

(19)



(11)

EP 4 116 507 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
11.01.2023 Bulletin 2023/02

(51) International Patent Classification (IPC):
E02F 9/28^(2006.01)

(21) Application number: **21382611.8**

(52) Cooperative Patent Classification (CPC):
E02F 9/2841; E02F 9/26

(22) Date of filing: **07.07.2021**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(72) Inventors:
• **Carballo Villazala, Rubén**
08870 Sitges, Barcelona (ES)
• **González Polo, Adrián**
08870 Sitges, Barcelona (ES)
• **Sánchez Guisado, Fermin**
08330 Premià de mar - Barcelona (ES)
• **Torres Montalvo, Raúl**
08027 Barcelona (ES)

(71) Applicant: **Metalogenia Research & Technologies S.L.**
08005 Barcelona (ES)

(74) Representative: **Carlos Hernando, Borja Garrigues IP, S.L.P.**
Hermosilla, 3
28001 Madrid (ES)

(54) RETAINING DEVICE AND WEAR ELEMENT FOR EXCAVATORS AND THE LIKE

(57) The present invention relates to a retaining device and a wear element, preferably a female part, for ensuring the retention between the female part and a male part, used in excavators and the like. The female part has a cavity and the male part has a projection which

is inserted into the cavity of the female part, both parts being coupled to each other due to the use of a retaining device together with at least one pin which at least partially crosses through the female part, the retaining device and the male part.

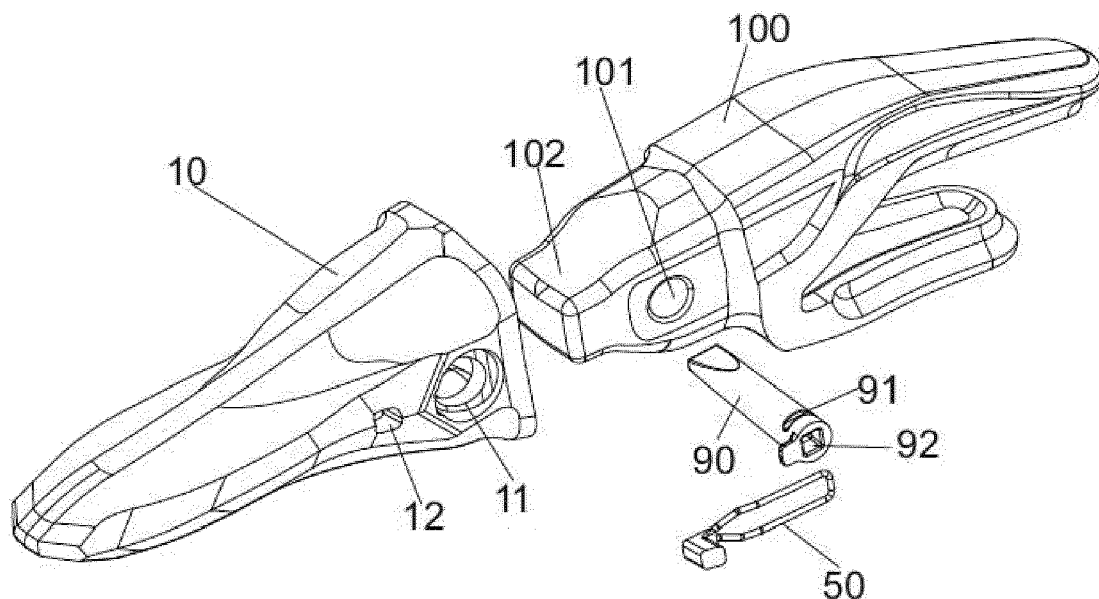


Fig. 1

EP 4 116 507 A1

Description

Object of the invention

[0001] The present invention relates to a retaining device and a wear element, preferably a female part, for ensuring the retention between the wear element and an adapter, in other words, between a female part and a male part used in coupling systems in excavators and the like. The retaining device has a body which determines a hollow space joined to the body, having a support element made of an elastic material. Said support element enables the retaining device to be supported when it is arranged inside the female part, as well as supporting a data storage code which enables, among other applications, the identification of the different components of the system, accessing videos showing how to assemble and disassemble said components, accessing the website of the manufacturer, the website of the product, the catalogue, technical support chat, information regarding the assembly of the components, information on the manufacturing method, mechanical properties of the components, the composition thereof, among others.

