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(73) Patenthaver: **Doppstadt Familienholding GmbH, Steinbrink 4, 42555 Velbert, Tyskland**

(72) Opfinder: **BERGER, Horst, Bahnhofstrasse 19, 39240 Calbe, Tyskland**
DOPPSTADT, Johann, Voßnackerstraße 67, 42555 Velbert, Tyskland

(74) Fuldmægtig i Danmark: **Dennemeyer & Associates S.A, P.O. Box 700425, DE-81304 Munich, Tyskland**

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BEATER FOR COMMINUTING DEVICES

Description

The invention relates to a mallet, particularly for comminuting devices, having a rotor or at least one shaft, on or against which the mallet can be fastened.

Comminuting devices, which are equipped with at least one mallet, which are arranged on a rotor or on a rotating shaft in the comminuting device and which interact with a counterblade arranged in the device for comminuting the item to be comminuted, are known.

A problem with the maintenance of comminuting devices equipped with mallets is generally that the blades or the blade carriers wears out very quickly and thus at least the blades or else the blade carriers must be replaced at regular intervals. This changing of the blades is a time-consuming matter, which leads to extended stoppage times of the comminuting device. It is now known that blades can be rotatably arranged on blade carriers, in order to achieve a certain extension to the service life of the machine. It is also known to replace the blades together with the blade head or blade heads. However, this holds two risks, namely firstly that the blades can then no longer be placed in the rotors or on the shaft of the comminuting device, as the wear is already so far advanced that then the entire shaft or the entire rotor must still be replaced in order to provide an appropriately safely working machine again for the next comminuting process and secondly a conversion to blades for other cutting tasks is not possible without replacing the rotor or the shaft. The replacement of the entire rotor or individual blade carriers, which are arranged on the shaft or on the rotor, is very time-consuming.

In the prior art, a row of mallets is known, which can be placed on a shaft or on a rotor of a comminuting device. All the mentioned devices have in particular the disadvantage that the mallets each fastened to the shaft or on the rotor are only equipped for one specific comminuting task in each case. Due to the formation of the fastenings on the rotor or the shaft, these connecting means or connecting solutions of the fastening of the blade or blade head on a shaft are subjected to a high degree of wear, such that it frequently occurs that not just the blade or special blade carrier must be changed, but also the entire carrier, which is fastened to or on the rotor or shaft, which means that generally the rotor or the entire shaft must be dismantled.

DE 92 17 598 U1 relates to a comminuting disc for a comminuting roller of a comminuting

device, having a main body and having at least one ripper tooth protruding on the peripheral side from the main body.

DE 20 2005 009 859 U1 relates to a blade carrier for comminuting devices.

DE 20 2006 007 055 U1 relates to a mallet for a comminuting device having a rotor, on or to which the mallet can be fastened.

DE 20 2006 019 687 U1 relates to a mallet arrangement for comminuting materials.

US 6,364,227 B1 relates to a comminuting device and a means for insertion or fastening to a rotor.

Starting with this prior art, the object of the invention is to propose a mallet, in particular for comminuting devices, which no longer has the disadvantages known from the prior art.

The object of the invention is achieved by a mallet having the features of claim 1.

Through this embodiment of the mallet with main body and cutting head, a compact unit as it were results, which is characterized in that the connection between the main body and cutting head in particular is considerably improved compared with the solutions known from the prior art. The connection is namely arranged in a concealed or hidden manner in a compact structural unit of a mallet and is therefore no longer exposed to wear. The entire mallet body is thereby protected in the connecting region from wear and in the case of wear of the blades on the cutting head, trouble-free replacement of the cutting head is now a given. The concealed connection, that is located in the interior of the main body, between the main body and cutting head also guarantees an extremely safe connection, as due to the positive connection here a readjustment and centering of a new blade head on the main body is no longer required.

Through the measure according to the invention of the formation of the mallet in the form of a main body with cutting head and the connection according to the invention, namely such that a connecting lug provided on the cutting head engages in a positive-fitting manner in a recess arranged in the interior of the main body, eliminates all the problems known in the prior art relating to the wear on the main body or blade carrier in relation to the connection of these two components.

Therefore, the invention is characterized in that the main body and cutting head form when connected a structurally compact unit of a mallet. This structural and compact unit of a mallet is also advantageous as now the contacting surfaces for the wear are substantially concentrated on the outer parts of the cutting head and the main body is substantially less affected by or remains free from wear. It is thereby provided that the replacement cycle of the rotor or the shaft in the comminuting device can be considerably

extended. Thus a higher production time of the comminuting device is achieved and the downtimes due to maintenance works are reduced.

The connecting lug is engaged in the recess in a positive-fitting, self-centring and self-locking or self-securing manner. Through the embodiment of the connecting lug and the recess, not only a simple positive connection is provided, but it is also achieved that the cutting head, as well as a secure connection, centres simultaneously during insertion and then self-locks or self-secures. The connecting means provided for the connection between the blade carrier and the blade in the prior art are only necessary as additional protection in the solution according to the invention, as due to the structure and design of the connecting surfaces a self-centering and self-locking or self-securing connection occurs, which enables the mallet to work in the comminuting direction without a corresponding securing means, such as a screw for example, without the blade head separating from the main body. The mallet according to the invention now uses the securing means as additional protection, whereby the safety of the comminuting device in general is increased.

The connecting lug and the recess have a shape corresponding to one another and are designed to be self-holding. As well as the previously described self-centering and self-securing effect, the solution offers an additional increase in safety. The hooking can for example be relatively simply detached in case of repairs by a slight impact contrary to the direction of securing or hooking (in the cutting direction).

The recess is enclosed on four sides and has in particular lateral guiding webs. These lateral guiding webs offer a further advantageous effect, namely such that now the entire connecting means is actually arranged in a concealed manner in the main body and at the same time the cutting head is laterally guided with its connecting means upon insertion into the main body and thereby very securely placed in the desired position without a check here being required again. Even if a not 100% insertion seems to be not possible due to the corresponding lighting conditions in the case of repair. It is now easily possible, without visual detection, to securely insert and fix the cutting head into the recess due to the lateral guidance in conjunction with the recess and the corresponding, positive-fitting embodiment of the connection.

An advantageous embodiment of the mallet according to the invention is characterised in that the compact unit has a cuboid shape and the main body is at least partially open only on one side, in particular on the side provided in the fitting direction above or on the side connecting to the cutting head. It is thereby provided that the external engagement points of the material to be comminuted are kept relative small on the mallet, whereby the wear

is generally reduced and is concentrated in particular only on the blades located on the cutting head. The protection of the connecting means in the form of a connecting lug, which engages in the correspondingly formed part of the main body, is provided by the solution according to the invention.

However, the invention not only offers the advantageous protection of the connecting elements between the main body and the cutting head, but also offers a range of further advantages. In this way, it was found according to the invention that it is advantageous if the cutting head for example rests in its entire width on or against the main body. This is accomplished in that the cutting head has a positive connection and the contacting surfaces of the connecting lug in the main body or in the recess located there have a supporting effect at the same time, such that the cutting head is capable of safely converting the forces transmitted by the shaft or the rotor.

It has been further discovered that it is advantageous if the cutting head is formed to be at least partially insertable into the main body, in particular with the connecting lug. The advantages of these variations have already been described above. They occur in the case of replaceability of the cutting head in the main body in a similar manner as have been described already above.

The invention is characterised in one variation in that the recess is located in the front part of the main body, viewed from the cutting direction. This variation is therefore advantageous as a support function, which will be described later, can be provided on the main body.

A further aspect of the invention is disclosed in that the recess is arranged oriented in the direction of the longitudinal axis of the unit of the mallet. In production terms, this embodiment offers advantages during the intended use of the mallet such that the concealed arrangement of the connection between the cutting body and the main body is very conveniently solved, as well as the secure transmission of the comminuting forces from the rotor to the mallet.

The invention according to a variation is further characterized in that in the recess there are at least two supporting surfaces, which preferably are angled in a wedge shape or are conically running outward. Through this embodiment of the recess with supporting surfaces, it is naturally also required that the connecting lug is assigned accordingly to the surfaces and it is possible thereby to achieve a support of the cutting head in the main body, connected with a self-centering. The surfaces angled in a wedge shape or conically running outward are particularly suitable for such a self-centring or self-securing connection.

The angling or the conical course of the supporting surfaces can be provided both falling outwardly or inwardly. The invention here is not restricted to a specific embodiment. Both variations guarantee the same effect.

The invention is further characterised in that between two supporting surfaces a non-falling or non-angled region is provided. The previously described effects of the self-centering and self-securing are also thereby better achieved than they are possible through the embodiment with supporting surfaces.

An advantageous variation of the invention is characterized in that the supporting surfaces extend over the upper edge of the recess in fitting position and, with a part of the main body, form a fastening and/or supporting body. With the upper edge of the recess, the side is meant, on which the cutting body is able to engage with its connecting lug. In the normal installation position, the upper edge is therefore substantially located in the horizontal extension, such that the cutting body is capable of engaging there accordingly. In this case, the fastening and/or supporting body offers the opportunity to use the solidly designed main body for a support of the cutting head and to achieve in the connection of the two components of the mallet according to the invention the desired compact structural unit and yet still maintain a sufficient support and therefore reliable transmission of the forces onto the cutting head. Furthermore, the embodiment of a fastening and/or supporting body on the main body offers the opportunity to secure the cutting head in the installation position by means of a fixing device or a securing device in the form of a screw. This securing occurs only so to speak as additional security and is actually not necessary due to the embodiment of the connection between the cutting head and the main body. In a variation of the invention, it is therefore further provided to form supporting surfaces on the supporting body, which are in particular angled in a wedge-like manner with respect to the cutting direction. It goes without saying that correspondingly arranged and designed surfaces exist on the cutting head, which then interact with one another when assembling the two components of the mallet according to the invention.

In the supporting body, as previously mentioned, a borehole is provided, which serves for receiving a fixing means such as for example a screw.

The mallet is further characterised in that the recess, viewed laterally in cross-section, has a J-shape. The connecting lug on the cutting head naturally has the same corresponding J-shape. The embodiment of this connection in the form of a J has the advantage that the front peak of the angled part of the J of the connecting lug rests accordingly in or engages or hooks into the J of the recess. The previously already

mentioned self-securing or self-hooking embodiment of the connection in particular is thereby achieved. It is self-evident that all compatible surfaces must be designed to be correspondingly compatible in order to maintain the effect according to the invention.

Furthermore, it is advantageous if the front edge, in the cutting direction, of the recess is formed as a nose when viewed in the intersection or as a cylinder when viewed in the cross-section. This embodiment also serves for the secure support of the cutting body with its connecting lug in the main body and furthermore the self-securing or self-hooking embodiment of the connection of the main body and cutting head.

The embodiment of the recess with laterally supporting and guidance guiding webs has already been described. According to a further variation of the invention, it is provided that these lateral guiding webs are designed as contact surfaces facing upwardly in the direction of installation. The designed support of the cutting head is thereby achieved in the entire width on the main body in a skilful variation.

These lateral guiding webs or their contact surfaces have according to the invention two extensions running laterally next to the supporting body, said extensions preferably running at an angle, particularly ascending, compared to the contact surfaces. Through this embodiment, a further positive connection and particularly a very favourable support of the cutting head on the main body is achieved.

The contact surfaces are designed to be flat or level according to a variation of the invention or else designed as a straight line when viewed from the side. Another variation proposes that the contact surfaces are designed to be arched when viewed from the side, they can thereby be formed concavely or convexly. With respect to the extensions, an arched or concavely or convexly formed embodiment offers the advantage that a favourable positive connection can also be maintained on these lateral surfaces, if the contact surfaces are designed for example to be arched when viewed from the side and the extensions run in a straight line. In production terms, both variations are possible. It is thereby advantageous if both the contact surfaces and the extensions are designed as a straight line, but run in a non-angled manner in respect to one another.

The invention proposes a further development such that in the cutting head a further borehole that interacts with the borehole of the supporting body is arranged, which serves to receive a fixing and/or fastening means fixing the cutting head. As the fixing and/or fastening means, a machine screw is preferably provided and a machine screw having a nut with self-locking thread is particularly preferably provided.

It is also advantageous if the mallet according to the invention is characterized in that on the cutting head counter-contact surfaces are provided which are designed or formed in

a manner corresponding to the contact surfaces of the main body. These then rest on the contact surfaces of the main body and offer the advantage of compact embodiment of the mallet in the form of a compact structural unit in its outside appearance. The detaching of the cutting head from the main body is advantaged by the embodiment of these counter-contact surfaces formed in a manner that corresponds to one another. As previously mentioned, this is achieved by a slight impact in the cutting direction or contrary to the locking direction, after the locking screws have been removed. The cutting head can then be removed without problems from the main body and replaced by a cutting head with non-worn blades.

