiment the carrier is rotatably adjustable via a rotational axis arranged transversally to the working direction. Thus, also the angle between the lifter rod and the support bar can be adjusted, whereby the position of the leading tip of the lifter rod can additionally be adjusted relative to the ground.

Preferably, the carriers are made from a stable material, which is specially well elastically deformable, without essentially deforming plastically.

A further subject of the invention, which meets the object, is a lifter rod for a crop lifter of a mower of a harvesting machine, especially as described above. The lifter rod

has, according to the invention, a leading end, when seen in working direction, wherein a through opening is provided in the lifter rod for facilitating an elastic deformation of the lifter rod when a force is applied to the leading end. The through opening causes buckling of the lifter rod in the area of the through opening, which represents a structural weakening and facilitates an elastic deformation. If the leading end of the lifter rod during the operation on a crop lifter collides for example with a stone, which causes an essential force impact onto the lifter rod, the lifter rod according the invention deflects more easily and evades the obstacle by means of elastic deformation, without damaging the crop lifter. The lifter rod springs subsequently back to its original shape. The lifter rod according to the invention can especially advantageously be used, where the leading end of the lifter rod is guided especially low, for example directly above the ground surface, as this is especially the case during the harvest of pulses, for example beans, especially soya beans.

According to a preferred embodiment it is provided, that the opening is arranged at least portion-wise between the leading end and the connection portion for attachment on a carrier. Preferably, the through opening has a main extension direction along a longitudinal direction of the lifter rod. The through opening is at least double as long, especially in the longitudinal direction, as transversally to the longitudinal direction. Preferably, the through opening converges at its ends in longitudinal direction under an acute angle. Furthermore, the through opening is preferably closed by a web, wherein the web does not resist essentially to a deformation of the through opening.

A further subject of the invention, which meets the object, is a crop lifter for a mower of a harvesting machine, comprising a support bar attachable on the mower, wherein the lifter rod is connected to the support bar as described above.

A further subject of the invention, which meets the object, is a crop lifter for a mower of a harvesting machine, comprising a support bar attachable on the mower, wherein a lifter rod is connected to the support bar, wherein the support bar has a recess for attachment on the mower, and wherein a bolting face is worked into the upper face of the support bar around the recess such, that planes, defined by the bolting face and the upper face, enclose an acute angle. The bolting face is that face, on which the

head of a threaded bolt or a threaded nut acts during the tightening of a screw connection. The corresponding faces on the head or on the nut are aligned parallel to the upper face of the support bar and thus, are tilted by the acute angle towards the bolting face. A tensioning of the screw connection is produced, which does not effect the strength of the screw connection. A loss prevention for the whole crop lifter is achieved in an advantageous manner. During an unintentional detaching of the screw connection, the crop lifter can, when seen in working direction, move forward, whereby the screw connection is again tightened in an advantageous manner, as the bolting face moves automatically wedge-like under the threaded nut or the screw head. A further advantage for the handling of the crop lifter is, that no securing measure for securing the screw connection has to be provided, which, in the case of an exchange of the crop lifter, necessary because of damage, would have to be loosened in a cumbersome manner. By means of the inclined bolting face, a screw connection, which is simple to detach, can be used. Preferably, the acute angle has an angular dimension of less than 5 degrees, preferably less than three degrees and particularly of approximately 1.5 degrees. Angles of less than 0.5 degrees are too flat, so that the technical effect according to the invention can not be achieved.

According to a preferred embodiment the recess is formed as an elongated hole extending in the working direction and/or the recess is open, when seen in working direction, towards a rear end of the support bar. Thus, a disassembly and assembly of the crop lifters according to the invention is possible without a complete removal of the bolt out of the nut. Furthermore, the support bar has preferably a receptacle for a mowing finger on the mower of the harvesting machine. By means of this receptacle, the crop lifter is pushed onto the mowing finger pointing in the working direction forward. The crop lifter according to the last described subject of the invention can, as the above described subjects, have a detachable lifter rod. However, also one-piece crop lifters shall be included, in which the lifter rod is rigidly connected to the support bar.

A further subject of the invention is a crop lifter for a mower of a harvesting machine, comprising a support bar attachable on the mower, wherein the support bar has a carrier and wherein a lifter rod is provided for the detachable mounting on the carrier

by means of a clamping jaws arrangement with two clamping jaws. Preferably, the crop lifter concerns an embodiment as the above described crop lifter.

According to the invention, at least one of the two clamping jaws is detachable, while the other of the two clamping jaws remains retained on the carrier. Thus, a defect lifter rod can be exchanged in an especially advantageous manner or can be adjusted in the longitudinal direction L, without the pre-adjusted angle for the lifter rod getting lost. As the second clamping jaw remains retained on the carrier, the detached clamping jaw can be adjusted to the same angle position in a simple manner like the stationary clamping jaw and the new lifter rod is exactly aligned. In light of the large number of exchanges of defect lifter rods during each harvesting season, the omission of the need of aligning the angle represents a simplification of the work and a time saving.

According to a preferred embodiment it is provided, that the clamping jaws are respectively attached with a separate attachment means on the carrier. Thus, it does not matter, which clamping jaw is detached. The respectively other remains fixed to the carrier. The clamping jaws have especially one first recess for fixingly accommodating the bolt and a second recess as an access to a bolt of the respectively other clamping jaw. The second recess enables in an advantageous manner to secure the bolt of the respectively other clamping jaw with a counter element, i.e. a nut, on the carrier. This means, the first receptacles have respectively a smaller bore than the second receptacles, so that an attachment is only possible to the first receptacles. The first receptacles can preferably have a recess corresponding to the head shape of the bolt head, to facilitate the tightening of the nut.

All here described subjects of the invention are combinable deliberately in any manner. Preferred embodiments are described in the following with reference to the drawings.

It shows:

Fig. 1 a perspective view of an embodiment of a crop lifter according to the invention,

Fig. 2 the crop lifter according to Fig. 1 in a side view,

Fig. 3 the crop lifter according to Fig. 1 in a view from above onto the lifter rod,

Fig. 4 a cross-section along the line A-A according to Fig. 2,

Fig. 5 a sectional view along the line J-J according to Fig. 2,

Fig. 6 a side view of the detail G of Fig. 2,

Fig. 7 a view from the top onto the detail according to Fig. 6,

Fig. 8 a sectional view along the line H-H of Fig. 7,

Fig. 9 a side view of a one-piece embodiment of the crop lifter, mounted on a sickle bar and a mowing finger of a harvesting machine,

Fig. 10 a perspective view of a further embodiment of a crop lifter according to the invention,

Fig. 11 a side view of a detail corresponding to Fig. 6, however in the embodiment of the crop lifter according to Fig. 10,

Fig. 12 a view from the top onto the detail of Fig. 11,

Fig. 13 a sectional view along the line H-H of Fig. 12,

Fig. 14 a side view of a further embodiment of a crop lifter according to the invention,

Fig. 15 a sectional view along the line A-A of Fig. 14,

Figures 16 to 19 different views of a clamping jaw of an embodiment of the crop lifter according to Fig. 14,

Figures 20 and 21 the crop lifter according to the invention of Fig. 14 in two perspective views.

In Fig. 1, an embodiment of the crop lifter according to the invention is shown in a perspective view. The crop lifter comprises a support bar 5, which is provided for the attachment of the crop lifter on a mower of a harvesting machine. For this, the support bar 5 has at its rear end 1 a recess 3, which is formed as an elongated hole, open towards the rear end 1. The recess 3 can be moved onto a bolt with thread on the mower and can be secured with a threaded nut (not shown). Simultaneously a receptacle 21 on the support bar 5 is pushed onto a mowing finger (not shown) of a mower. An advantage of the embodiment with the elongated hole 3 is, that an assembly of the support bar is possible on different finger types, even if the mowing finger has different lengths and thicknesses. A bolting face 17, which encloses the recess 3, is described in detail later.

The support bar 5 has at its front end a carrier 7, on which a lifter rod 8 is provided for the detachable mounting. The lifter rod 8 is connectable according to the invention at a multitude of positions, distanced in longitudinal direction L of the lifter rod 8, to the carrier 7. For this, the carrier 7 has in the shown embodiment two clamping jaws 19, clampable against each other and which act onto a connection portion 6 of the lifter rod 8. The lifter rod 8 is an approximately rod-like component, elongated in the longitudinal direction designated by the double arrow L, with a head portion 10 at its leading end 4, which is provided for being guided as low as possible above the ground. The head portion 10 can for example be formed dart-like, starting from the tip

at the lead end 4 widening to the rear, while a centre portion of the lifter rod 8 with the connection portion 6 has an essentially constant cross-section and while an end 12 of the lifter rod 8 converges rearwards slightly. The construction of the connection portion 6 and of a through opening 2 of the lifter rod 8 are described in the following with reference to the further Figures.