[0002] The female part has a cavity and can be a wear part or element, a tooth, a tip or an intermediate adapter (in a three-part system with an adapter or a weld-on or cast nose; an intermediate adapter; and a tip). The male part has a projection into which the aforementioned cavity of the female part fits, this male part being able to be a tooth holder or adapter, an intermediate adapter (in a three-part system with an adapter or a weld-on or cast nose; an intermediate adapter; and a tip), a cast lip nose, or a weld-on nose. The intermediate adapter has a cavity on one side and a projection on the opposite side, such that it acts as a female part on one side and as a male part on the other side.

[0003] The female part is coupled to the male part, these two parts being maintained coupled through the interaction of a pin and the retaining device. The female part is removably coupled to the male part and the position between both of them is maintained due to a pin which interacts with the retaining device that also maintains the pin in the position thereof. By means of the pin and the retaining device, the female part is prevented from coming out of the locked position thereof with the male part and therefore the coupling between both parts is maintained. The detachable coupling requires the removal of the pin for the replacement of the female part, as well as the retaining device, if necessary.

[0004] The present invention applies especially to the public works, mining and dredging sectors, as well as to all kinds of earth-moving machinery.

Background of the invention

[0005] Excavators and the like, such as those used in public works and mining and dredging sites, are used to move and carry soil, ground, and rocks. These machines

are normally provided with a shovel or bucket joined to a mechanical arm. The shovel is provided with a blade on a leading edge intended to penetrate the ground. In order to prevent excessive wear of the blade and to aid in the penetration of the ground, it is common to assemble a wear element associated with the blade projecting from the leading edge thereof. However, said wear elements are also exposed to impacts, wear and breakage, for which reason they must be replaced frequently. Furthermore, depending on the application, it may be advisable to change the type or shape of the wear element in order to improve the efficiency of the excavation. In order to facilitate said replacement, adapters are used which are fastened to the blade of the shovel in a more or less permanent manner, and wear elements are used which are removably coupled in the adapters by means of a securing system provided with at least one pin. The coupling system between the wear element and the adapter is formed by a complementary cavity and nose, such that the cavity fits with the nose, it being common for the wear element to have the cavity and for the adapter to have the nose, although it could also be the other way around, this type of coupling being commonly identified as inverse systems.

[0006] The pin normally passes through at least one hole arranged in one of the walls of the wear element and a duct which crosses the nose of the adapter fastening the wear element to said adapter by means of the action of the pin. Alternatively, the wear element can have two holes in opposite walls, such that the pin crosses through both holes, as well as the duct which crosses the nose of the adapter. In any case, in order to guarantee the coupling between the wear element and the adapter, the pin is located between the wear element and the adapter, being fastened in the assembly position thereof by means of a retaining device which prevents the pin from coming out of said position when the system is in operation; in other words, when the assembly formed by the wear element, the adapter and the securing system, formed by the pin and the retaining device, are subjected to high tensions.

[0007] The retaining element is used in order to prevent the pin from coming out of the assembly position thereof, as it is responsible for locking the pin in the assembly position thereof, securing the coupling between the wear element and the adapter and, therefore, securing the assembly of the system or set. When the coupling systems work under difficult conditions, due to those forces, the tooth tends to come out of the assembly position thereof fitted in the adapter, the pin being what maintains the wear element, or tooth, fastened to the adapter, or tooth holder, and supporting all the tensions, the pin tending to move, come out and/or break due to said tensions. If this happens, both the pin and the wear element which separate from the adapter may be lost. The loss of a wear element, mainly a tooth, can be very damaging depending on the work site, not only because of the loss of time, but also because it can damage the adapter as well as

cause breakdowns in other machines, such as crushers, which may work in the same production site as the machine which uses the teeth, such as, for example, in mines or quarries.