It is naturally also possible, e.g. when converting the comminuting device to a different cutting task, that all cutting heads are replaced by otherwise designed cutting heads. In this way, it is for example possible without problems to use so-called eucalyptus mallets, which are generally provided with two cutting blades, which are arranged laterally to the webs of the cutting head, or else to insert cutting heads with a continuously designed blade, which is naturally supported along the entire width on the cutting body. Furthermore, it is possible to insert cutting heads provided with a plurality of blades, wherein the blades are also formed differently and also can be made from different materials, for example from hard metal or else from hardened steel. The invention therefore provides the advantage that without having to remove the entire rotor of the comminuting device or the entire shaft of the comminuting device the blades are replaced without problem and the newly inserted blade heads are securely fastened on the main body without this having to be dismantled from the rotor or the shaft.

The invention is characterized in an advantageous embodiment in that the main body and/or cutting head have been at least partially obtained as a forged punched part. Thus, it is possible in the forging or punching procedure to manufacture the largest part of the components of the mallet according to the invention. In particular, it is also possible to manufacture the recess and the connecting lug accordingly. The invention is also characterized in that on the cutting head, as already mentioned, at least one blade is provided.

However, the invention is not restricted to just one blade, in fact according to the invention, as already mentioned, is possible without problem to provide a wide range of blades on the cutting head, and then to provide different cutting heads in order to be able to react to different comminuting tasks. In doing so, it is indeed possible to provide one blade consistently on the cutting head or else a plurality of blades or else to design the cutting head such that for example only two blades are provided laterally on the left and

right to execute the cutting procedure.

It is further advantageous if the mallet, as described above, is characterized in that the blade has on the edges and/or sides facing in the cutting direction at least hardened regions. In doing so, it is possible to provide only partially hardened regions or also to correspondingly harden the entire cutting blade region. The blade or the hardened region or regions are for example obtained by means of welding or hardfacing.

According to a variation of the invention, it is provided that a fixation opening is provided on the main body, which preferably is provided on the side of the main body facing away from the cutting direction and which extends at least to the through bore in the main body and serves to receive a mallet fixating means. The mallet fixating means can for example be disclosed in the form of a screw, a fixing screw, a wedge or the like.

It is also provided according to the invention when a sleeve is positionable in the through bore, said sleeve serving as a clamping sleeve for fastening the mallet to or on the rotor or on the shaft of the comminuting device. The clamping sleeve can also be fixed by means of the previously described fixing means through the fixation opening.

To ensure the compactness of the mallet, it is provided that the connecting lug provided on the cutting head, as previously described, has an external form or contour corresponding to the interior of the recess. In this way, it is provided for example according to a further embodiment that the connecting lug is designed in the shape of a J when viewed from the side. It is also naturally possible to provide on the connecting lug counter-supporting surfaces designed to correspond with the supporting surfaces of the main body. Furthermore, the invention proposes to provide on the cutting head counter-supporting surfaces designed and arranged to correspond with the supporting surfaces of the supporting body. This embodiment has also already been described in detail above.

The embodiment of the blades on the mallet according to the invention is not in the least restricted according to the invention. Thus, it is for example possible to form the blade from hard metal. It is also naturally possible to form the blade as a cutting plate and to equip the cutting plate accordingly.

Therefore, according to a further variation of the invention, it is provided to provide on the cutting plate guide surfaces, which taper the cutting plate to the side facing away from the cutting direction, such that a guidance of the goods to be comminuted occurs by the cutting plate itself.

The invention also proposes that in the direction of installation beneath the blade or blades at least one impact plate is provided. The impact plate helps as well as to reduce wear the comminuting process in general.

According to an embodiment of the invention, it is provided that the cutting head has two blades, which are arranged on parallelly formed cutting head sections. This embodiment is particularly advantageous for comminuting tasks, which are to comminute softer material. Such mallets with the above described cutting heads are also used as so-called eucalyptus mallets.

According to a further embodiment of the invention, it is provided that the blade or blades is/are formed in a wedge-like manner or in a V-shaped manner. In doing so, the V-shape is to be understand favourably such that the blades run in a wedge-like manner contrary to the cutting direction. It is naturally also possible to provide the wedge shape of the blade in the cutting direction in order to obtain an improvement of the cutting effect.

The invention is also characterized by an embodiment, in that the blade is formed in one piece and the width of the cutting head corresponds overall. According to the invention, the cutting head is rounded and/or angled contrary to the cutting direction. Thus, a so-called free cut is achieved without problem and no material accumulation occurs during the cutting process.

The invention also proposes a mallet having a cutting head, which has a so-called cutting attachment viewed from the cutting direction, which carries the blade or blades. When viewed from the side, the cutting head is formed as a tongue shape so to speak. The cutting attachment carries on its front end (in the cutting direction) the blade or blades. This cutting head is also intended for special comminuting tasks and is universally available and insertable.

The invention also relates to a comminuting device having at least one mallet according to one of the previously described embodiments.

However, the invention also provides a comminuting system, which is suitable particularly for the above described comminuting devices with rotor or shaft, consisting of a main body and a plurality of cutting heads as described above. It is now possible for a comminuting device of the type in question to hold different mallets, without having to maintain the entire material costs of an entire mallet. Instead, it suffices to provide the main body present on the comminuting device with different cutting heads, equipped according to the features of the invention. Now, the different cutting heads can be provided for the wide range of comminuting tasks, for example the comminuting of waste or else the comminuting of wood of different hardnesses, and these can be replaced accordingly as required. Not yet worn cutting heads with their corresponding blades can also be stored for upcoming comminuting tasks and must not be scrapped immediately. Thus, it is characterized in that the comminuting system is also characterized in that the

cutting heads have differently formed blades or cutting plates for a wide range of comminuting tasks. Main bodies can be provided with different diameters of the through bore, such that different comminuting devices can also be operated, which have different shafts or rotor diameters.

The comminuting system as described above is characterized in that the blades and/or cutting plates are provided with different cutting angles for different comminuting tasks. Thus, according to a further variation, it is provided that the blades and/or cutting plates are formed to taper, particularly running in a wedge shape, contrary to the cutting direction.

The invention will be described further below on the basis of exemplary embodiments.

In the drawings:

Fig. 1a shows an exploded view of an embodiment of the mallet according to the invention;

Fig. 1b to 1c show a three-dimensional representation of the embodiment according to Fig. 1a; Fig. 2a to 2c show further embodiments according to the invention with a modified cutting head;

Fig. 3a to 3c show variations of the mallet according to the invention with a one-piece blade on the mallet head;

Fig. 4a to 4b show the main body in a three-dimensional representation according to the invention;

Fig. 5a to 5c show different views of an embodiment of a cutting head according to the invention;

Fig. 6a to 6c show further variations of a cutting head according to the invention;

Fig. 7a to 7c show an embodiment of a cutting head according to the invention having two blades;

Fig. 8a to 8c show a one-piece embodiment of the blade on a cutting head according to the invention;

Fig. 9a

to 9c show a cutting head with a wedge-shaped blade;

Fig. 10a

to 15b show further embodiments of cutting heads according to the invention;

Fig. 16a

to 16b show an embodiment of a variation of a main body according to the invention;

Fig. 17

to 18b show cutting heads in further exemplary embodiments and

Fig. 19a

to 20c show further embodiments of the cutting head and main body according to the invention.

Fig. 1 shows an exploded view of an embodiment of the mallet according to the invention. The cutting head 3 is thus shown in a position separated from the main body 2. On the cutting head 3, cutting head sections 31 and 32 are located, which each carry a blade 11. The connecting lug 5 is designed for positive-fitting engagement in the recess 4 of the main body 2 and, as can be seen, through the merging of the main body 2 and the recess 4 a positive-locking connection is created between the main body 2 and the cutting head 3. The connection is thus designed to be both self-centring and self-fixing or self-hooking. This results from the J-shape, which both the connecting lug 5 and the interior of the recess 4 have. On the cutting body 3, impact plates 13 are located below the blades 11, said impact plates reducing the wear on the cutting head sections or on the cutting head itself. With the reference numeral 8/4, a bore in the cutting head 3 is indicated, which interacts with a borehole 8/3 on the main body 2 such that a fixing device 10 can be guided through this borehole in order to secure the cutting head additionally to the self-securing connecting measures. The borehole 8/4 is thereby designed such that it is able to completely receive the head of a machine screw in order to secure this against wear and particularly against loosening.

On the main body 2, the through bore A is provided, which is provided for fastening the main body to or on the rotor or a shaft provided on the rotor or a shaft in the comminuting device. In the through bore A, a sleeve 2/3 is inserted, which for example is formed as a clamping sleeve and which realises the fixation of the main body 2 to the rotor or to the not-shown shaft. In the recess 4, which is formed to be enclosed on four sides, supporting surfaces 7 are located, which are angled in a wedge shape towards the outside. Between two supporting surfaces 7, a non-angled region is located, which receives the reference numeral 70 in a later representation. To even better transfer and absorb the forces, which

are transferred from the main body 2 to the cutting head 3, a supporting body 8 is located on the main body 2 in the upper extension, which has supporting surfaces 8/1 and 8/2, on which then corresponding surfaces of the cutting body 3 rest. As well as the outstanding self-centering and fixation, a more favourable component of power transmission is thus created. To the side of the recess 4, contact surfaces 6/1 and 6/2 are located on or against the webs 6, said contact surfaces being formed in the depicted embodiment as flat or level. Angled towards these contact surfaces 6/1 and 6/2, extensions 6/3 and 6/4 extend. The cutting head 3 rests flush with its correspondingly formed surfaces thereto such that the cutting head 3 rests on or against the main body 2 in its entire width. The fixing device 10 in the form of a screw only serves in the depicted embodiment as additional securing. As already described above, the mallet according to the invention is characterized by self-centring and self-fixing properties, which have been obtained particularly by the concealed form of the connecting means. Thus, this is a special embodiment of the recess 4, which interacts with the connecting lug 5 and which is protected particularly by the recess 4 which is enclosed on four sides. Thus, wear does not occur on the junction, namely on the connecting lug and the recess, such that without problem a new cutting head 3 can be put on after the cutting head 3 or its blades 11 are worn.

However, the invention also allows that as well as the depicted embodiment of a cutting head 3 completely different cutting heads 3 can naturally be fitted there, which must only be formed similarly in the connecting lug 5 and in the embodiment of the contact surfaces 6/1 ... and the extensions 6/3 ... in order to obtain the same effect as has been previously described, namely a self-centring and adjusting or hooking embodiment of the connection of the cutting head 3 with the main body 2.

Fig. 1b and 1c show different views of the mallet 1 described in Fig. 1a in its mounted or assembled state. With the reference number I, it is indicated that a structure unit is created, which is particularly compact and which thus provides a mallet, which is completely protected with regard to the connection between the cutting head 3 and the main body 2. This becomes outstandingly clear in the two representations Fig. 1b and 1c. With the reference numeral 2/1, a fixation opening is shown in Fig. 1c, into which a fixing means can be inserted. This can for example occur in the form of a screw, a fixing screw, a wedge or the like. All other reference numbers have already been presented in Fig. 1 and are used here in the same way.

Fig. 2a to 2c show a further embodiment of a mallet according to the invention with a modified cutting head 3. The blades here are formed as cutting plates 12, which are

particularly angled in a wedge shape such that the cutting surfaces serve simultaneously for the guidance of the material to be comminuted. On the cutting plates 12, guide surfaces 12/1, 12/2 are provided. These serve the guidance of the material and the provision of a free cut. Wedge-shaped recesses on the cutting head 3 extend from the cutting plates 12 contrary to the cutting direction, said recesses serving for the problem-free material passage and through which a free cut also occurs. All other reference numbers have already been explained previously and are used here in the same way.

Fig. 2c shows an exploded view, wherein the variation described here of the mallet according to Fig. 2a and 2b is shown.

The variations 3a to 3c show a further variation of a mallet according to the invention with a one-piece blade on the mallet head.

The difference with the previously described variations of the invention exist in that the mallet head 3 carries a one-piece blade 11, which extends over the entire width of the mallet head and also of the main body. Thus, special cutting tasks are solvable, which are only realised with such a mallet head or with such a blade arranged on the mallet head. All other features of the mallet according to the invention are realised in the same manner as the previous embodiments. Fig. 3a shows a view in a three-dimensional representation with a front incline, in Fig. 3b a view with a backwards incline and Fig. 3c is the exploded view again.