In Figures 2 and 3 the crop lifter according to Fig. 1 is shown in two views, wherein Fig. 2 shows the mounting position in a side view and Fig. 3 shows a view from above. A working direction is represented by the arrow designated with R. It is the working direction of the not shown mower, which generally corresponds to the driving direction of the harvesting machine. This means, that the crop lifter moves during operation in the direction of the arrow R through the crops, straightens and aligns these at the same time, to guide them to the mower such, that the crops are cut at the stem and no fruits are damaged. For adaption to different types of crops, the carrier 7 can rotatably be adjustable around a rotational axis extending transversally to the working direction R. According to the invention it is provided, that the lifter rod 8 is connectable at a multitude of positions, distanced in its longitudinal direction, to the carrier 7. For this, the carrier 7 interacts with the connection portion 6, which defines also the maximal adjustment range. It can also be considered, that the clamping jaws 19 of the profile carrier 7, clampable against each other, work themselves into the connection portion 6 such, that a connection is made, based essentially on a frictional connection. According to a preferred embodiment, the lifter rod 8 is however connectable in a form-fitting manner to the carrier 7. For this, the connection portion 6 has a projection, which meets with a complementary formation on the carrier 7, so that these can correspondingly engage each other and thus make a form-fitting connection in the longitudinal direction L. In general, a serration is selected as the projection. By means of the form-fitting connection a stable connection between the carrier 7 and the lifter rod 8 is produced advantageously at lower tightening forces on the carrier 7, than necessary with a frictional connection based on clamping force.

The head portion 10 of the lifter rod 8 is guided for specific crops, as for example for the harvesting of beans, extremely low over the ground surface and may even penetrate the ground shortly, whereby it shall be prevented, that husks growing at the bot-

tom of the bush are destroyed by the mower. In the process the lifter rod 8 is exposed to extremely strong loads, so that the wear on the lifter rods 8 is comparable high. It has been shown to be advantageous, to manufacture the lifter rods 8 from a material, which is comparably advantageous during the manufacture, however robust and especially easy elastically deformable. If the head portion 10 collides for example with stones in the ground, the lifter rod 8 is elastically deformed and returns essentially to its original shape. For supporting the elastic deformability of the head portion 10 the lifter rod 8 according to the invention has a through opening 2, which extends transversally to the longitudinal or working direction through the lifter rod 8. The through opening 2 extends in the longitudinal direction L between the front end 4 of the lifter rod 8 and the connection portion 6, especially in a transition portion between the head portion 10 and the connection portion 6. As in the connection portion 6, the carrier 7 holds the lifter rod 8, a connection portion 6 that is not deformed would be desirable, as otherwise the form-fitting connection to the carrier 7 could be detached, which might lead to the loss of the lifter rod 8 during the harvesting operation. The through opening 2 represents a weakening of the lifter rod 8 in the transition portion between the head portion 10 and the connection portion 6, whereby it is advantageously achieved, that the head portion 10 is deflected to the side under application of a strong force, whereas the connection portion 6 is essentially not deformed. A force transmission from the head portion 10 to the connection portion 6 does practically not take place via the transition portion weakened by the through opening 2. Especially after an impact the head portion 10 is elastically returned to its original position. The through opening 2 can be formed continuously, which however is not compulsory. According to a preferred embodiment the through opening 2 is closed by a web 16, the resistance to deformation of which is essentially lower than that of the head portion 10. An advantage of the closed through opening 2 is, that no stems or similar can be caught in the through opening, which could influence the mowing performance.

In connection with Figures 4 and 5 the form-fitting connection between the lifter rod 8 and the carrier 7 is described in detail in the following. Fig. 4 shows a cross-sectional view along the line A-A of Fig. 2 and Fig. 5 shows also a sectional view along the line J-J of Fig. 2. The cross-sectional view in Fig. 4 shows the carrier 7 with the lifter rod

8, wherein the lifter rod 8 is held by a clamping jaws arrangement 15. The clamping jaws arrangement 15 engages an area below the through opening 2, which is closed by a comparably thin web 16. The clamping jaws arrangement 15 comprises two clamping jaws 19, acting against and clampable against each other, wherein also three or more clamping jaws may be considered, which could act on a connection portion 6 of the lifter rod 8, adapted correspondingly in shape. The longitudinal direction L of the lifter rod 8 is aligned in Fig. 4 vertically to the drawing plane. In the other spatial directions the clamping jaws 18 enclose the lifter rod 8 such, that a form-fitting connection is achieved. In the longitudinal direction L, this form-fitting connection is realised in the shown embodiment by inserts 11, which are arranged between the clamping jaws 19 and the connection portion 6 of the lifter rod 8. In Fig. 5 it is visible, that the inserts 11 are retained in the longitudinal direction L again form-fittingly on the clamping jaws 19. The inserts 11 have at their side, facing the connection portion 6 of the lifter rod 8, a serration 9, which interacts with a corresponding counter serration of the connection portion 6. By means of the serration 9, a connection, based mainly on the form-fitting connection of the components, is achieved. The inserts 11 have the advantage, that they are exchangeable, whereby lifter rods 8 with different formations of the connection portions 6 can be used, such, that inserts 11, congruently formed, are made available. Furthermore, the inserts 11 can be more easily exchanged, when the serration is damaged by excessive application of force.

Referring to Figures 6 to 8, the attachment of the support bar 5 in the mower is described in detail. Fig. 6 shows a detail of Fig. 2, designated with G, in a side view. Fig. 7 shows the detail of Fig. 6 in a view from above. The support bar 5 has in the shown embodiment, which corresponds to the crop lifter shown in Fig. 1, a recess 3 for attachment on the mower (not shown), wherein the recess 3 is formed as an elongated hole extending in the working direction R. According to a preferred embodiment it is provided, that the recess 3 is open towards the rear end 1 of the support bar 5, when seen in working direction R. In Fig. 8 a sectional view along the line H-H of Fig. 7 is shown enlarged. Around the recess 3, a bolting face 17 is worked into the upper face 14 of the support bar 5 such, that the planes, defined by the bolting face 17 and the upper face 14, enclose an acute angle A, the angular dimension of which is 1.5 degrees in the shown embodiment.

In Fig. 9, the sickle bar 31 is visible in schematical representation, from which a mowing finger 32 is projectingly shown. This is retained via a screw 33 on the sickle bar 31. Into the drawing plane or out off the same, several further mowing fingers 32 are assigned to the sickle bar 31 with distance to each other. The mowing fingers 32 serve for guiding a cutter bar 34, which has cutting blades for cutting the crops. The shown crop lifter 30 corresponds to the State of the Art. On such a mower the crop lifter according to the invention is attached. The rear end 1 of the support bar 5 is, for example, retainable by means of a screw 33 on the sickle bar 31. The support bar 5 is, preferably, made from a sheet material and has bending elastic properties. The support bar 5 is supported via attachment means in form of the receptacle 21 on the mowing finger 32. The receptacle 31 is, for example, connected by means of rivets to the support bar 5.

In Fig. 10, an alternative embodiment to the support bar 5 is shown perspectively to the crop lifter shown in Fig. 1. For the attachment, the support bar 5 has a recess 3 in form of a circular bore, which is less cumbersome to manufacture compared to the elongated hole or the elongated hole open towards the rear end as in Figures 6 to 8.

Referring to Figs. 11 to 13 again, the attachment of the support bar 5 on the mower is described in detail. Fig. 11 shows a detail of the support bar 5 of Fig. 10 in a side view. Fig. 12 shows the detail of Fig. 11 in a top view. The support bar 5 has in the shown embodiment, which corresponds to the crop lifter shown in Fig. 10, a recess 3 for the attachment on the mower (not shown here), wherein the recess 3 is formed as a circular bore. In Fig. 13 a sectional view along the line H-H of Fig. 12 is shown enlarged. Around the recess 3, a bolting face 17 is worked into the upper face 14 of the support bar 5 such, that the planes, defined by the bolting face 17 and the upper face 14, enclose an acute angle A, the angular dimension of which is, preferably, approximately 1.5 degrees.

In Fig. 14, a further embodiment of the crop lifter according to the invention is shown. For adaptation to different types of crops, the carrier 7 can rotatably be adjustable around a rotational axis. According to the invention it is provided, that the lifter rod 8

is connectable at a multitude of positions, distanced in its longitudinal direction L, to the carrier 7. For this purpose, the carrier 7 and the connection portion 6 interact, the connection portion also indicating the maximal adjustment range. According to a preferred embodiment, the lifter rod 8 is connectable form-fittingly to the carrier 7. For this purpose, the connection portion 6 has a formation, which meets with a complementary equivalence on the carrier 7, so that the formations can correspondingly engage each other and form such a form-fitting connection in the longitudinal direction L. A serration is generally selected as formation. By means of the form-fitting connection a stable connection between the carrier 7 and the lifter rod 8 is already established advantageously at lower tightening forces on the carrier 7.

The head portion 10 of the lifter rod 8 is guided for specific crops, as for example for the harvest of beans, extremely low above the ground surface and may, in this case, even shortly penetrate the ground. When the head portion 10 for example collides with stones in the ground, the lifter rod 8 is elastically deformed and returns essentially to its original shape. For facilitating the elastic deformability of the head portion 10, the lifter rod 8 according to the invention has a through opening 2, which extends transversally to the longitudinal direction through the lifter rod 8. The through opening 2 extends in longitudinal direction L between the front end 4 of the lifter rod 8 and the connection portion 6, especially in a transition portion between the head portion 10 and the connection portion 6. As in the connection portion 6, the carrier 7 holds the lifter rod 8, it is desirable that the connection portion 6 is not deformed, as otherwise the form-fitting connection to the carrier 7 could be detached, which may lead to a loss of the lifter rod 8 during the harvesting operation. The through opening 2 represents a weakening of the lifter rod 8 in the transition portion between the head portion 10 and the connection portion 6, whereby it is advantageously achieved, that the head portion 10 is deflected to the side under a strong application of force, whereas the connection portion 6 is essentially not deformed. A force transmission from the head portion 10 to the connection portion 6 does practically not take place via the transition portion weakened by the through opening 2. Especially after the discontinuation of the load application, the head portion 10 is again elastically returned to its original position. The through opening 2 may, in this case, be formed continuously, which however is not mandatory. According to a preferred embodiment the through

opening 2 is closed by a web 16, the resistance of which to deforming is essentially lower than that of the head portion 10.