[0008] As described above, the fastening system comprises a retaining device associated with a pin in order to prevent the pin from coming out of the assembly position thereof between the wear element and the adapter. The retaining device has elastic characteristics so that the pin can be fastened and released without needing to be broken, in a simple manner and preferably without a hammer.

[0009] The international application WO2017137619A1 describes a female part for excavators and the like comprising two holes in a wall, a first hole for enabling the insertion of a pin and a second hole for fastening and receiving a retaining device inside the cavity of the female part. It presents a retaining device which is directly coupled to the internal cavity of the female part or the wear element by means of integrated joining means, which is subsequently coupled to a male part. Said retaining device is located laterally inside the female cavity, between the wall of the cavity and the wall of the male part when both parts are coupled. In said position, the retaining device is protected from impacts inside the cavity when the coupling is in operation. The joining means of the retaining device enable the retaining device to be joined to the female part such that said joining means are integrated with the female part. Furthermore, the retaining device can be joined to the female part in the manufacturing installation and therefore both elements, the female part and the retaining device, can be supplied together as one component to the work site. In the work site, the female part will be coupled to a male part and a pin will guarantee the coupling between the male and female parts through the interaction of said pin with the retaining device. When the female part, a tooth or an intermediate adapter has to be replaced because it has become worn, the retaining device is changed at the same time, thus guaranteeing a correct operation since all the components are new. The insertion and extraction of the pin of the coupling is performed without a hammer, which means that no hammer impacts are necessary for the insertion or extraction of the pin. In fact, the pin is extracted by rotating the pin, which makes the pin system easy and safe to use.

[0010] However, in the solution described in the aforementioned document WO2017137619A1, the assembly of the retaining device requires subjecting said retaining device to forces which hinder the assembly thereof in the female part. For example, it must be flexed in order to be inserted and remain joined in a cavity made in the second hole of the female part, requiring force from the operator in order to place the retaining device in said cavity. In order to prevent the entry of fines, through the hole wherein the retaining device is secured to the female part, inside the coupling between the male part and said female part, in the state of the art it is necessary to ob-

struct said hole from the outside with a part independent from the previous ones, with the consequent additional step in the assembly, as well as the risk of said additional part coming loose from the hole, leaving the hole open.

[0011] Likewise, due to the increasing number of available components, the logistics for the organisation of said components becomes complicated and the information on the existing products increases, which makes it necessary to have an element that facilitates the identification of the different components participating in a coupling, enabling access to information about the different components, as well as the retaining device, in a simple manner, taking into account the type of components and the working conditions thereof. It is convenient to facilitate access to visual information, through videos or images, which enables the identification of the different components of the system, showing how to assemble and disassemble said components correctly and safely for the user, enabling access to the website of the manufacturer, the website of the product, the catalogue or technical support chat, among others.

[0012] The present invention makes it possible to solve the aforementioned problems existing in the state of the art.

Description of the invention

[0013] In order to overcome the aforementioned drawbacks, mainly simplifying the supporting or fastening of the retaining device in the cavity of a female part, as well as enabling the support of a data storage code of all or some of the elements participating in the coupling between the male part and the female part, a first object of the present invention is, therefore, a retaining device according to claim 1. Said data storage code enables access to information related to the different components of the system, instructions for assembling or disassembling them, videos or images of said instructions, information from the manufacturers, information on other related products, as well as products of the manufacturer among other information. Said information is preferably accessed through a mobile device with a camera and internet access, in order to then capture the data storage code, accessing the web page or pages with the required information. Said data storage code is preferably a QR code or BIDI code.

[0014] The retaining device comprises a body, preferably made of metal, with a hollow space determined by an upper section, a lower section, opposite from the previous one, and a rear section, in addition to a support element with elastic properties which is joined to said body. Said support element has a body with elastic properties and with a first base and a second base which is opposite from the first. Likewise, on said first base the data storage code is preferably arranged which enables access to the identification of one or all of the components making up the coupling between the female part, the male part, the retaining device object of the invention and the

pin, as well as accessing another type of information as mentioned above.