Fig. 4a and 4b show a main body according to the invention in a three-dimensional representation, wherein it is possible here to depict the individual features of the main body more clearly than in the previous embodiment variations. Fig. 4a shows thus the main body 2 with a front incline, whereby the supporting surfaces 7 are visible. The region 70, which is non-angled, is also clearly visible. Starting from the supporting surfaces 7 in the recess 4, the supporting surfaces 8/1 and 8/2 extend to a supporting body 8. On this supporting body 8, the cutting head 3 not shown in this representation rests. The contact surfaces 6/1 and 6/2, which limit the recess 4 laterally in a web-like manner (web 6) are also very clearly visible. It is also clearly visible that the entire recess 4 is closed or enclosed on four sides. Thus, the connecting lug of the cutting head provided for engagement is then also protected or through the compact embodiment of the entire mallet, the connection including the recess 4 and the therein provided supporting surfaces 7 or supporting surfaces 8/1 and 8/2 is provided. The contact surfaces 6/1 or 6/2 continue backwards contrary to the cutting direction as it were, wherein angled extensions 6/3 and 6/4 are provided here in respect to the contact surfaces 6/1 and 6/2. The cutting head 3 has on its underside correspondingly formed surfaces, which ensure that those visible in

the previous, assembled representations develop no gaps here, where material can penetrate or where wear can occur. The supporting effect thereby occurs accordingly.
Fig. 5a to 5c show a further variation of a cutting head 3 according to the invention in various views. In this representation, the counter-support surfaces 71 are visibly shown for the first time, said counter-supporting surfaces interacting with the supporting surfaces 7 of the main body 2. The counter-contact surfaces 3/1 and 3/2 and the counter-extension 3/3 are also visible. The blade is formed in this embodiment as a cutting plate 12. It is clearly visible in this case that the cutting plates 12 are angled in a wedge shape and particularly backwards extending, wedge-shaped recesses connect on the cutting head 3, whereby a free cut occurs.
Fig. 6a to 6c are only different from the previously depicted Fig. 5 in that a cutting head with a cutting attachment 33 is presented, which carries the blade or as shown here a cutting plate 12 or a plurality of cutting plate 12. Fig. 7a to 7c show an embodiment of a cutting head 3, which has cutting head sections 31, 32, which are separated from one another by a U-shaped opening. On each of the cutting head sections 31 and 32, a blade 11 is provided, which is also angled in a wedge shape in the cutting direction and which is fastened to the cutting head section for example as hard metal.
Fig. 8a to 8c show in turn a cutting head with a different blade 11, in this state namely a blade formed as one piece. The blade 11 is also provided for example as hard metal fitting. With respect to the angulation of the blade 11, it should be stated that this can be changed according to the respective cutting task naturally to other cutting heads 3 such that other angulations can be achieved. Both a sharper and a blunter angle can be achieved in this case. The invention here is not restricted to a specific angulation.
Fig. 9a to 9c show an embodiment of a cutting head 3 with a wedge-shaped blade 11. The blade 11 is thus designed to be graduated with regards to the conical angle. The mallet according to this embodiment is suitable for undertaking comminuting tasks, which require a pointed entry of the comminuting tool. Otherwise, the reference numbers correspond to the embodiments that have already been presented.
Fig. 10a to 15b show mallets or cutting heads, which only differ in that the contact surfaces 6/1 and 6/2 located to the side of the recess 4 and the surfaces provided to correspond to the cutting heads 3 are designed in an arched manner. This arched embodiment has the advantage of a further centering, but is in terms of production somewhat more difficult to produce. Nevertheless, the invention also includes this embodiment. All other embodiments or features and reference numbers correspond to those which have already been presented in the previous description of the exemplary embodiments. For this

reason, these reference numbers will not be presented again.
Fig. 16a and 16b show a main body 2, which has likewise arched contact surfaces 6/1 and 6/2.
Fig. 17 to 18b show a cutting head 3, which in turn has a wedge-shaped blade or in Fig. 18a has two such wedge-shaped blades 11 and otherwise is insertable into a main body according to Fig. 16a or 16b.
Fig. 19a to 20c show a special embodiments of the cutting head 3 according to the invention or the main body 2 according to the invention. In these two depicted variations, specific radii, angular measurements, dimensions are stated, which are applied explicitly for the depicted variation of the represented mallet 1. The special embodiments with respect to the radii on the connecting lug ensure the self-centring or self-hooking or self-fixing embodiment. The same can be said about the embodiment of the radii for the free cut on the cutting body 3, which is 163.2 mm in a depicted variation. The radius of 18 mm for the front part of the connecting lug should also be protected.
The variations shown in Fig. 19a to 19d show the special embodiment of a mallet, which is provided here for comminuting tasks, as it is used particularly for the comminuting of soft wood materials. This variation was described as a eucalyptus mallet at the beginning. The diameters of the boreholes or dimensions of the fixation means are also a special embodiment, which fall within the protective scope of the invention. The same applies for the embodiment of the dimensions and angles in Fig. 20a to 20c. The wedge-shaped angulation of the supporting surfaces, which result in an angle of 140° when combined, should be mentioned in particular here. The non-angled region is calculated with 10.5 mm. The recess 4 is in the depicted example 60 mm wide, when viewed from the side. The main body 2 has in total in the upper part a width of 90 mm and in the lower part (including the sleeve 2/3 located in the through bore A) 105 mm. The radii for the nose 9, the J, the angulation of the supporting body and the dimensions of the boreholes are special embodiments and included in the scope of protection of the invention in the depicted variation.
The dimensions stated in the figures represent preferred variations. However, the invention is not restricted to these dimensions. Instead, features are stated in the description and the patent claims, which claim a broader protection for the invention.
The invention has been described above on the basis of exemplary embodiments. The claims submitted now and subsequently with the application are attempts to formulate without prejudice for the achievement of broader protection.
The dependent claims stated in the subsidiary claims refer to a further embodiment of the

object of the main claim by means of features of the respective dependent claim. However, these are not to be understood as a waiver to the achievement of an independent, representational protection for the features of the dependent subsidiary claims.

Features, which have only been disclosed thus far in the description, can be claimed as part of the procedure as being an essential feature of the invention, for example to demarcate the prior art.

Knuser til findelingsanordninger

Patentkrav

1. Knuser, særligt til findelingsanordninger med en rotor eller i det mindste en aksel, hvorpå knuseren (1) kan fastgøres, bestående af et underlegeme (2), der er forsynet med en gennemgangsboring (A), hvor gennemgangsboringen (A) er beregnet til at forbinde knuseren (1) med rotoren eller akslen, og i det mindste et skærehoved (3), hvor det i det mindste ene skærehoved (3) kan forbindes aftageligt eller fast med underlegemet (2), hvor der i underlegemet (2) er tilvejebragt en udsparing (4), som er placeret i det indre af underlegemet (2), og som et forbindelsesfremspring (5), der er tilvejebragt på skærehovedet (3), griber formsluttende ind i, hvor forbindelsesfremspringet (5) griber formsluttende, selvcentrerende og selvlåsende eller selvsikrende ind i udsparingen (4), og hvor forbindelsesfremspringet (5) og udsparingen (4) har en indbyrdes korresponderende form og er udformet selvholdende, hvor underlegemet (2) og skærehovedet (3) i den forbundne tilstand danner en konstruktionsmæssig kompakt enhed (I) af en knuser (1), kendetegnet ved, at udsparingen (4) er omsluttet på fire sider og særligt er forsynet med styreribber på siden (6).

2. Knuser ifølge krav 1, kendetegnet ved, at skærehovedet (3) over sin samlede bredde er understøttet på eller ved underlegemet (2).

3. Knuser ifølge et af eller begge de foregående krav, kendetegnet ved, at den kompakte enhed (I) er udformet i kasseform, og underlegemet (2) i det mindste delvist er åbnet på kun den ene side, særligt på den side, der vender opad i monteringsretningen, henholdsvis på forbindelsessiden til skærehovedet (3).

4. Knuser ifølge et eller flere af de foregående krav, kendetegnet ved, at skærehovedet (3) er udformet således, at det i det mindste delvist kan indsættes i underlegemet (2), særligt med forbindelsesfremspringet (5).

5. Knuser ifølge et eller flere af de foregående krav, kendetegnet ved, at udsparingen (4) er tilvejebragt i den forreste del af underlegemet (2) set i skæreretningen.

6. Knuser ifølge et eller flere af de foregående krav, kendetegnet ved, at udsparingen (4) er placeret således, at den er orienteret i retning af enhedens (I) længdeakse.

7. Knuser ifølge et eller flere af de foregående krav, kendetegnet ved, at der i udsparingen (4) strækker sig mindst to støtteflader (7), der fortrinsvis er udformet således, at de er vinklet i kileform eller løber konisk udad.

8. Knuser ifølge krav 7, kendetegnet ved, at støttefladernes (7) vinkling eller koniske forløb er indrettet således, at det falder udad eller indad.

9. Knuser ifølge krav 7 eller 8, kendetegnet ved, at der mellem to støtteflader (7) er tilvejebragt et område (70), der ikke har noget fald eller nogen vinkling.

10. Knuser ifølge et af kravene 7 til 9, kendetegnet ved, at støttefladerne (7) strækker sig ud over den øverste kant af udsparingen (4) og sammen med en del af underlegemet (2) danner et fastgørelses- og/eller støttelegeme (8).

11. Knuser ifølge krav 10, kendetegnet ved, at der på støttelegemet (8) er udformet støtteflader (8/1, 8/2), der særligt er vinklet i kileform i forhold til skæreretningen.

12. Knuser ifølge krav 10 eller 11, kendetegnet ved, at der i støttelegemet (8) er tilvejebragt en boring (8/3), der tjener til optagelse af et fikseringsmiddel (10) som f.eks. en skrue.

13. Knuser ifølge et eller flere af de foregående krav, kendetegnet ved, at udsparingen (4) set i et lateralt snit har form af et J.

14. Knuser ifølge et eller flere af de foregående krav, kendetegnet ved, at der på underlegemet (2) er tilvejebragt en fikseringsåbning (2/1), som fortrinsvis er tilvejebragt på den side af underlegemet (2), og som strækker sig i det mindste hen til gennemgangsboringen (A) og tjener til optagelse af et fikseringsmiddel til knuseren (2/2).