In connection with Fig. 15, the form-fitting connection between the lifter rod 8 and the carrier 7 is described in detail in the following and an essential difference of the shown embodiment to the crop lifter according to Figures 1 to 5 is described. Fig. 15 shows a sectional view along the line A-A of Fig. 14 in an enlarged representation. The sectional view shows the lifter rod 8, wherein the lifter rod 8 is clamped by two opposite acting clamping jaws 19 of a clamping jaws arrangement. The clamping jaws 19 have on their side facing the connection portion 6 of the lifter rod 8 a serration 9, which interacts with a corresponding counter serration of the connection portion 6. By means of the serration 9, a connection mainly based on a form-fitting connection of the components, is provided. Providing the serration 9 directly on the clamping jaw 19 has the advantage, that the use of components which can easily be lost, can be prevented.

In Figures 16 to 19, the clamping jaw 19 of the crop lifter according to Fig. 14 is shown in four different views, which are described together. The serration 9 has a row of teeth on the inside of a half shell-like receptacle for the connection portion of the lifter rod 8 (not shown). The recesses 18 and 20 of the clamping jaws 19 differentiate these from those clamping jaws shown in Figures 1 to 5 and 10. The clamping jaw 19 shown in Figures 16 to 19 is provided as a right-hand clamping jaw, when seen in the working direction R, the clamping jaw 19 being attached on the carrier 7 by means of a bolt 23 and a nut 25 (see Figures 20 and 21) with the first recess 20. A tightening of the two clamping jaws 19 against each other does not take place. Rather, the second recess 18 of the clamping jaw 19 enables an undisturbed access to the screw connection of the respectively other clamping jaw, as described in detail in the following in connection with Figures 20 and 21. The formation 22 around the first recess 20 serves for a form-fitting accommodation of a bolt head 23' in rotational direction, which is generally formed square or hexagon-like, to simplify the tightening and loosening of a counter nut 25.

Figures 20 and 21 show the crop lifter of Fig. 14 according to the invention in two perspective views. In Fig. 20, the left side, when seen in working direction R, is visible and in Fig. 21 the right side is visible, when seen in working direction R. The left clamping jaw 19, visible in Fig. 20, has also the second recess 18 with larger diameter than the first recess 20. Within the second recess 18, the bolt 23, attaching the left clamping jaw 19, is visible, which is secured by the nut 25. A detaching of the nut 25 and thus, a detaching of the right clamping jaw 19 is possible, without having to detach the left clamping jaw 19. This rather retains the pre-adjusted angle of the lifter rod 8, such that the relative position of the left clamping jaw 19 to the carrier 7 remains unchanged, while the lifter rod 8 is exchanged, for example because of a defect. The left clamping jaw 19 is also attached by means of a bolt 24 through the first recess 20 on the carrier, wherein in Fig. 20 only the bolt head 24' is visible, which is form-fittingly accommodated in the hexagon-like formation 22 of the clamping jaw 19. In Fig. 21 it is visible, that the bolt 24 is secured by a nut 26. The second recess 18 of the right clamping jaw 19 enables visibly also a detaching of the left clamping jaw 19, while the right clamping jaw remains attached on the carrier 7. Also the bolt head 23' is form-fittingly accommodated in the hexagon-like formation 22 of the right clamping jaw 19, to facilitate the detaching and tightening of the nut 25.

Reference numerals list

1	rear end
2	through opening
3	recess
4	leading end
5	support bar
6	connection portion
7	carrier
8	lifter rod
9	serration
10	head portion
11	insert
12	end
14	upper face of the support bar
15	clamping jaws arrangement
16	web
17	bolting face
18	second recess of the jaw
19	jaw
20	first recess of the jaw
21	receptacle
22	formation
23	bolt
23'	bolt head
24	bolt
24'	bolt head
25	nut
26	nut
30	crop lifter according to the State of the Art
31	sickle bar
32	mowing finger
33	screw
34	cutter bar

L longitudinal direction

R working direction

A angle

Claims

1. Crop lifter for a mower of a harvesting machine, comprising a support bar (5), attachable on the mowing device, wherein the support bar has a carrier (7), and wherein a lifter rod (8) is detachably retained in one of a plurality of positions on the carrier (7) by means of a clamping jaws arrangement (15) with two clamping jaws (19),

wherein at least one of the two clamping jaws (19) is detachable, while the other of the two clamping jaws (19) remains fixed on the carrier (7).

2. Crop lifter according to claim 1,
characterised in
that the clamping jaws (19) are respectively attached by a separate attachment means on the carrier.

3. Crop lifter according to one of claims 1 or 2,
characterised in
that the clamping jaws (19) have respectively one first recess (20) for fixingly accommodating a bolt (23, 24) and a second recess (18) as an access to a bolt of the respectively other clamping jaw (19).

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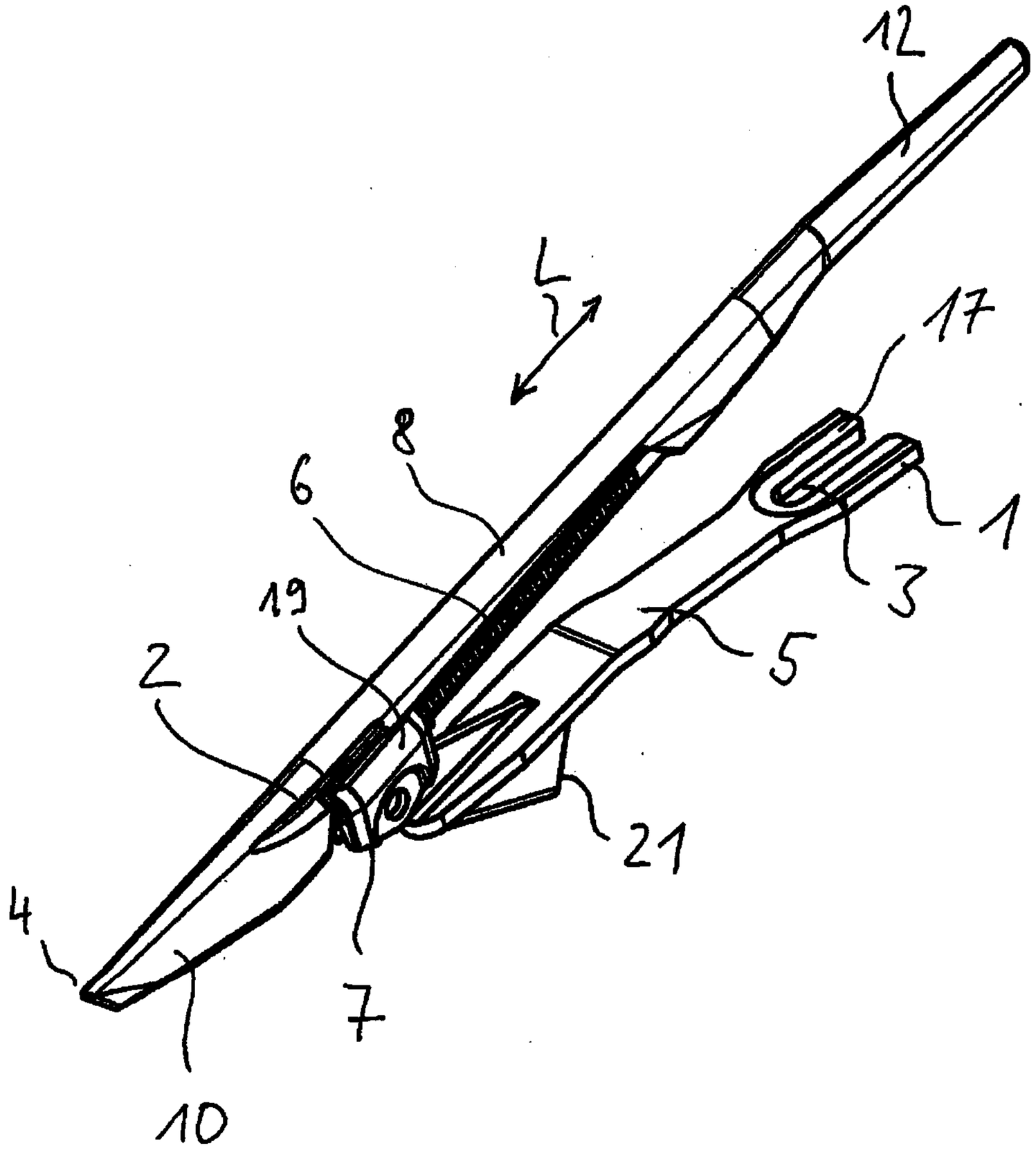