[0015] Said retaining device is inserted into the cavity of the female part and by means of the support element said retaining device is supported, or secured, inside said cavity. In particular, said female part has a body with a cavity with an inner end, an open end and side walls, wherein at least one of said walls has a first through hole, for the insertion of the pin, and a second through hole separated from the first and located between the inner end of the cavity and the first hole. The retaining device object of the present invention is supported in the female part by means of inserting the support element into the second through hole of the female part such that, thanks to the elastic properties or compression properties of the material of said support element, it is self-securing, self-fastening or self-supporting in said second hole, in other words, the support element is secured, fastened or supported by itself. In the hollow space of said retaining device, the pin is inserted for the fastening thereof to the coupling formed by the male part and the female part.

[0016] In accordance with the foregoing, a second object of the invention is, according to claim 9, a wear element comprising a data storage code accessible from outside the part. Preferably, said wear element is a female part with a retaining device in the cavity thereof and the support element of said retaining device inserted into a second hole of said female part. The wear element can be a female part such as a tooth, a tip or an intermediate adapter (in a three-part system: adapter, intermediate adapter and tip), but it could also be a male part.

[0017] The securing of the information storage code on the wear element, either directly on the body thereof or through intermediate elements, enables access to information on any of the elements making up the coupling, formed by the female part, the male part, the pin and the retaining device, as well as information related to the assembly thereof, information on the manufacturing method, mechanical properties of the components, the composition thereof, among other data. Said information storage code is preferably a BIDI code, a QR code or a barcode, among others, which is preferably a sheet adhered to said wear element.

[0018] Said female part, tooth or wear element receives the retaining device and comprises a cavity which fits with the projection of the male part, usually an adapter or tooth holder or an intermediate adapter or a weld-on or cast nose. In other cases, which are less frequent, the couplings are reversed and therefore the previous male and female parts are interchanged, such that, for example, the tooth or wear element, instead of having a cavity, has a projection and the tooth holder or adapter has a cavity. In these possible embodiments, the retaining device will be joined to the cavity of the tooth holder or adapter.

[0019] The configuration of the retaining device not only enables the coupling between a female part and a male part to be ensured, by acting as retaining for the pin which

crosses through the two previous parts, but also enables:

- Securing the retaining device inside the cavity of the female part by means of inserting the support element with elastic characteristics by pressure into the second hole of said female part, and
- Securing, also through said support element, specifically through the first base thereof, an information storage code of any of the elements making up the coupling, formed by the female part, the male part, the pin and the retaining device. Said information storage code is preferably a BIDI code, a QR code or a barcode, among others, which is preferably a sheet adhered to said support element.

[0020] By arranging the retaining device of the support element with these elastic properties, it is sufficient for the user to insert the support element by pressure into the second hole, preventing having to handle the body of the retaining device, which is stiffer and preferably made of metal, in order to insert it into a housing inside the cavity arranged to this end, as occurs in the state of the art. Furthermore, the prior solution of the state of the art requires more complicated manufacturing moulds of the female part with internal housings. The elastic properties of the support element compared to the lower elasticity of the female part enable said support element to be deformed in order to be inserted into the second hole and expand therein, guaranteeing the securing thereof in said second hole. The female part is usually obtained by a casting process wherein due to the ample tolerances of the process, it is difficult to specify the dimensions of the holes, and therefore the elasticity of the support element enables a good fit for the retention thereof in the second hole of the female part.

[0021] When inserting the support element into the second hole, the second base of the support element will be maintained inside the cavity while the first base of said element will face the outside. On this first base, the information storage code will be arranged, preferably adhered, so that from outside the female part an operator can access the same by means of the corresponding reader device, preferably a camera of a mobile device or a barcode reader, depending on the type of code used.

[0022] The securing of the information storage code on the support element prevents having to place said code on the female part or on the male part as described above. The arrangement of the code on either of these two parts has the difficult adherence of the code on a cast part as the main drawback. After the part is manufactured, it can be subjected to a drying and painting process after which the code should be adhered. In addition to the problems of the adhesion of the code on the cast part, it must be taken into account that these parts are subjected to handling and transportation during which they can receive blows from other parts that could damage the code as well as contribute to the detachment thereof from the part. In this manner, by arranging the

code on the support element, the code is protected by guaranteeing that it is functional.