15. Findelingsanordning med i det mindste en knuser (1) ifølge et af de foregående krav 1 til 14.

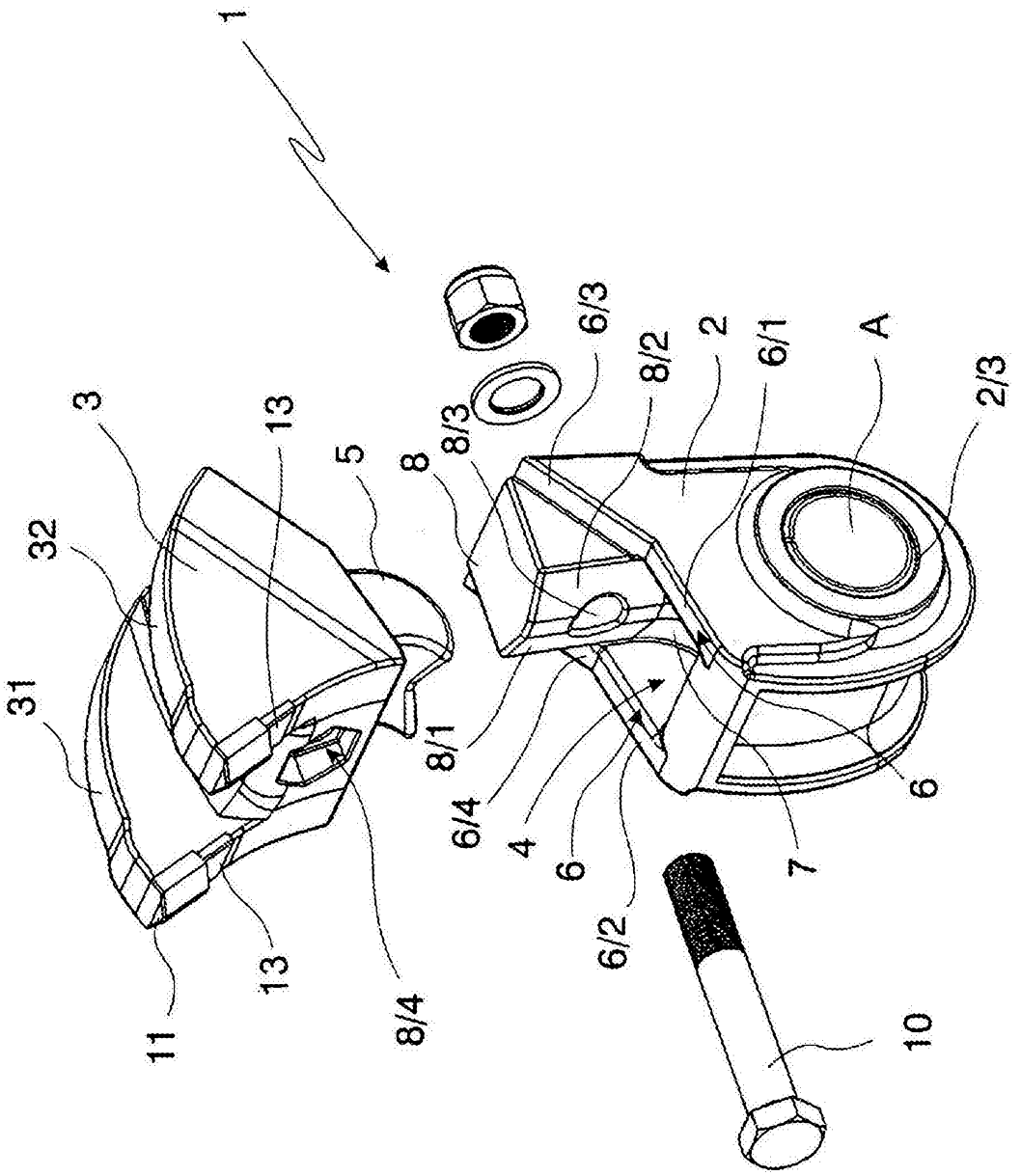

Fig. 1a

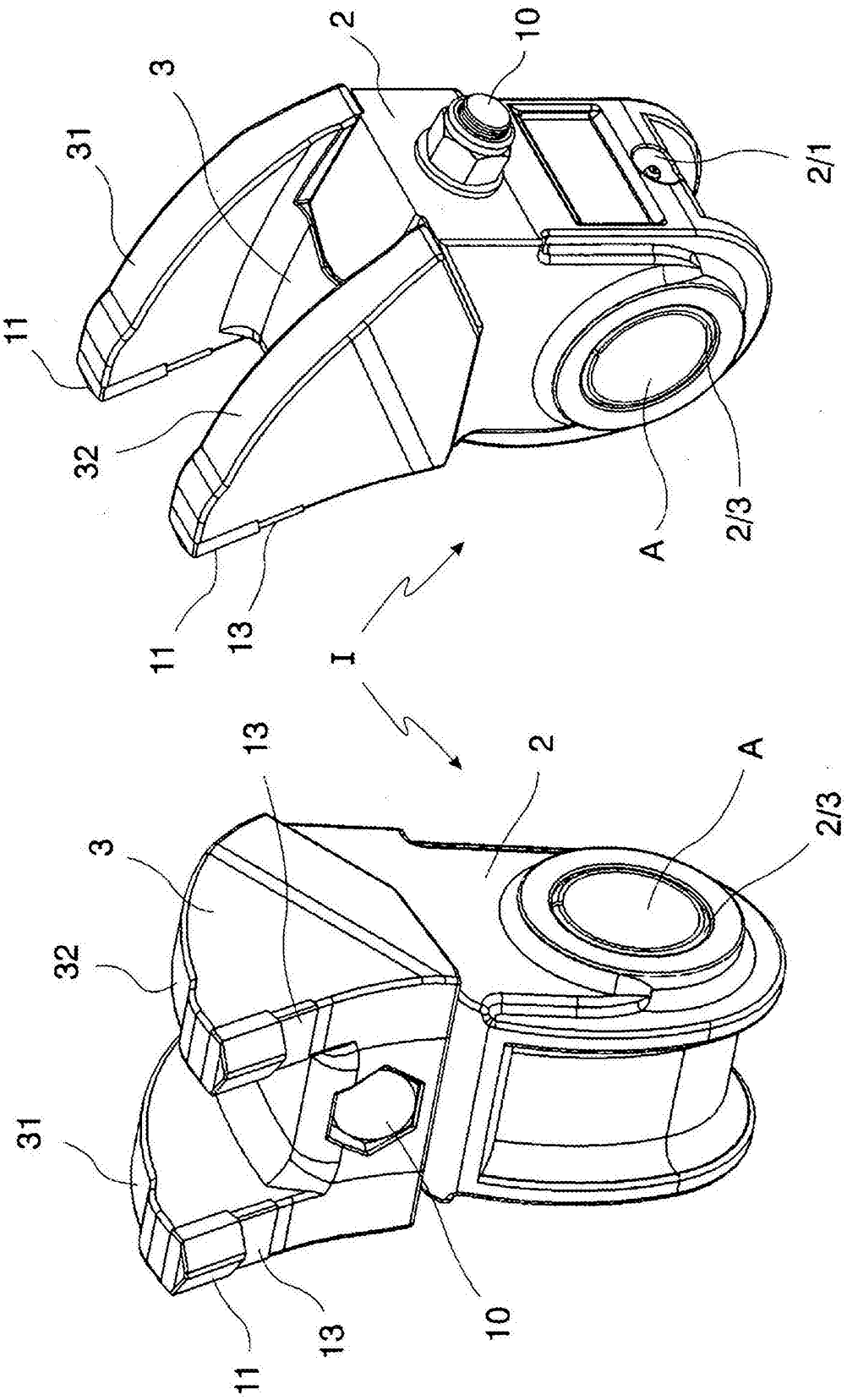

Fig. 1c

Fig. 1b

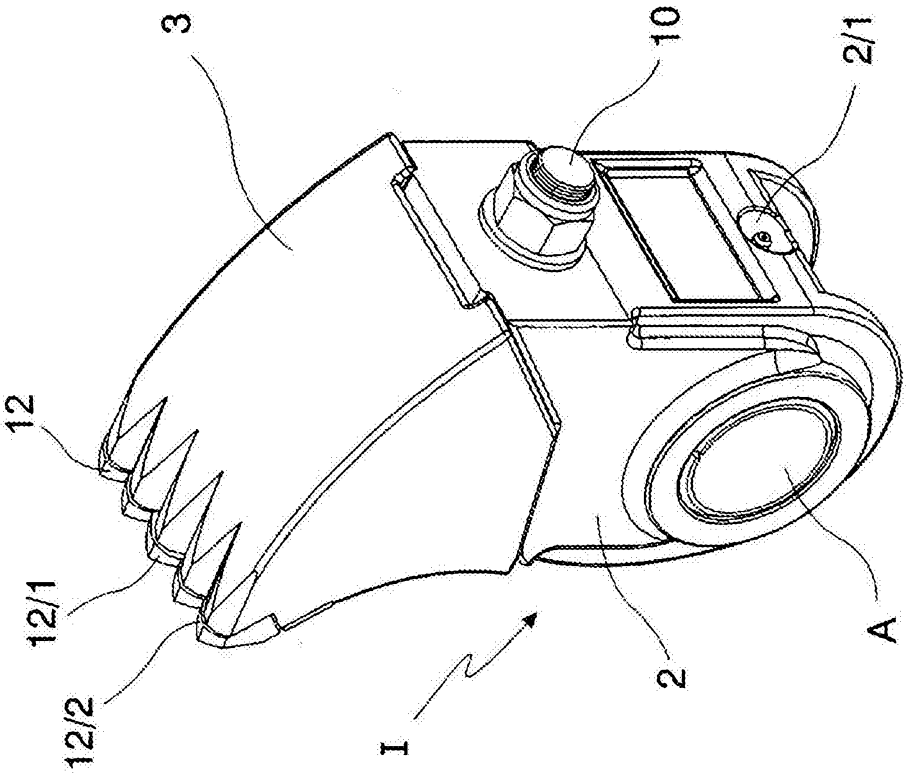

Fig. 2b

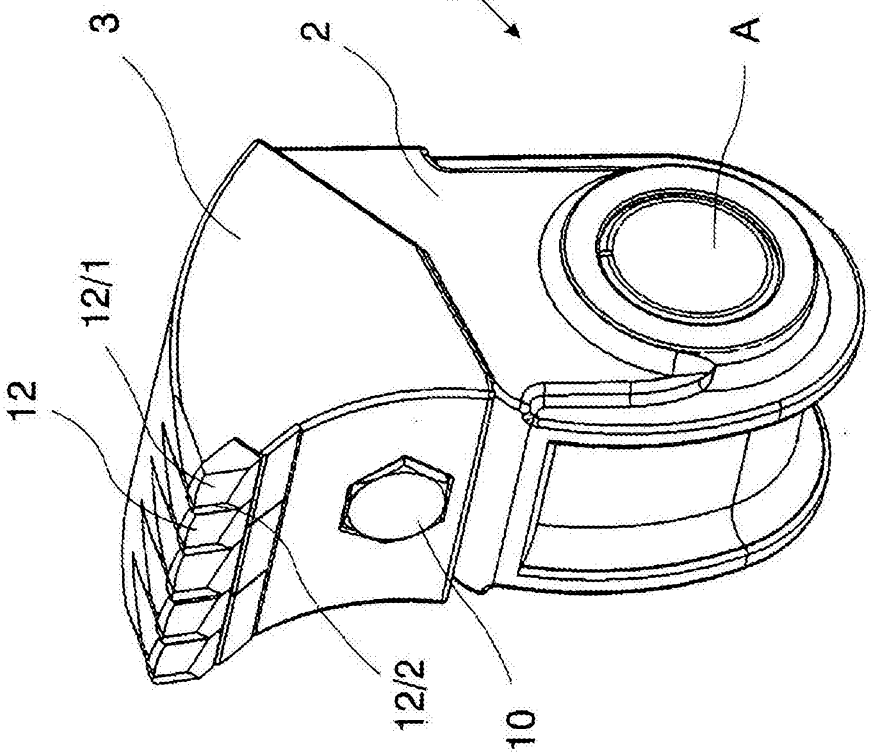

Fig. 2a

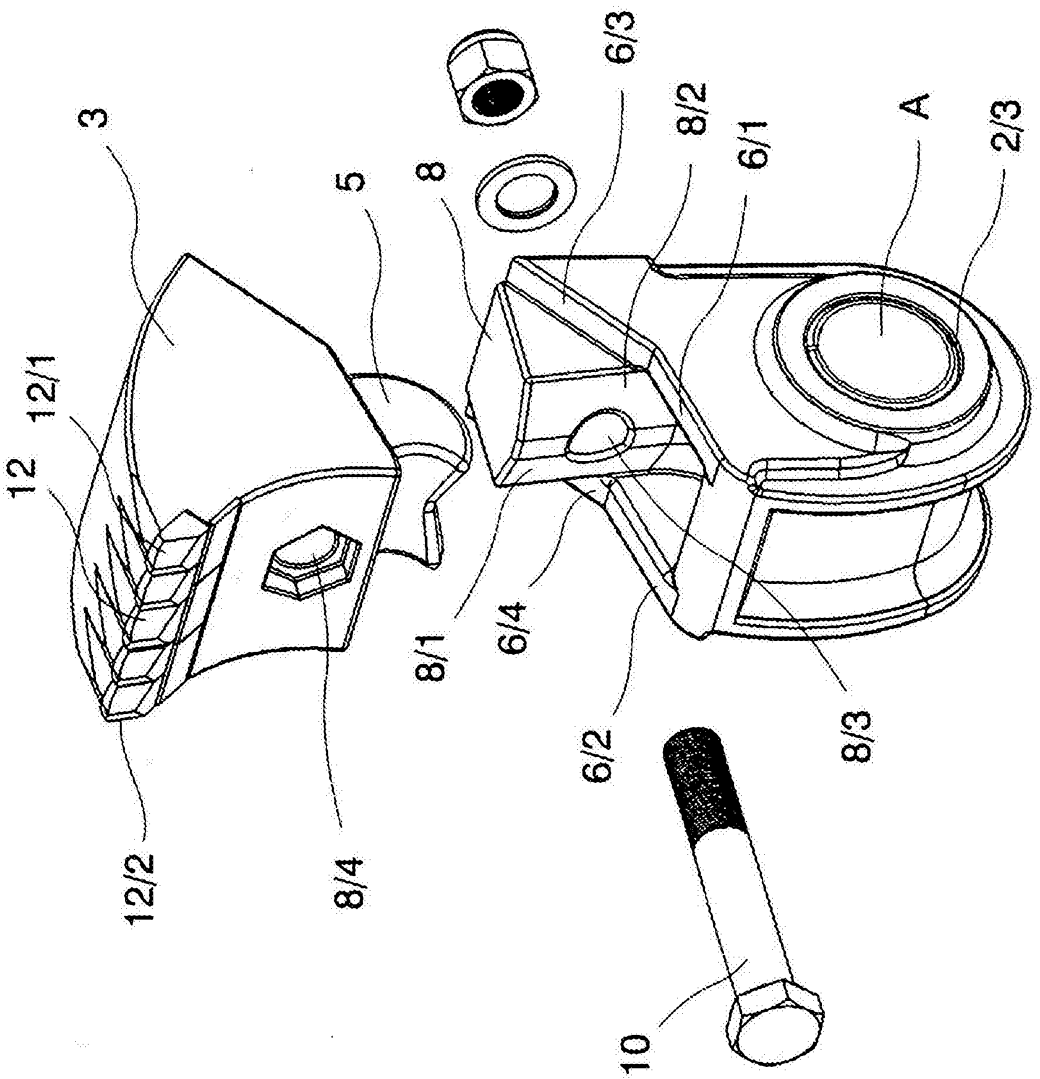

Fig. 2c

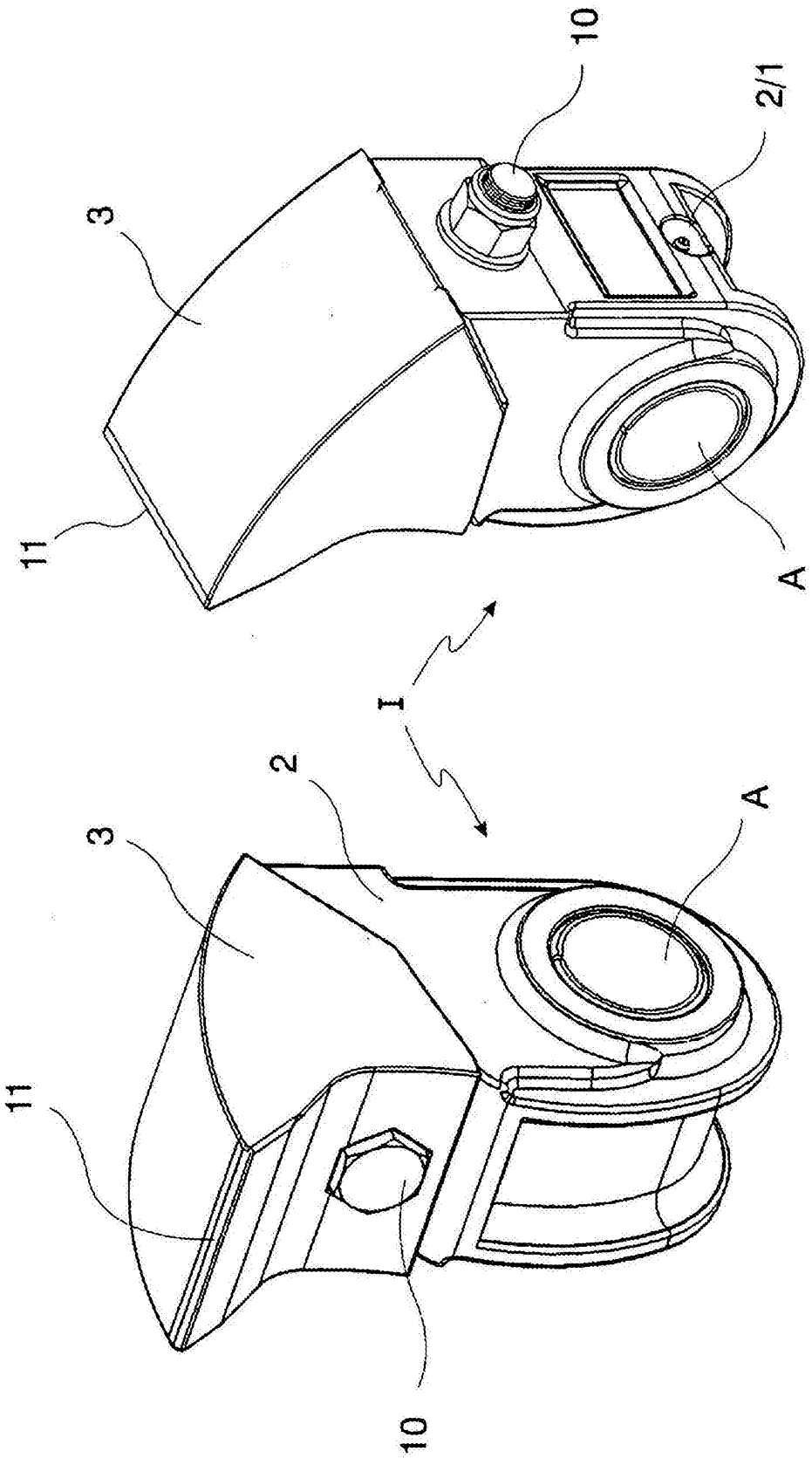

Fig. 3b

Fig. 3a

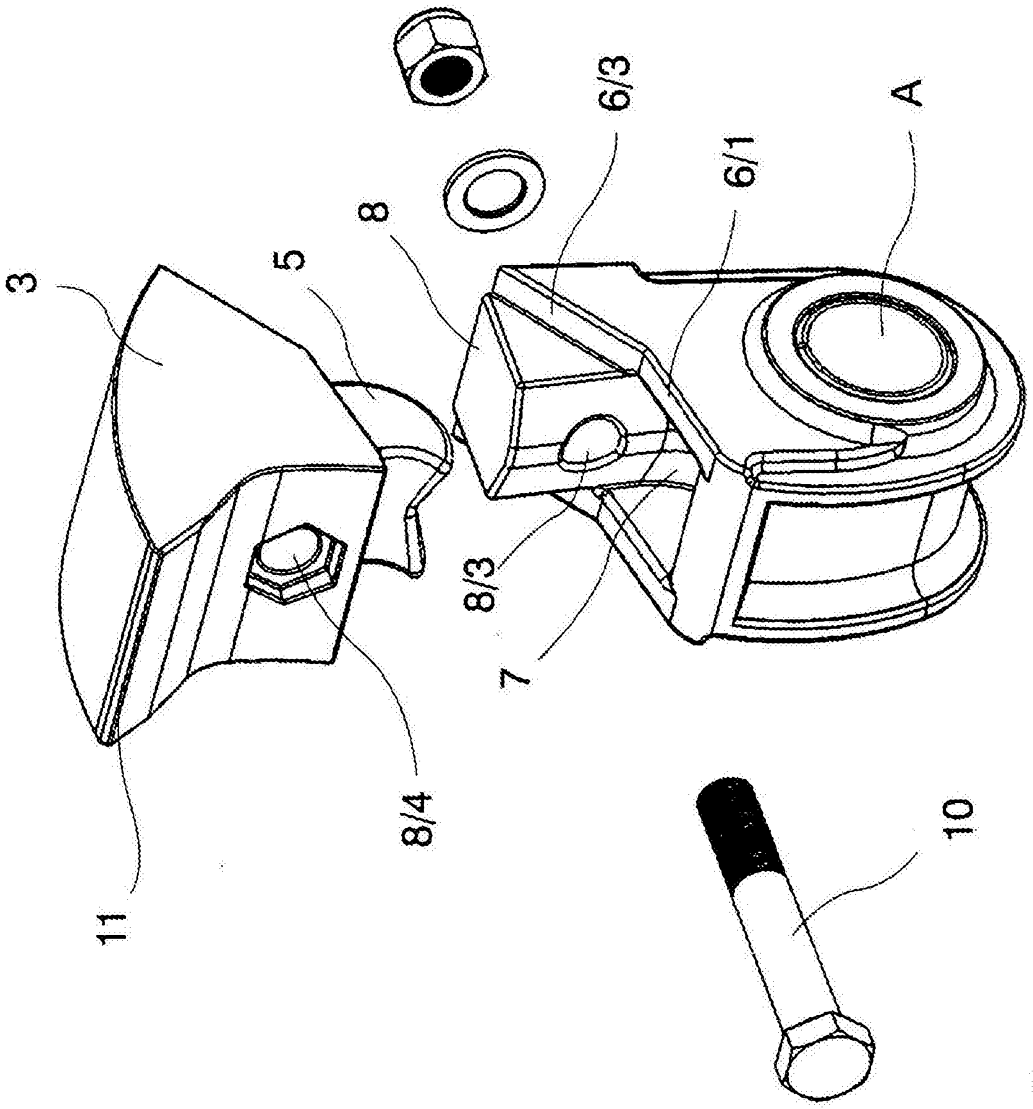

Fig. 3c