FIG. 1

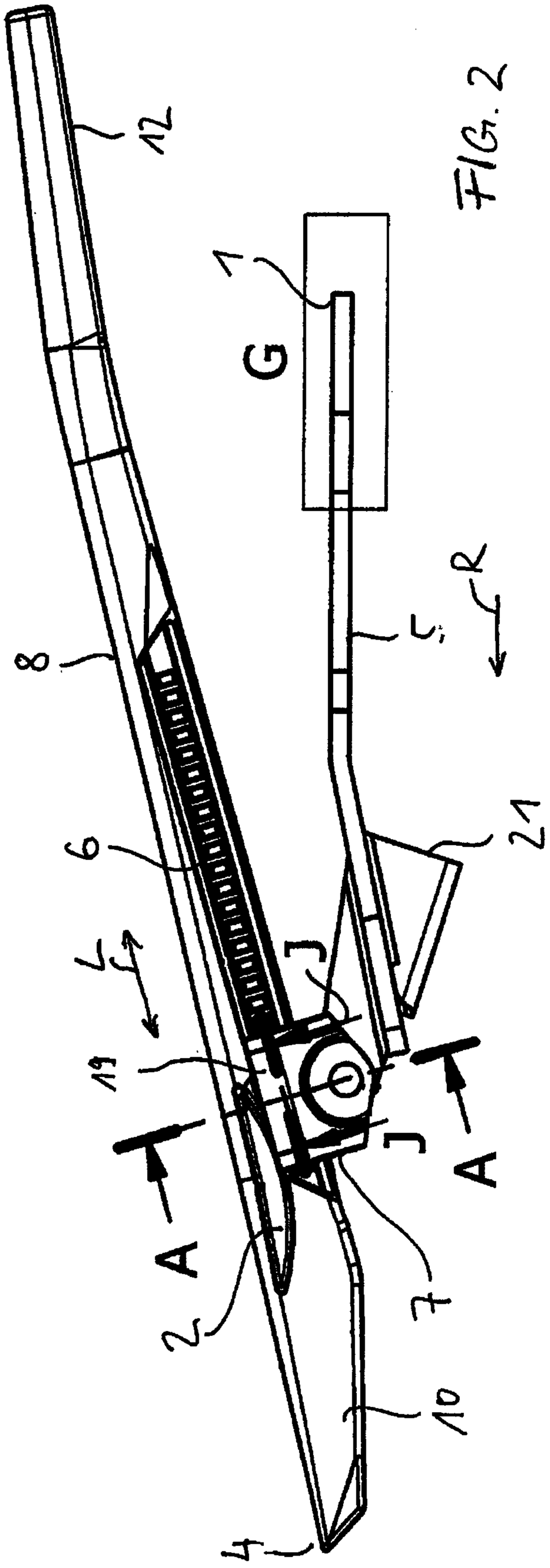

FIG. 2

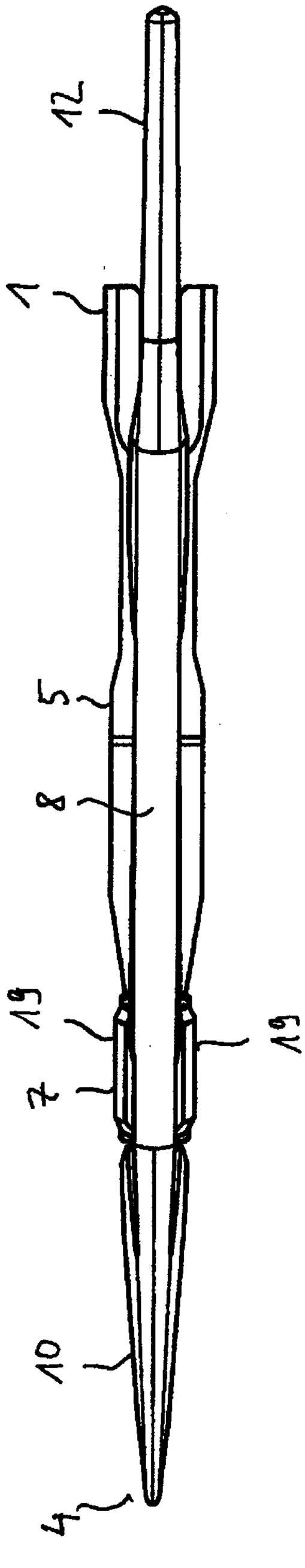

FIG. 3

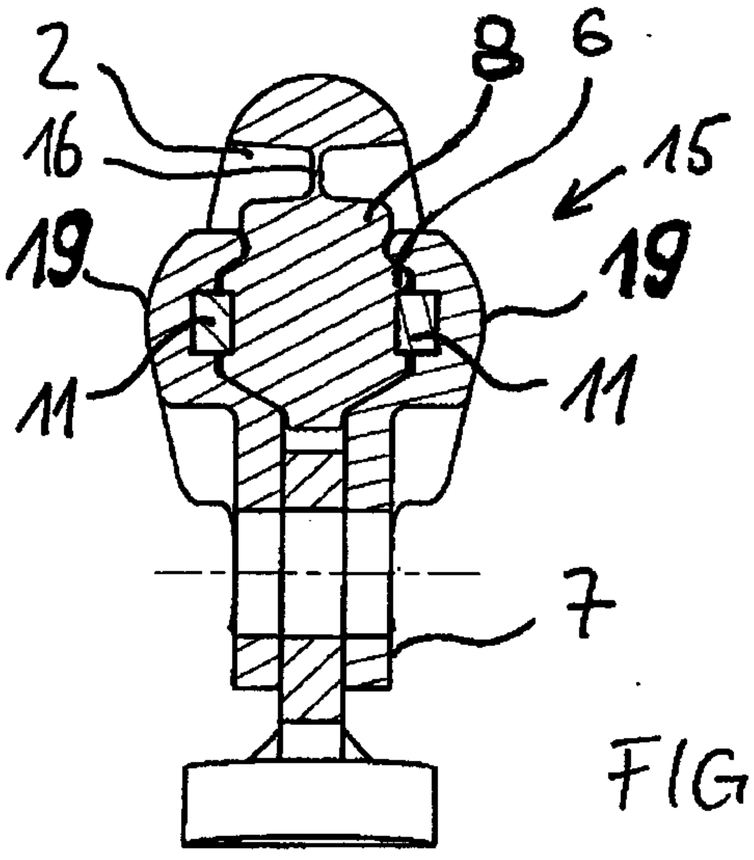

FIG. 4

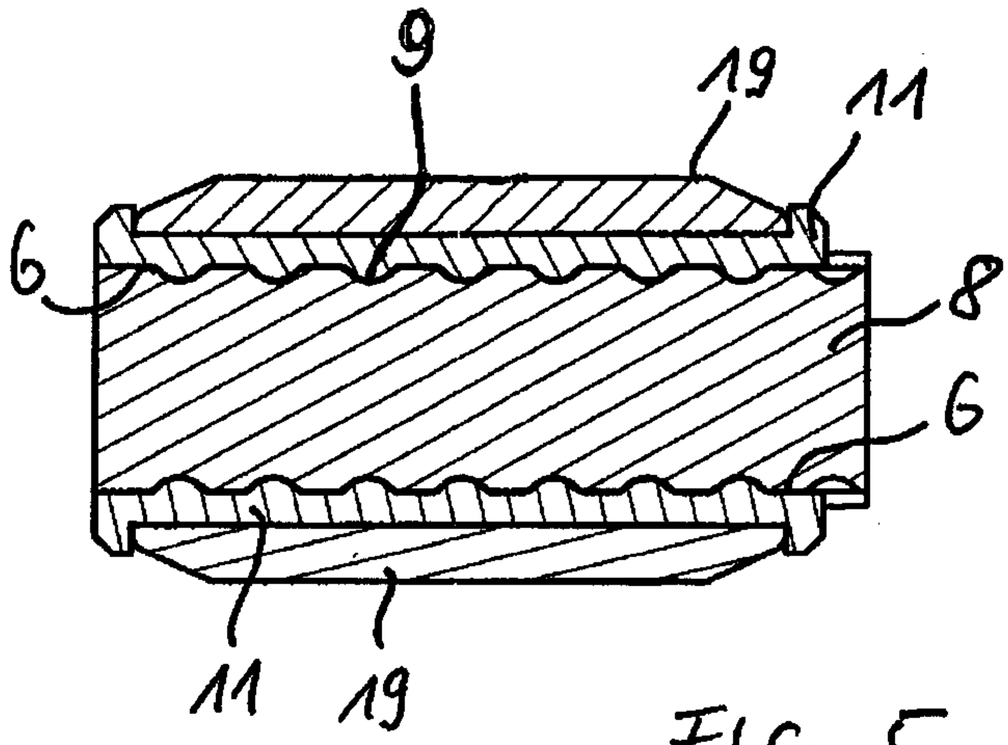

FIG. 5

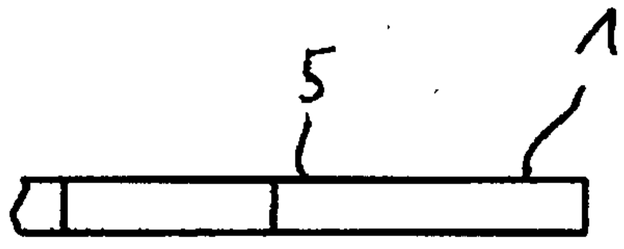