[0023] In order to protect the information code arranged on the first base of the support element while it is accessible from the outside, preferably the distance between the first and second bases of the support element is smaller than the depth of the second hole of the female part or thickness of the side wall containing said second hole.

[0024] Likewise, the transverse cross section of the support element which is inserted into the second hole is larger than the cross section of the second hole in order to guarantee the insertion of the element by pressure into said hole and in order to guarantee the fastening therein. Preferably, the shape of the cross sections of the second hole and of the support element are similar in order to achieve a perfect fit between both of them and thus prevent unwanted movements of the retaining device, as well as the inlet of fines into the female part.

[0025] The coupling method between a female part with the retaining device object of the present invention and a male part would be as follows:

- Insertion of the retaining device into the cavity of the female part,
- Insertion of the support element into the second through hole in one of the walls of the female part, leaving the hollow space of the body of said retaining device facing the first hole of the female part,
- Arrangement of the female part on the male part by means of the fitting of the cavity of the female part with the nose of the male part, leaving the body of the retaining device between the female part and the nose of the male part
- Insertion of a pin through a hole in the wall of the female part such that said pin crosses through said wall, and subsequently crosses through the hollow space of the retaining body until it reaches the nose of the male part, the end of the pin remaining retained in the hollow of the retaining body. Alternatively, the pin can be inserted through a hole in the wall of the female part, subsequently crossing through the nose of the male part in order to then cross through the hollow space of the retaining body. Therefore, the retaining body can be arranged on either of the two sides of the nose, between the wall of the female part and said nose, or even on both sides of the nose. The shape of the body of the retaining device and the characteristics of the material must provide the retaining device with a certain flexibility which enables the pin to cross through the hollow space delimited by the body so that the pin can be fastened and also released when it crosses through said hollow space.

[0026] Although throughout the description reference is only made to the arrangement of a retaining element inside the cavity of a female part, it is possible to insert

two retaining devices into walls facing each other, it therefore being necessary that both walls have at least one first hole for receiving the pin and a second hole for receiving the support element of each retaining device. In this case, two pins are arranged, one on each side of the nose of the male element such that each pin crosses through approximately half of said nose, in other words, they do not cross through the entire nose. It could also be one which crosses through the entire male part.

[0027] The retaining device can have different configurations. In a first configuration, the retaining device has an elongated body, with an upper section and a lower section approximately parallel to each other and a rear section which is perpendicular to both, it being located at a first end of the body, the three sections determining a U shape with a hollow space. Each of these two sections, upper and lower, has a front section with a free end at a second end, opposite from the first end and therefore opposite from the rear section, each of these free ends being joined to the support element. Preferably, said front sections approach each other in an oblique section until they reach the support element.

[0028] The elongated body of the retaining device is made of a stiff material, preferably a wire or band preferably with a circular cross section, although they can also have a square or rectangular cross section. The material is preferably steel, although it can also be a plastic or Teflon material.

[0029] Also preferably, said free ends form a bend of at least 90°, thus determining a section perpendicular to the front section for the joining thereof to the support element. Said free ends can be inserted into the support element or they can be coupled to the sides of said support element which have slits wherein the free ends of the support element will be coupled, as well as a portion of the upper and lower sections of the second end of the body of the retaining device. In this second construction, the free ends and the portion of the sections coupled to the support element are partially inserted into the slits of said wear element, such that a cross section of the retaining body protrudes from the support element, enabling the contact of the material of the retaining element, usually metal, with the material of the female part, also metal. This contact helps to prevent possible losses of tension in case there is a massive wear of the support element.