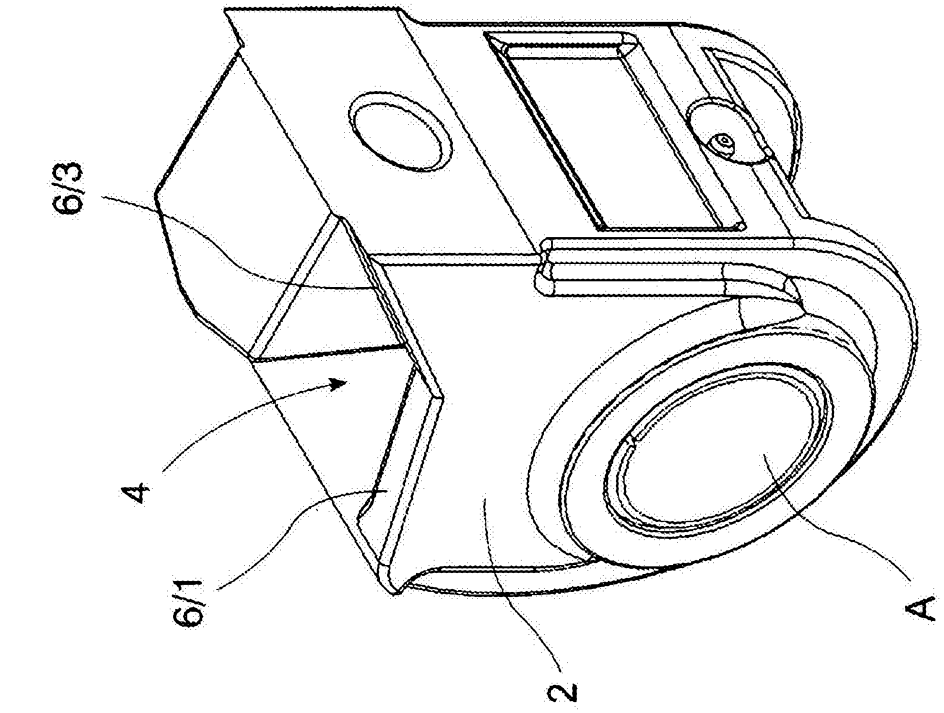

Fig. 4b

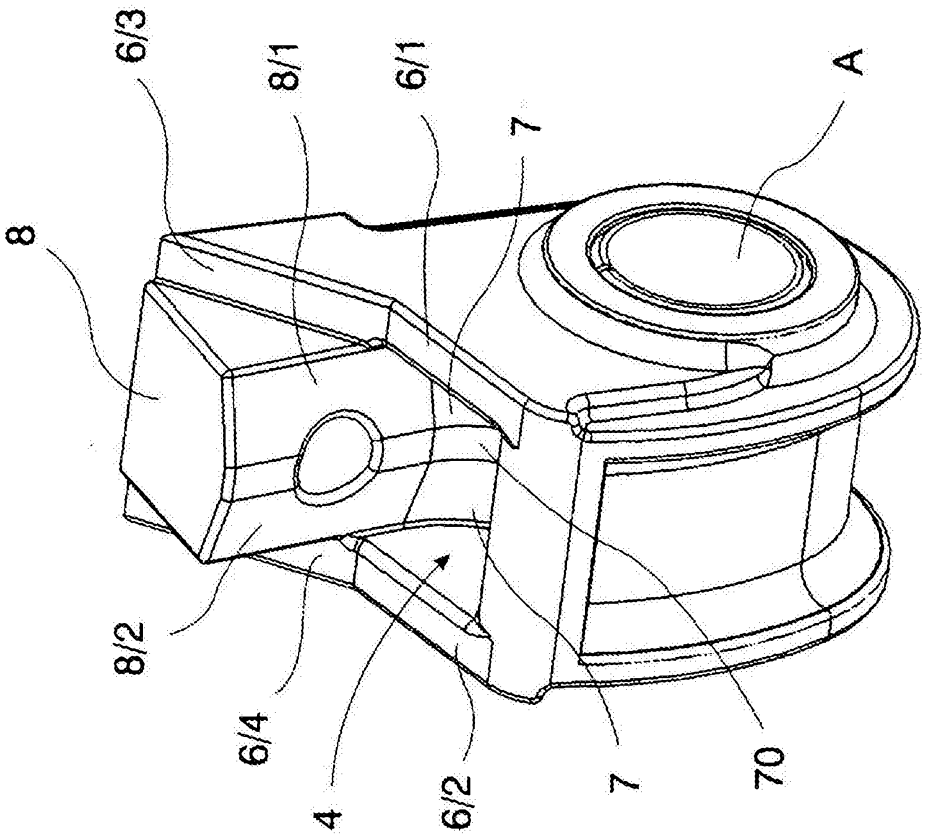

Fig. 4a

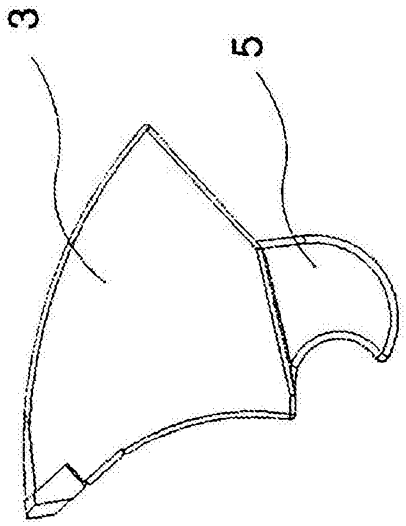

Fig. 5b

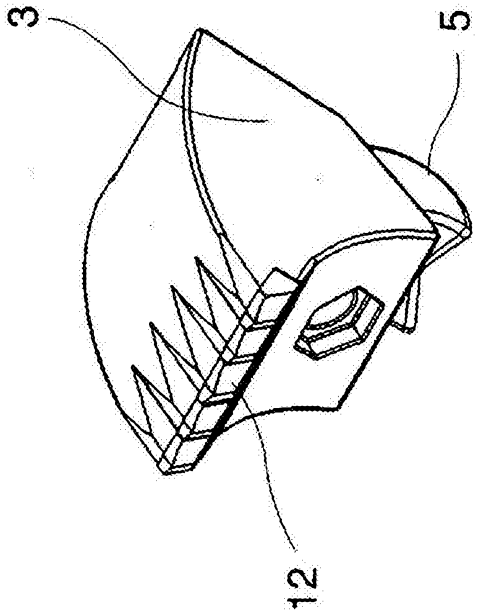

Fig. 5c

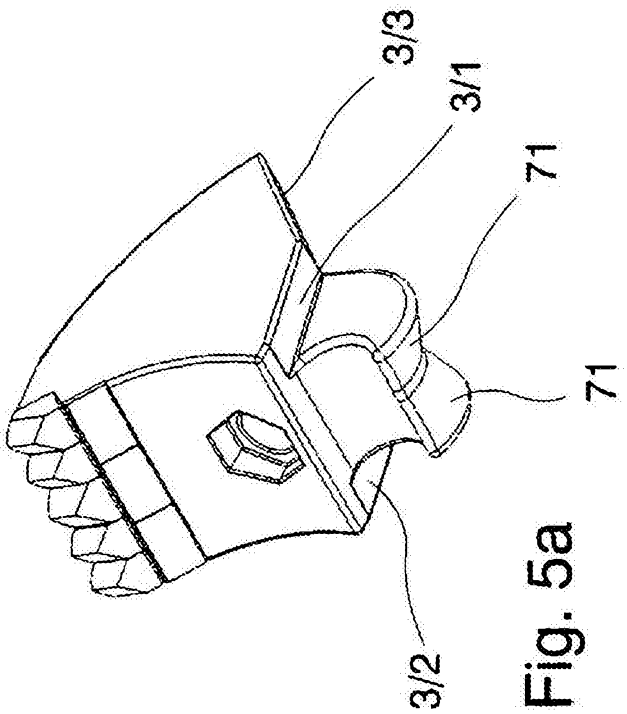

Fig. 5a

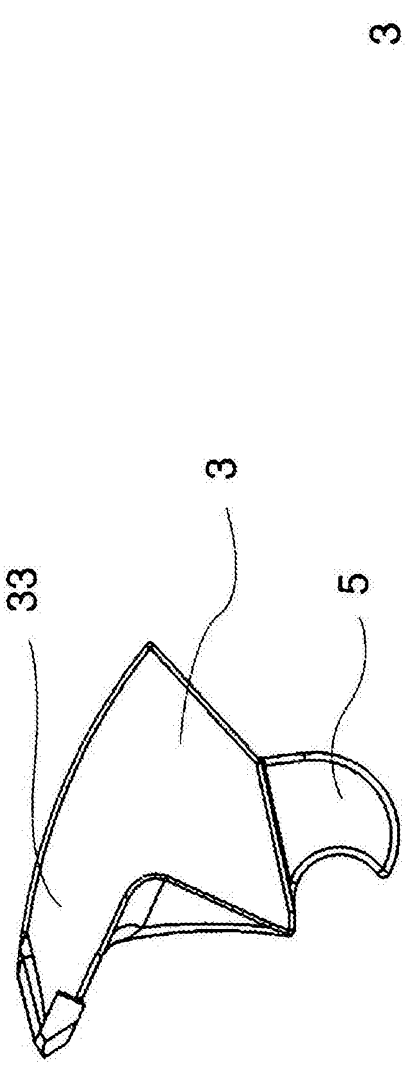

Fig. 6b

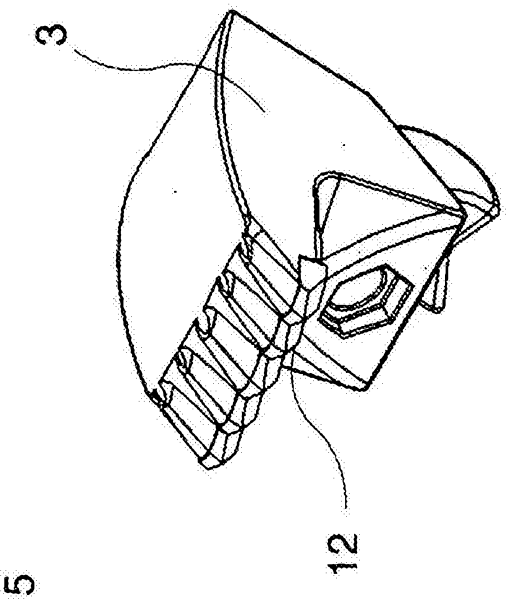

Fig. 6c

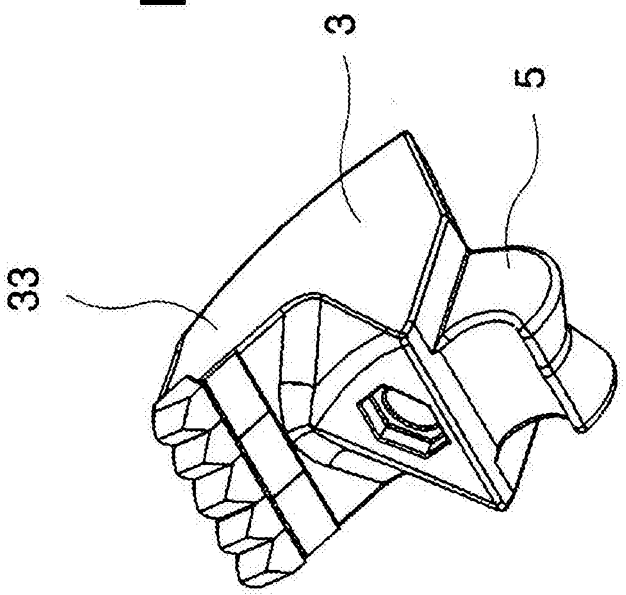

Fig. 6a

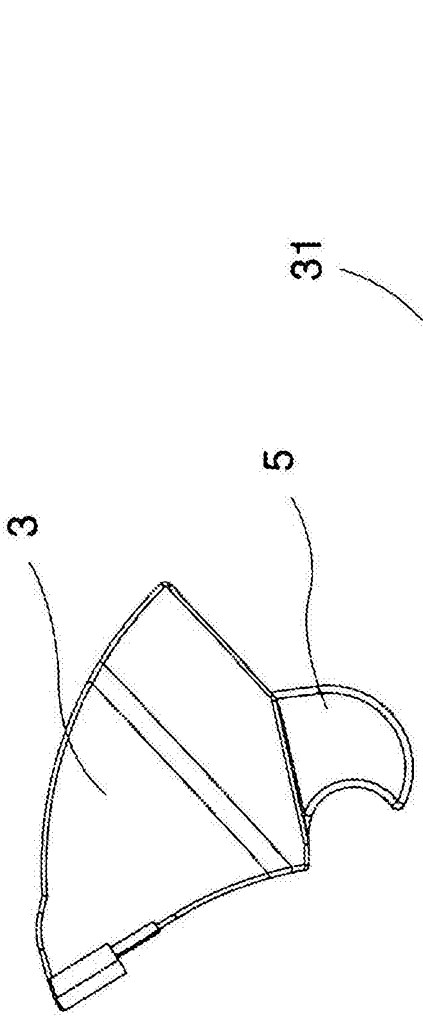

Fig. 7b

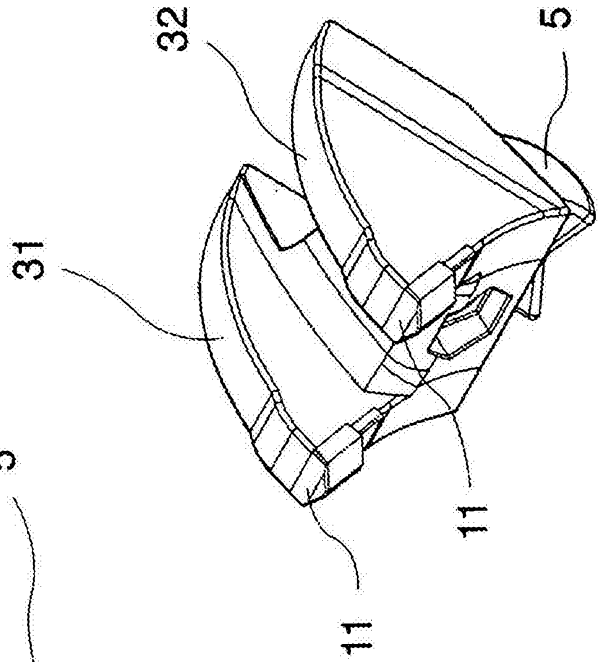