FIG. 6

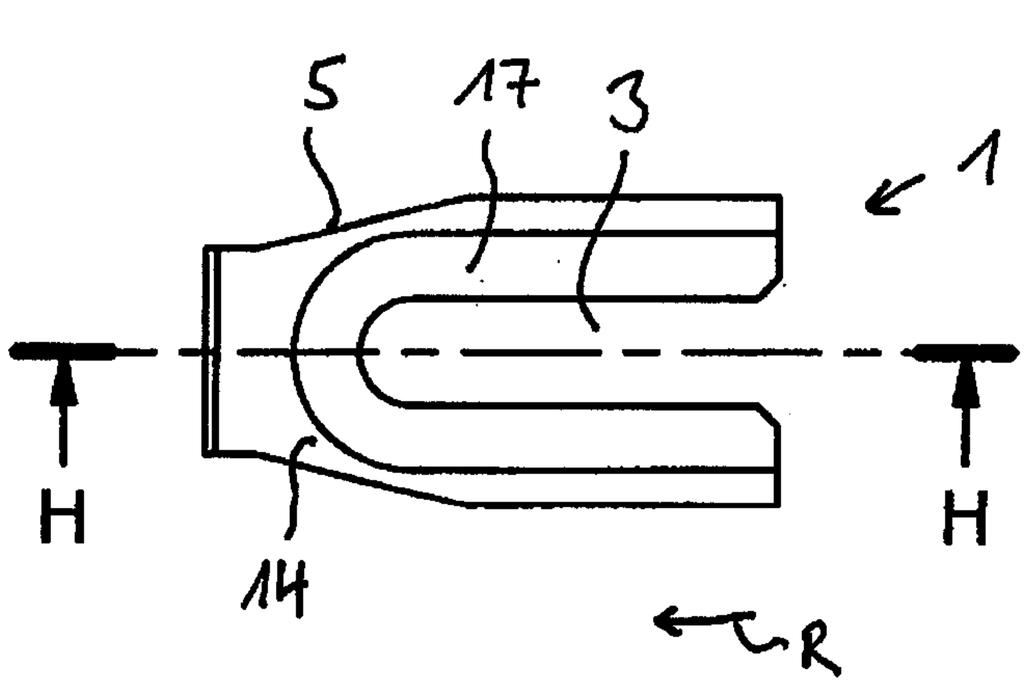

FIG. 7

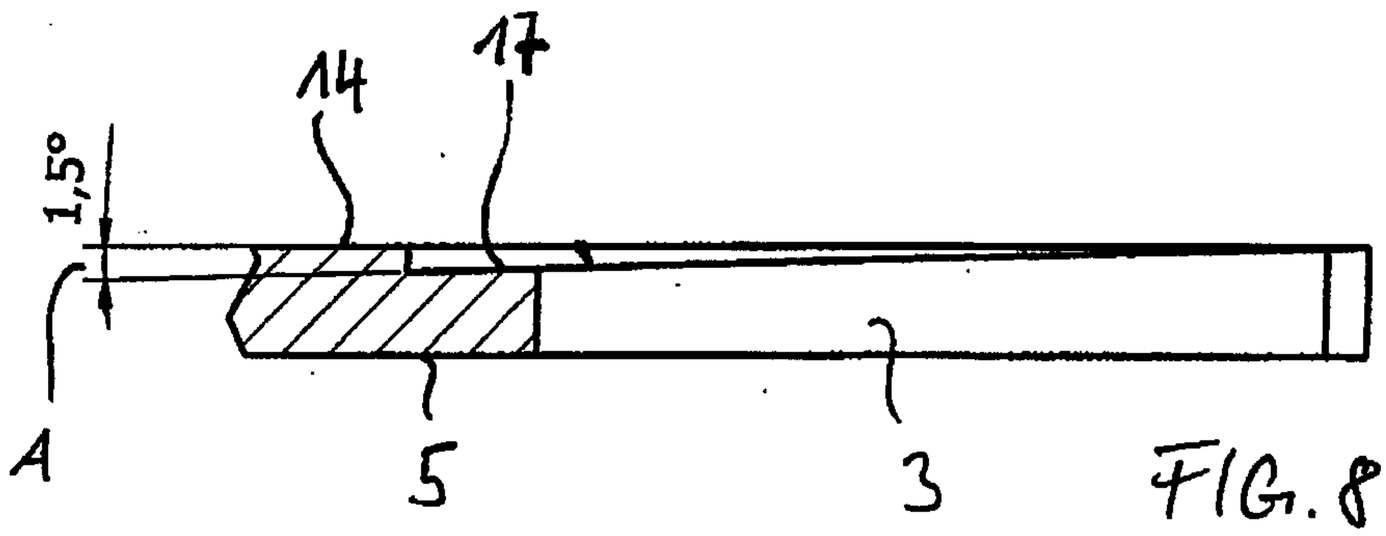

FIG. 8

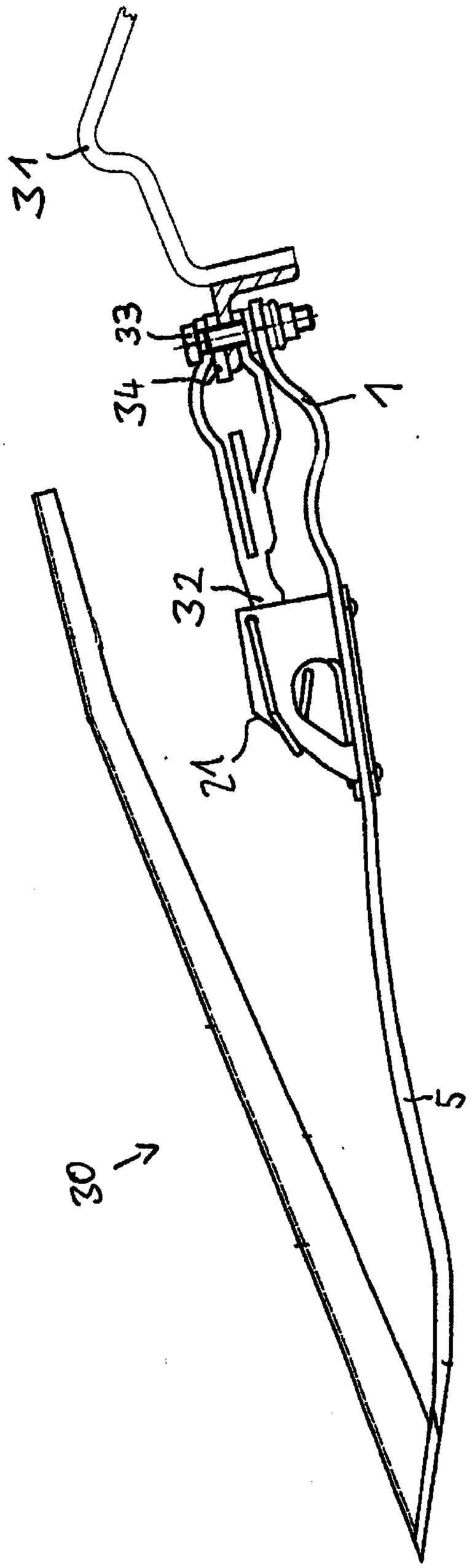

FIG. 9

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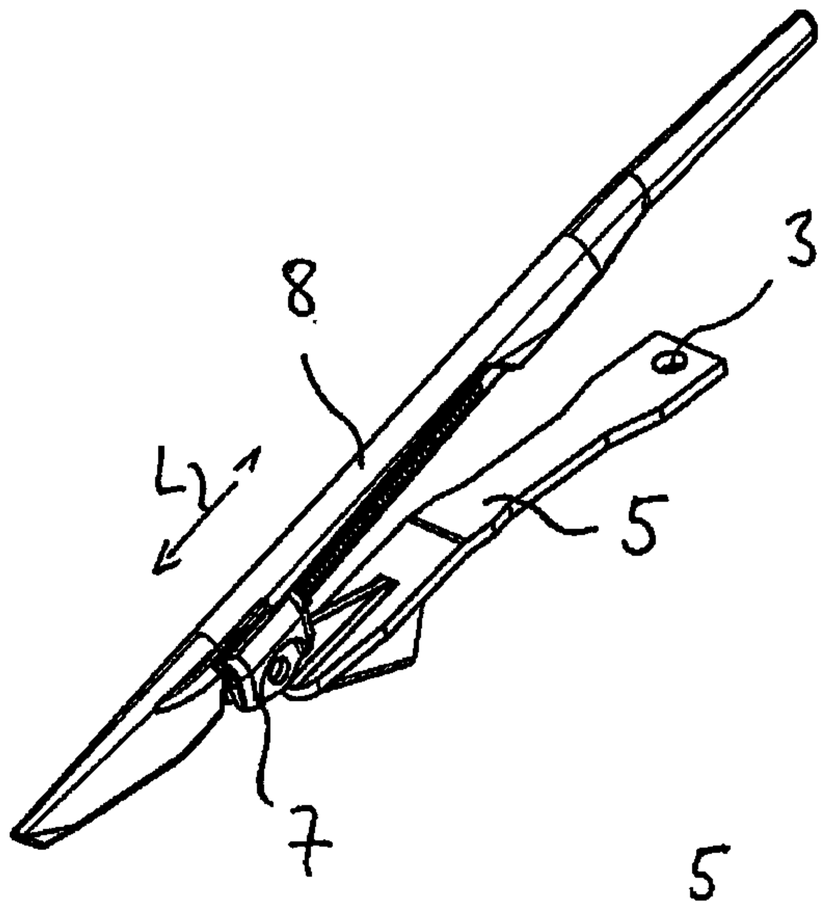