[0030] In both previous configurations, the support element has an L-shaped longitudinal cross section, such that one portion is inserted into the second hole of the female part while the other portion remains inside the cavity, this being wherein the upper and lower sections of the second end of the body of the retaining device rest. Furthermore, the support element can have different flexible ribs or fins which, depending on the location thereof, will contribute to a better fit between said support element and the components which are in contact with it. For example, when the fins are arranged on the surfaces of the support element in contact with the inside of the second

hole, the fit between said support element and said hole will be improved. Furthermore, when a rib or fins are arranged on the surface of the support element which will be facing the nose of the male element, a greater sensation of tension will be achieved in the lateral movements and damping will be achieved in the vertical movements of the female part with respect to the male part.

[0031] The joint or coupling between the free ends of the arms of the elongated body and the support element can be accentuated, in addition to inserting said ends into the support element, by means of using different fastening means. For example, the free ends can be adhered to the inside of the support element, or the free ends are inserted by pressure into the cavity inside the support element, or the support element is injected onto the aforementioned free ends. Other fastening means may exist which guarantee that the free ends remain fastened to the inside of the support element in order to ensure the integrity of the retaining device during the assembly, use, and disassembly thereof.

[0032] Sometimes, for example, in fittings with large dimensions wherein the length of the body of the retaining device is large and with a fastening point to the female part, the position thereof is not completely stabilised, so it may be necessary to not only ensure the position of the retaining device in the female part through the securing of the front part thereof by means of inserting the support element into the second hole, but it may also be necessary to ensure the position of the retaining device in the rear portion thereof closer to the opening of the cavity of the female part through the first end thereof, such that the retaining device remains ensured on the wall of the female part by two different points.

[0033] To do so, in a first alternative it is possible that the upper and lower sections are bent at the first end thereof, or rear end, approximately 90° in the vicinity of, and before reaching, the rear section of the body of the device, thus determining a second upper section and a second lower section approximately 90° from the upper and lower sections of the body of the retaining device. The purpose of said second sections is, together with the rear section, to act as support for the retaining device on the perimeter surface of the opening of the cavity of the female part.

[0034] A second alternative in order to immobilise the retaining device at the rear end or first end thereof, consists of arranging a second support element between the opening of the cavity of the female part and the first hole wherein the pin will be inserted. For this solution, the female part must incorporate a third through hole, between the first through hole and the opening of the cavity, which will receive said second support element.

[0035] In an alternative configuration of a retaining device, the body of the device is a laminar body, preferably made of metal, with an upper section and a lower section parallel to each other separated by a rear section and a front section also parallel to each other, and said upper and lower sections preferably perpendicular. The four

sections determine a closed frame with a hollow space. At least one of the two upper and/or lower sections has at least one flexible flange joined at one of the ends thereof to one of the sections on the side of the hollow space such that the free end of the flange is opposite from the joining end thereof with the section. Said free end of the flange moves away from the hollow space. The front section of the body remains joined to the support element. For said joint, joining means are provided between at least the front side of the retaining body and the support element. Said joining means can be formed by an extension of said front side of the body of the device comprising a hole wherein a projection existing in the same body of the support element is inserted, such that the shape of the hole of the extension of the front side is complementary to the shape of the projection of the support body. The projection of the support body is inserted by pressure into said hole.

[0036] Likewise, the body preferably has two flanges, one in the upper section and the other in the lower section, such that the free ends of the flanges move away from the hollow space of the body while they approach each other. These flanges are an extension of the upper and lower sections, and can be flat or slightly curved.

[0037] The material of the body of the retaining device in this configuration is a plate, preferably made of steel, although it could also be Teflon or a plastic material.

[0038] Delving into the second object of the present invention, the female part according to claim 12, the cavity of the female part has the second hole in the same wall as the first hole and towards the lower end of the cavity. The centres of the first and second holes are preferably located in the same axis, both holes being symmetrical with respect to said axis or said axis dividing the wall of the female part into two parts with a similar size. Said first and second holes are preferably located inside a flat recess or recessed surface in the wall inside the cavity. Furthermore, the depth of the recessed surface will preferably be the same or slightly larger than the width of the elongated body of the retaining device in order to prevent the interference of the retaining device joined inside the female part with the male part when the male part is inserted into the cavity of the female part. The recessed surface could alternatively be placed on the outer wall of the projection or nose of the male part, whereby the interference when the male part is inserted into the cavity of the female part would also be prevented.