Fig. 7c

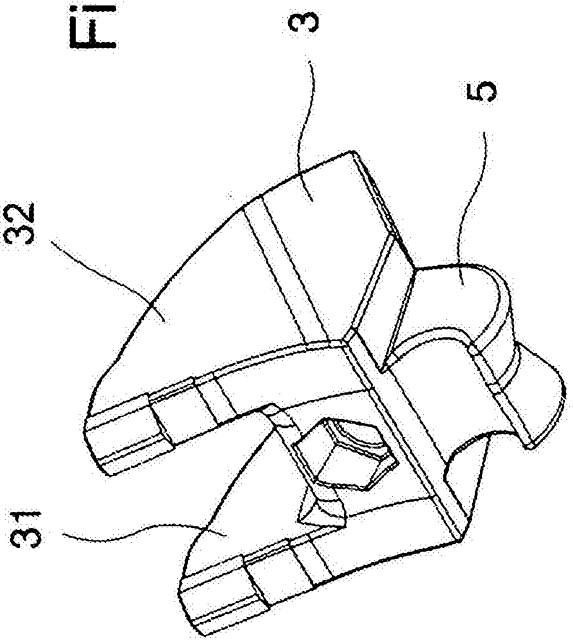

Fig. 7a

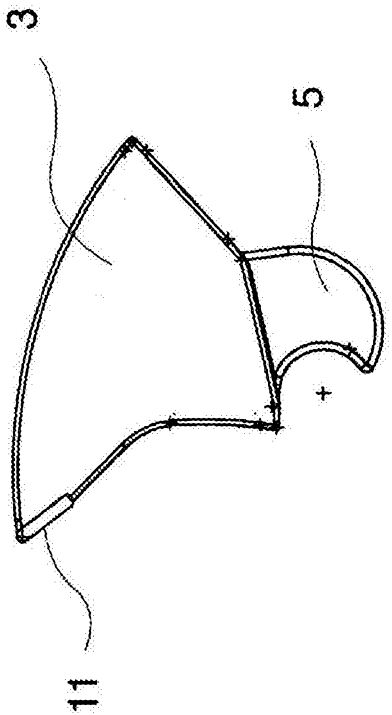

Fig. 8b

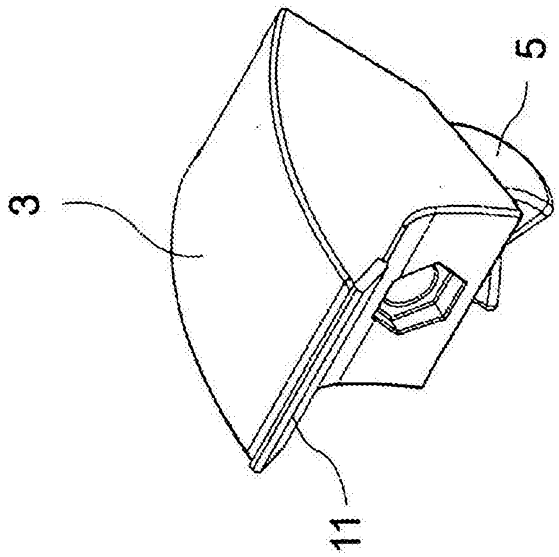

Fig. 8c

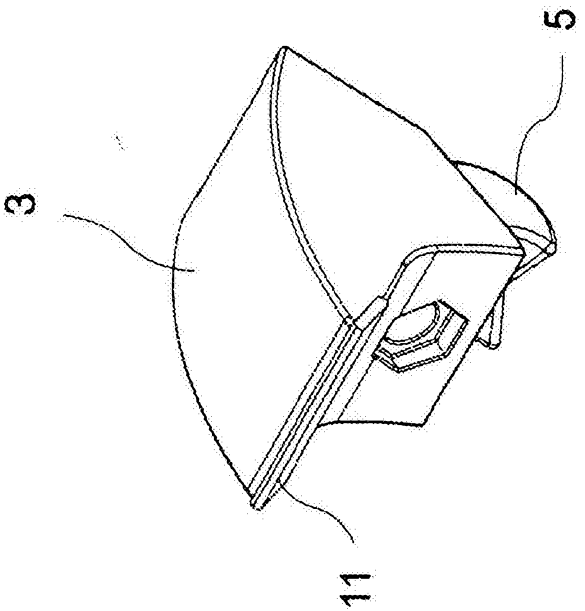

Fig. 8a

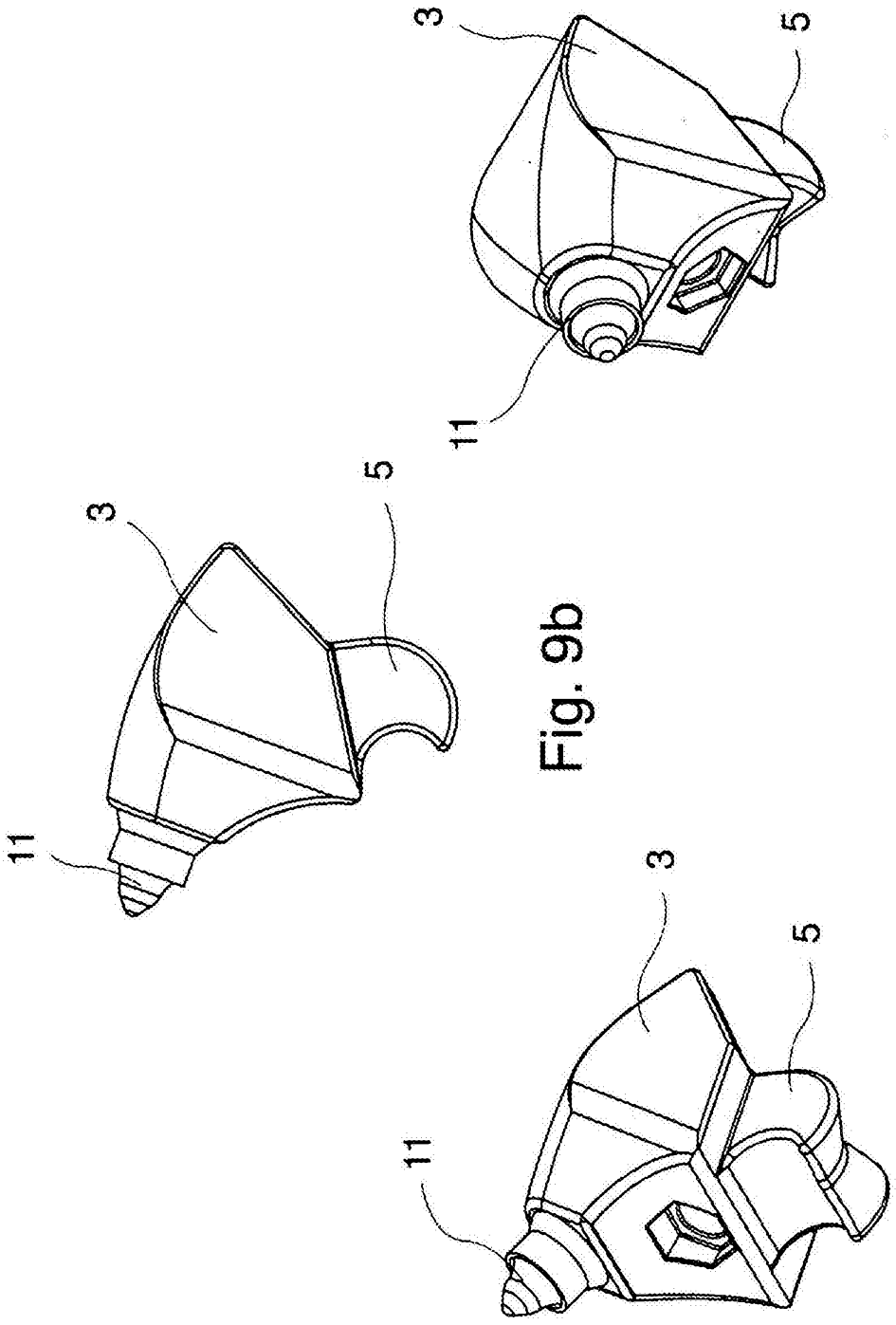

Fig. 9c

Fig. 9b

Fig. 9a

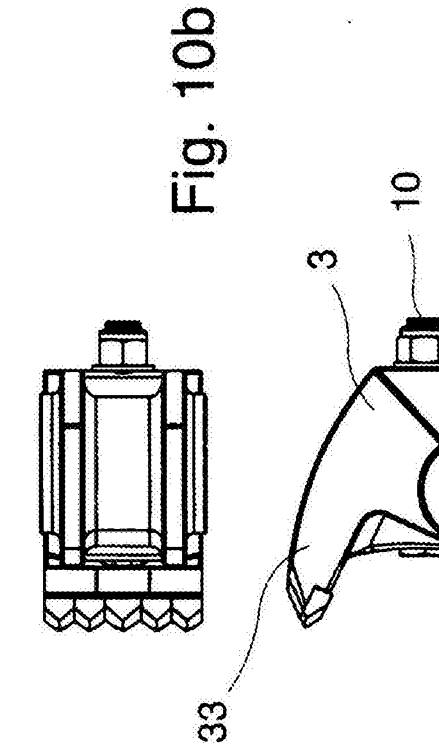

Fig. 10b

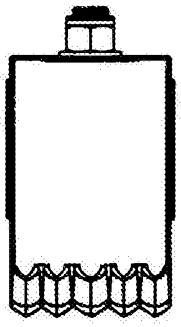

Fig. 10c

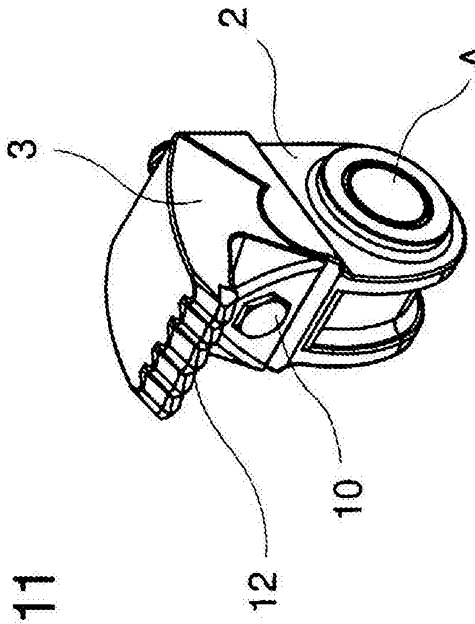

Fig. 10d

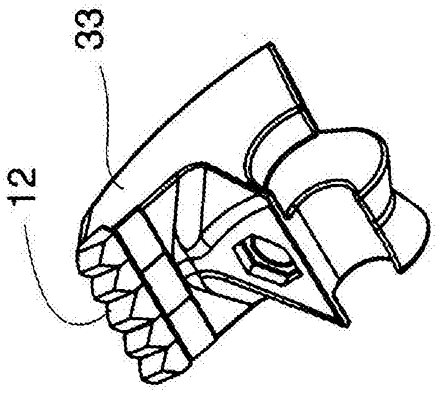