FIG. 10

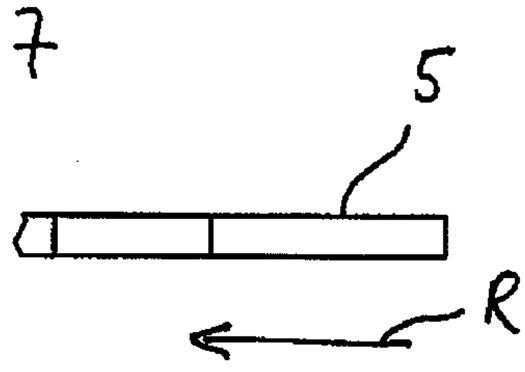


FIG. 11

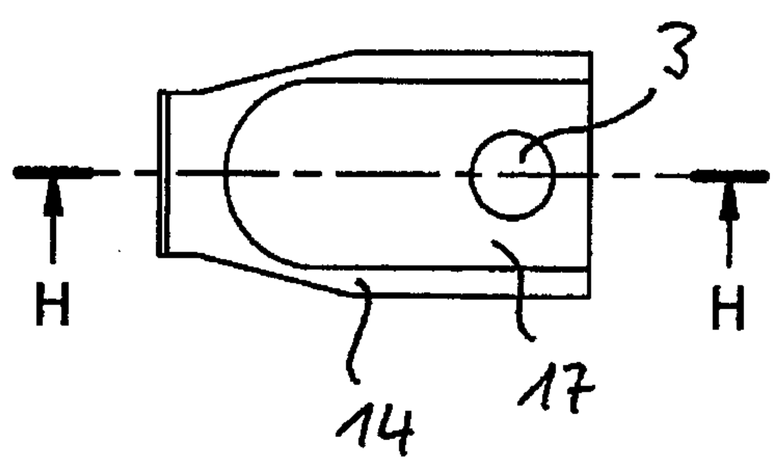


FIG. 12

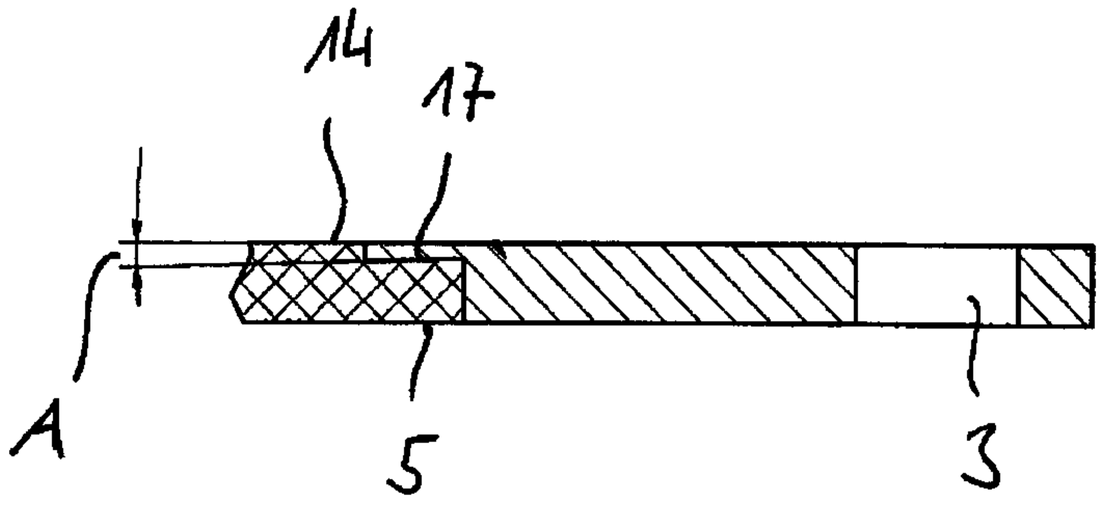


FIG. 13

FIG. 14

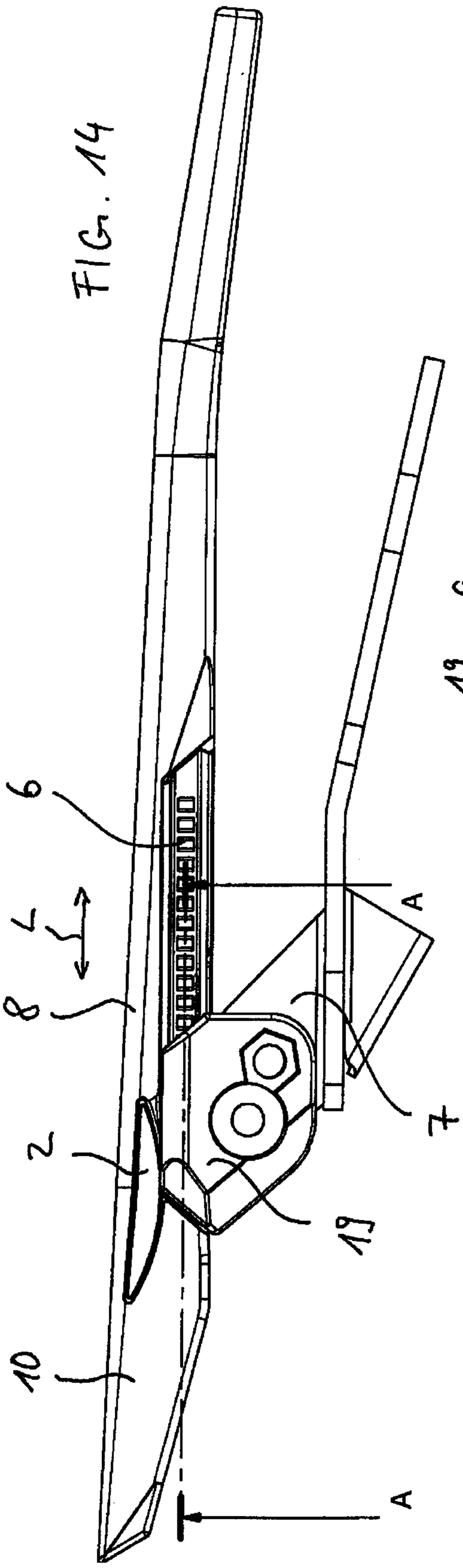
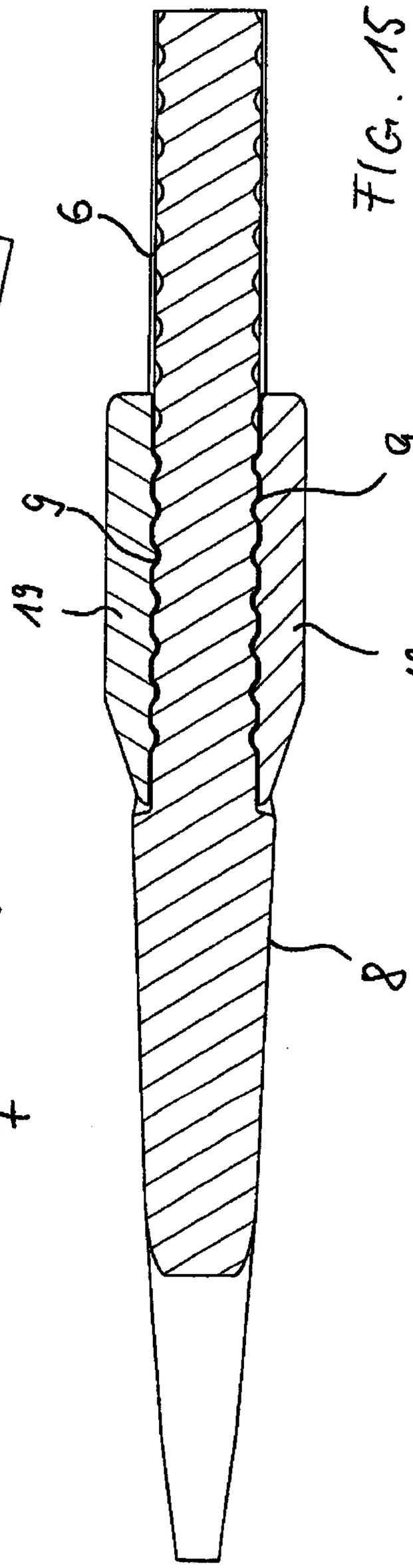


FIG. 15



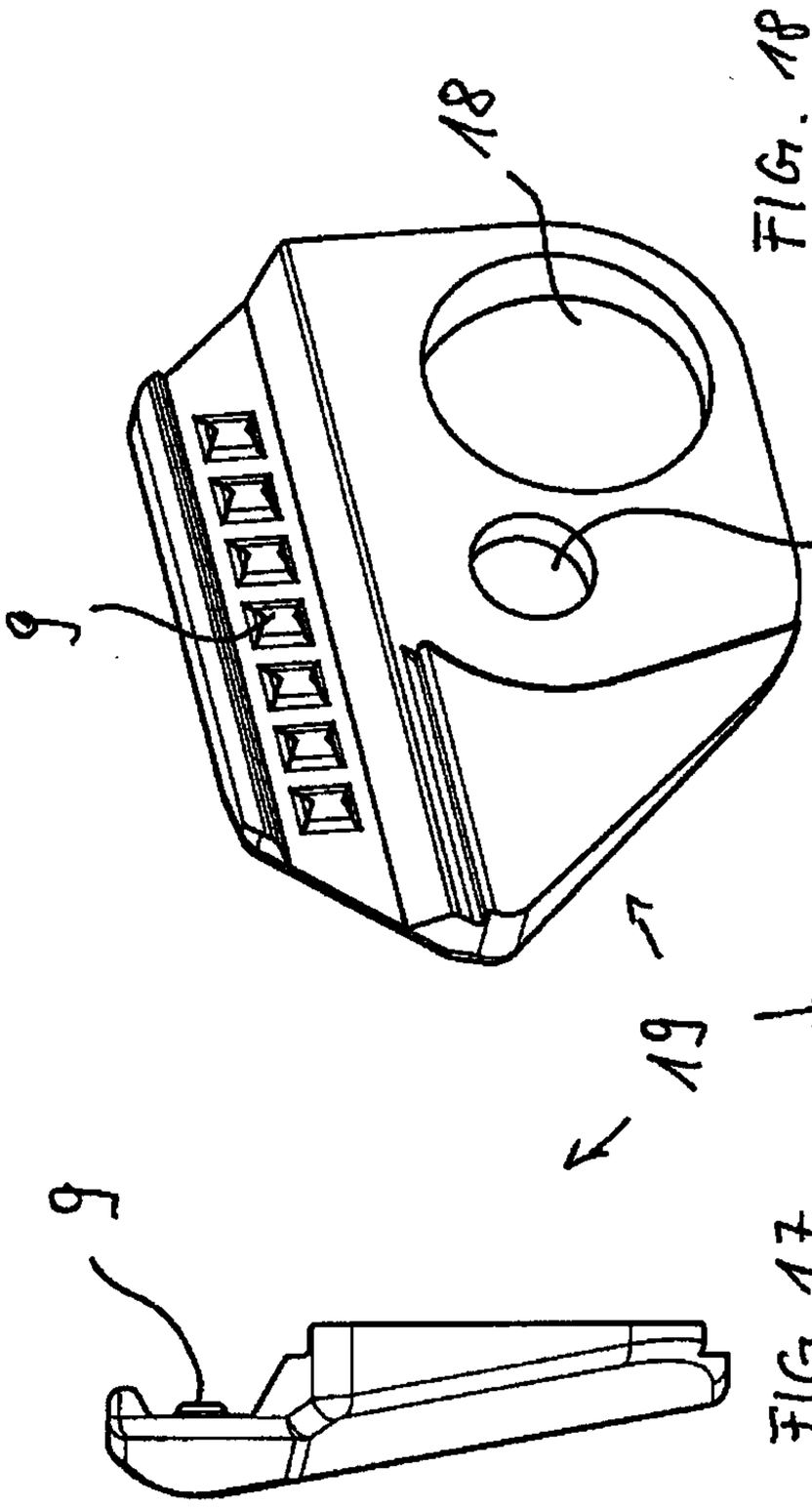


FIG. 18

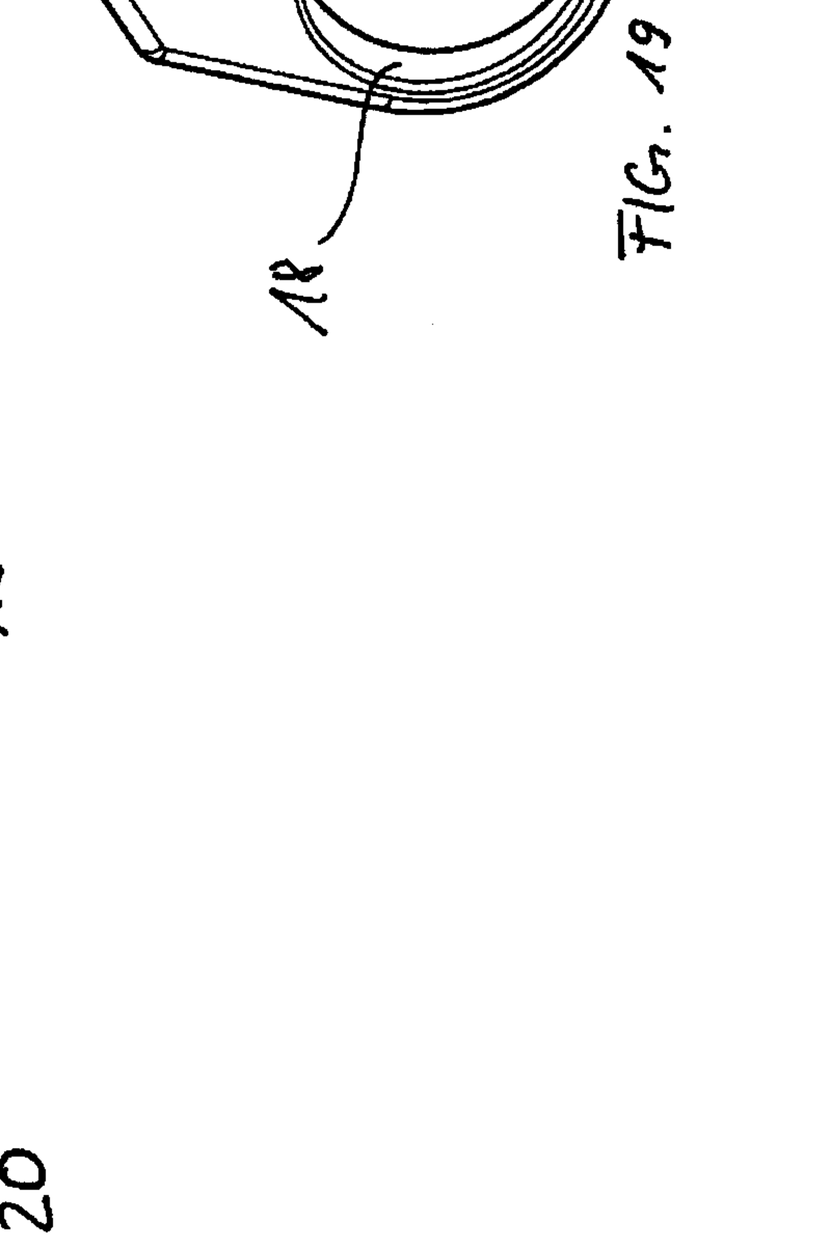


FIG. 19

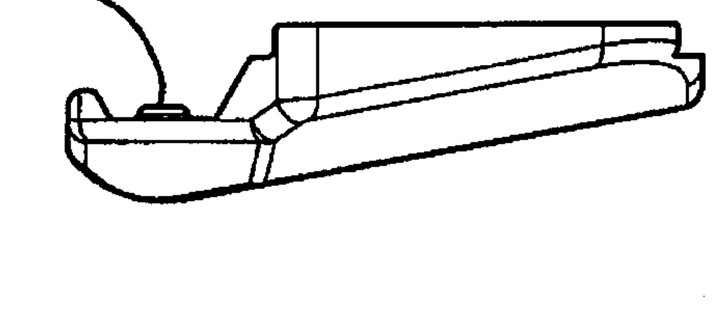


FIG. 17

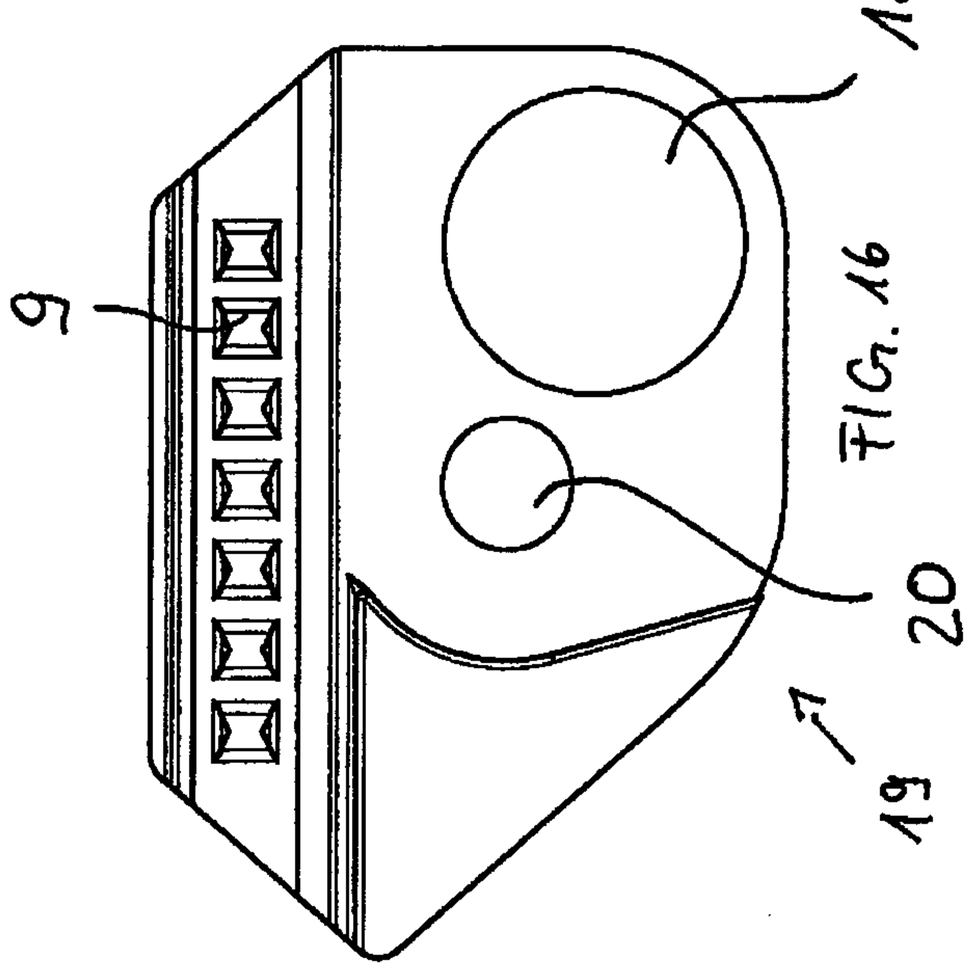