Fig. 10a

Fig. 11

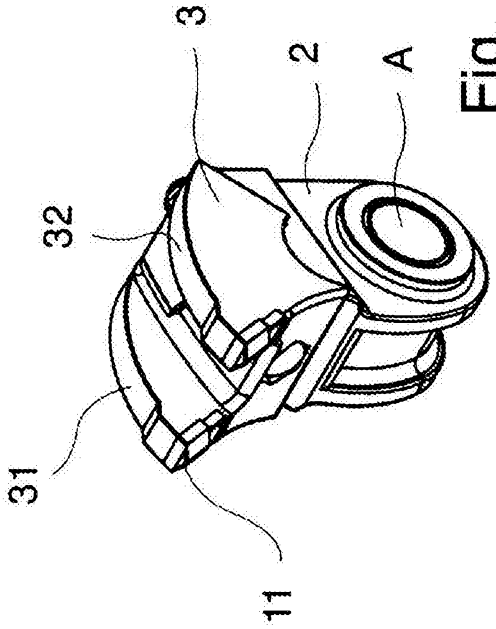

Fig. 13

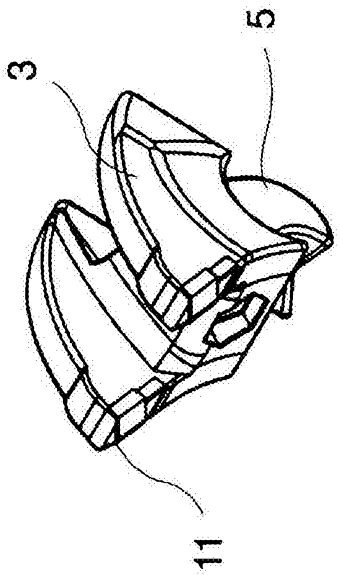

Fig. 14

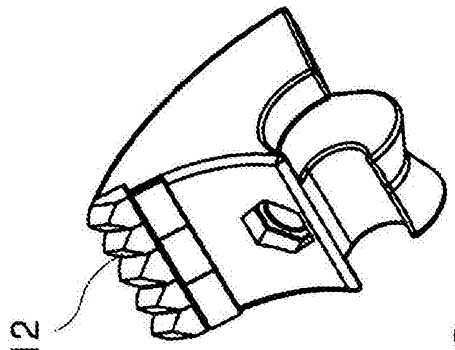

Fig. 12a

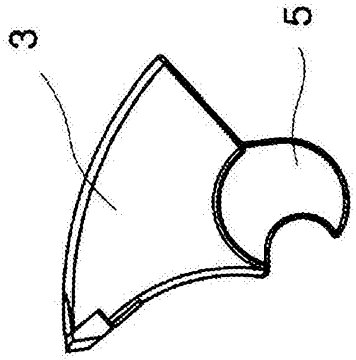

Fig. 12b

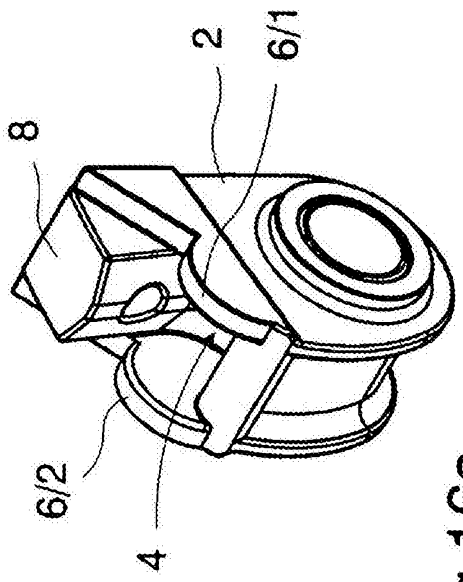

Fig.16a

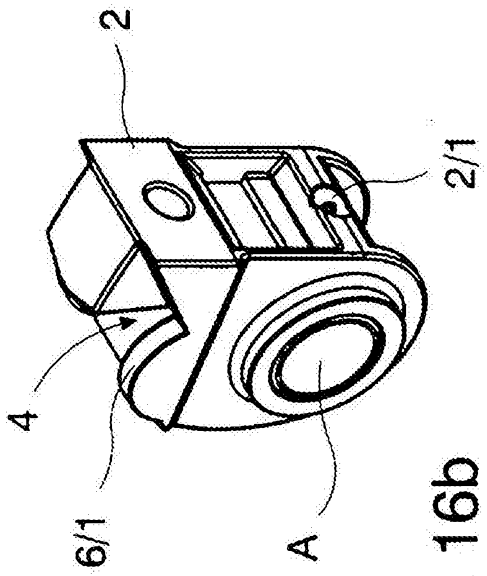

Fig. 16b

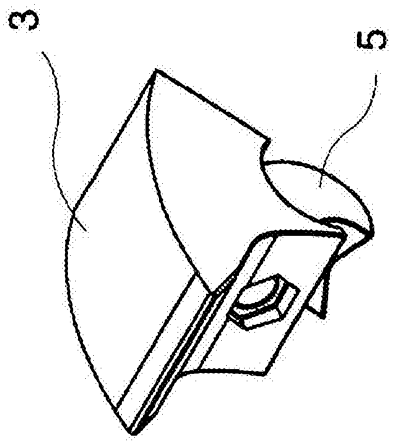

Fig. 15a

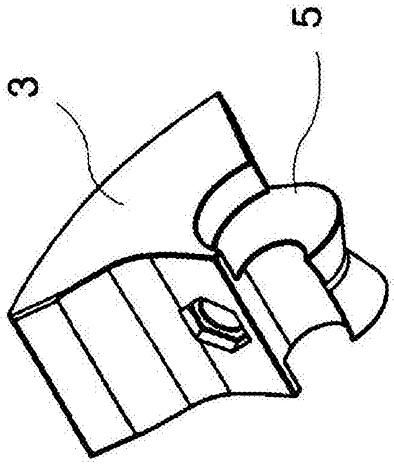

Fig. 15b

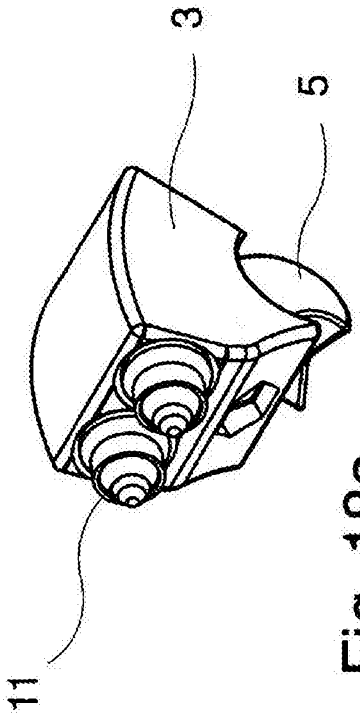