FIG. 16

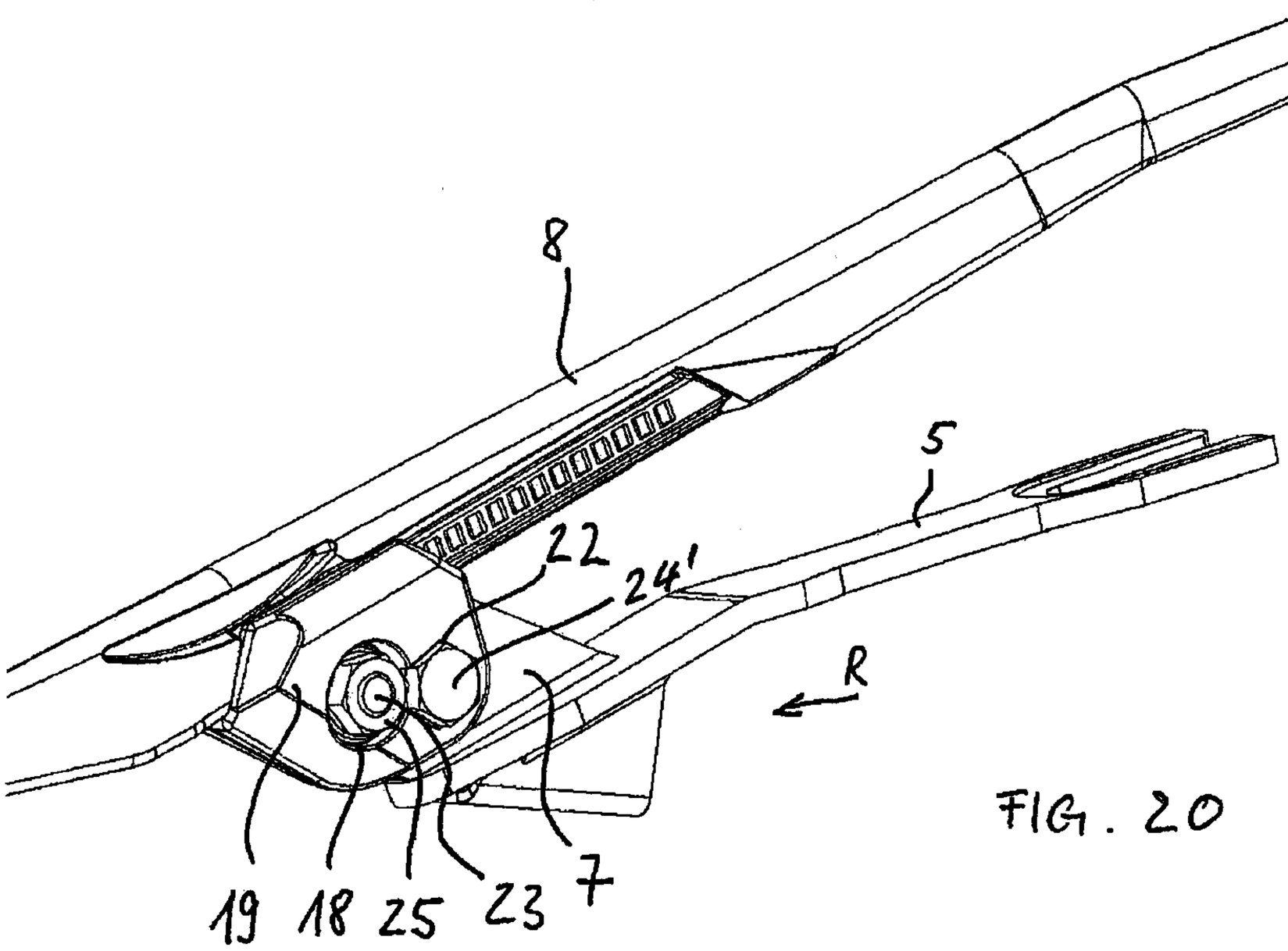


FIG. 20

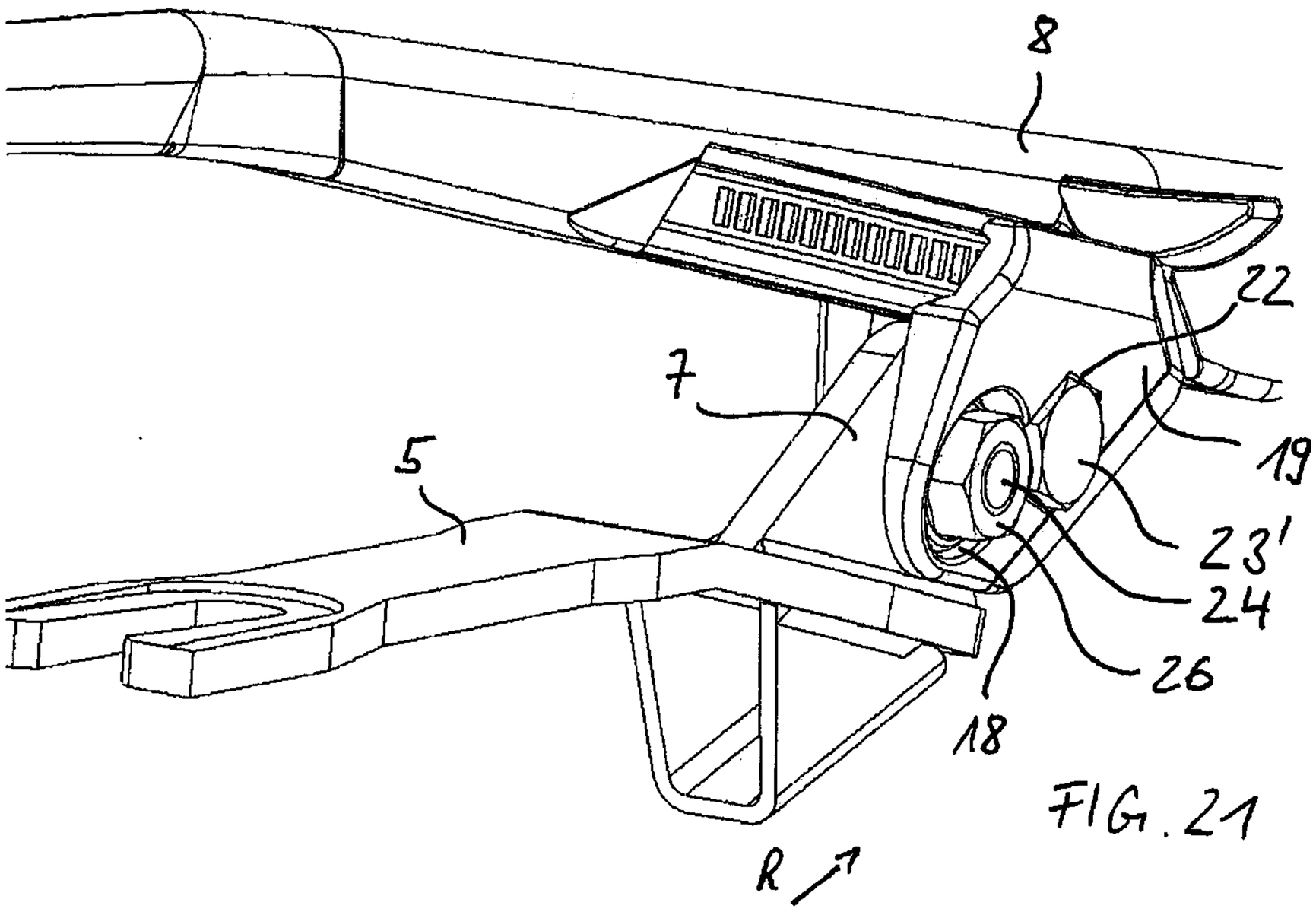
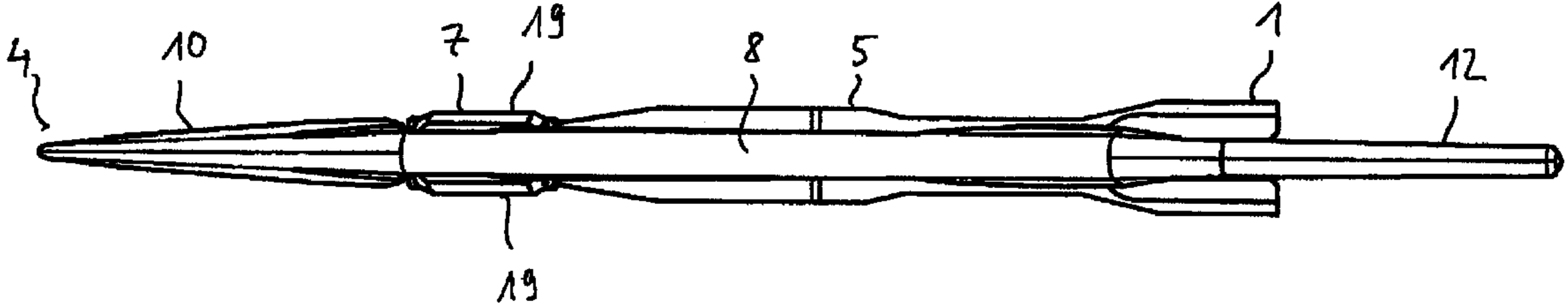


FIG. 21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