Fig. 18a

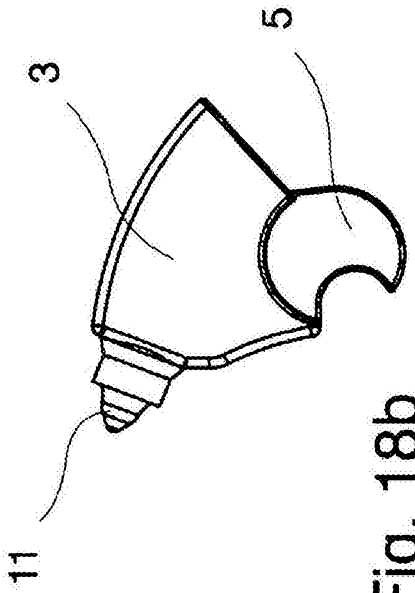

Fig. 18b

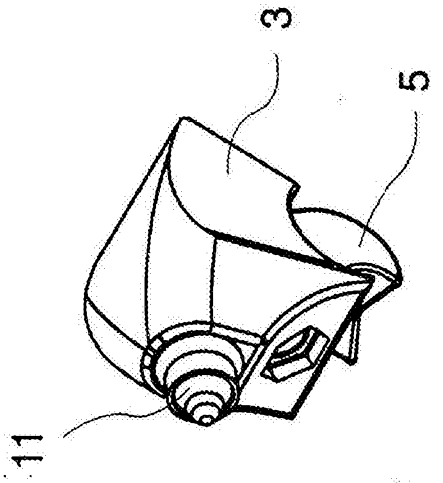

Fig. 17

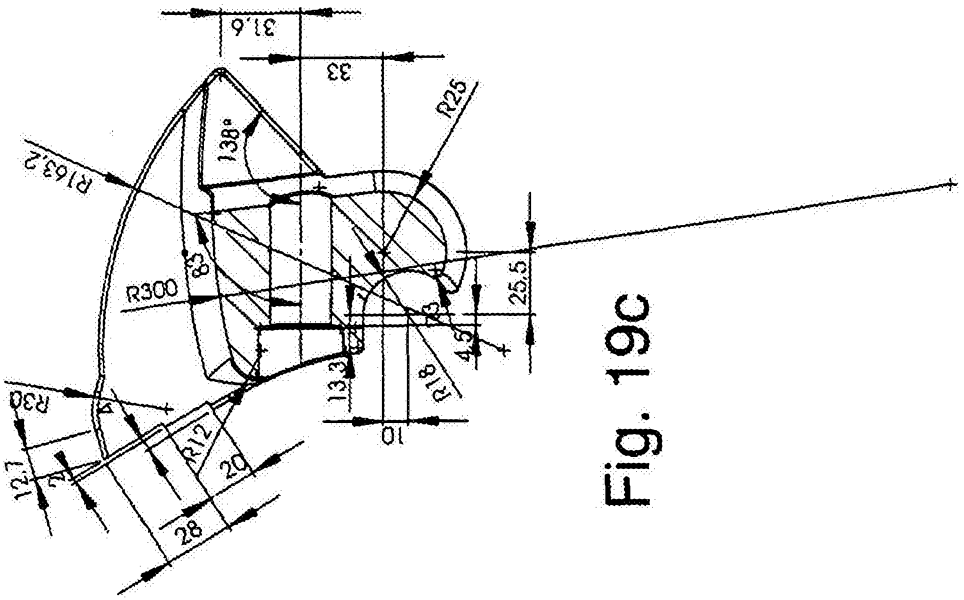

Fig. 19c

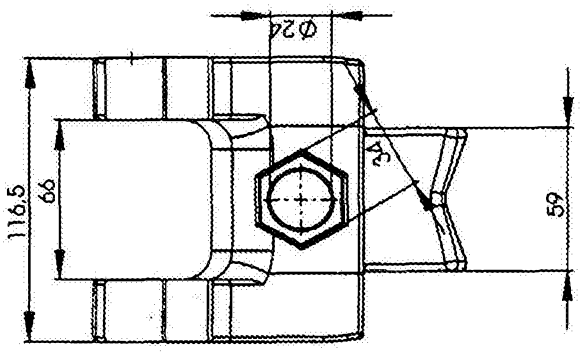

Fig. 19b

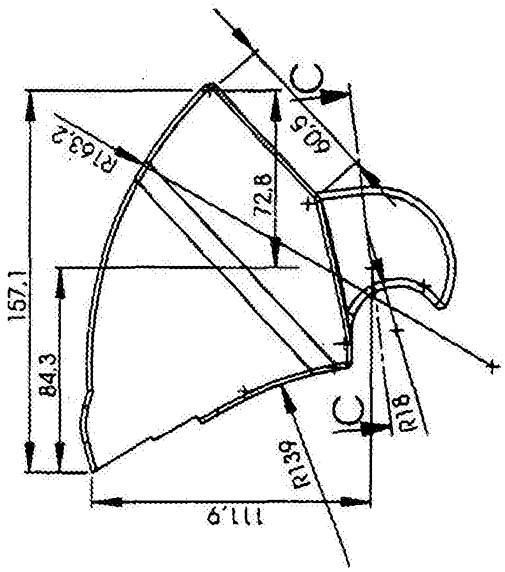

Fig. 19a

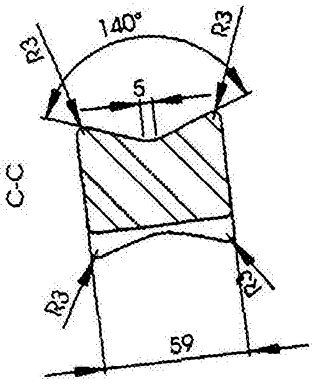

Fig. 19d

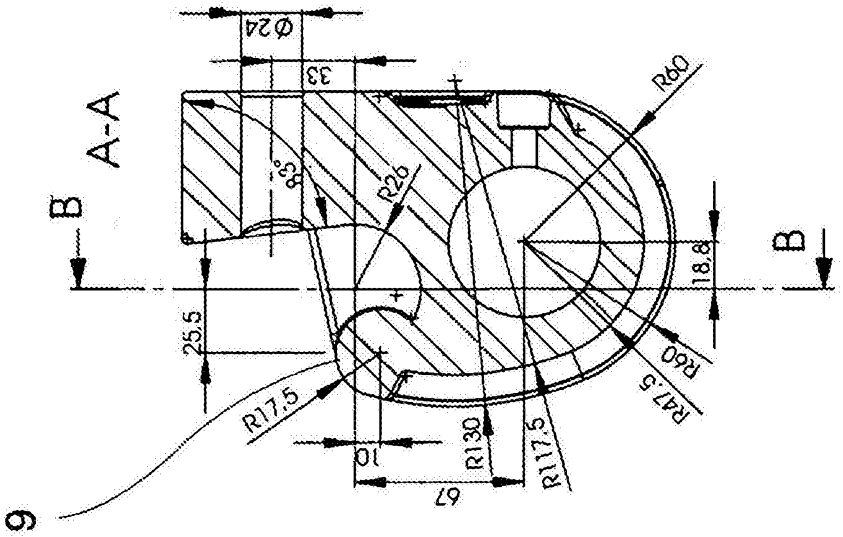

Fig. 20c

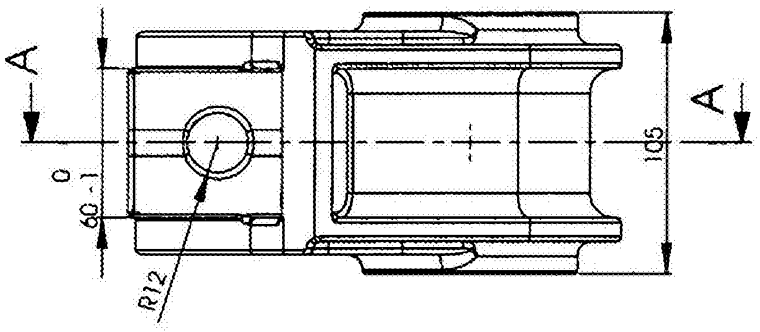

Fig. 20b

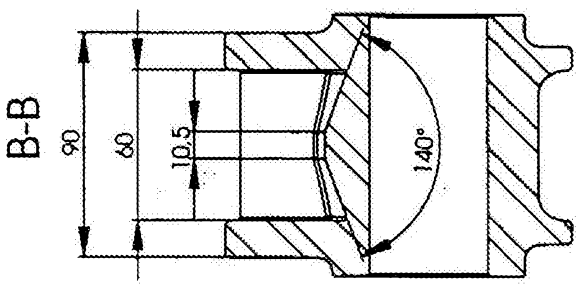

Fig. 20a