[0039] The female part must be coupled to the male part comprising the projection or nose to be inserted into the cavity of the female part, and said projection or nose is provided with a channel or through duct from one side of the projection to the other. Said duct houses the retaining pin during the coupling of the female part with the male part. Sometimes, the duct does not cross through the entire projection or nose, in other words, the duct does not need to be a through duct. Preferably, when the duct in the male part crosses the projection or nose, the female part will also have two holes for receiving the pin,

but this is not mandatory.

[0040] Looking deeper into the aforementioned steps for the coupling of a male part and a female part:

- Before the coupling of the male part and the female part, the retaining device which will serve to fasten the pin in the working position thereof must be joined to the cavity of the female part.
- Prior to the coupling of the retaining device in the female part, it is necessary to perform the assembly of said retaining device by means of joining the body of the retaining device and the support element. This facilitates the storage of the retaining device with the components thereof already assembled and already joined to the inside of the female part, while minimising possible assembly errors by the end user.
- For the joining of the retaining device to the female part, it will be necessary to insert the retaining device into said cavity and then insert the support element by pressure into the second hole, such that the external base of the support element is facing the outside through said second hole.
- The entire retaining device is maintained inside the recess or lower surface of the wall inside the cavity, the depth of the recess or lower surface being the same or slightly larger than the width of the body of the retaining device.
- Once the retaining device is installed inside the cavity of the female part, the sections of the elongated body or the flanges of the laminar body interfere with the first hole wherein the pin will be inserted, the distance between the parallel sections of the upper section and lower section in the elongated body, and the distance between the flanges of the laminar body, being smaller than the diameter of the first hole.
- Once the retaining device is fastened inside the cavity of the female part, and more specifically in the recess of the inner wall of the cavity, the cavity of the female part fits with the projection or nose of the male part in order to couple said female part to the male part. The retaining device sits between the surface of the recess of the cavity and the surface of the projection of the male part when the projection is inside the cavity.
- In this position, with the retaining device interfering with the first hole of the female part and located between said first hole and the inlet to the duct of the projection in the male part, the pin is inserted through the first hole of the female part. The pin causes the separation of the parallel upper and lower sections, or the separation of the flanges, from the retaining device and enables the insertion of the pin until at least one of said parallel upper or lower sections, or the flanges, has at least one notch or slot made in the surface of the pin wherein it houses the section or the flange of the retaining body. In this position, the pin is retained inside the male and female parts

coupled in an assembly position, both parts having a fitted coupling and preventing both parts from separating.

- In order to release the pin, it will only be necessary to rotate the pin with a tool which is inserted into a housing in the base of one of the ends of the pin such that the rotation will release the pin from the parallel upper and lower sections, or from the flanges, since they will come out of said notch or notches in the pin.

[0041] As mentioned above, a single retaining device or two retaining devices can be arranged, either for the fastening of a single pin which completely crosses through the assembly from one wall of the female part to the opposite wall of the female part, or for the fastening of two pins each inserted through a wall of the female part.

[0042] The inner wall of the female part which will house the retaining device can have, as said, different configurations. For example, it may have a first hole for the passage of the pin and a second through hole for housing the support element. Alternatively, it may have a third hole for housing a second support element arranged in the retaining device.

[0043] Likewise, the first and second holes can be separated or close to each other, when it is necessary to improve the strength and flexibility of the female part in the area for fastening to the female part. If the first and second holes are close, that area of the side wall is equipped with greater flexibility for the absorption of forces than a wall with the two separated holes, which will have a higher rigidity since many tensions will be centred between both holes since they are areas of the side wall wherein the pin makes contact. The fact that both holes are communicated with each other causes the area of the wall to lose rigidity, adapting better to the tensions, in other words, it better absorbs the tensions by increasing the breakage threshold of the wall in that area.

Brief description of the drawings

[0044] In order to better understand the previous description, drawings are joined wherein several practical embodiments are schematically represented and only by way of non-limiting example.

Figure 1 shows an exploded perspective view of an embodiment according to the invention.

Figure 2 is a side view of a female part with a retaining device.

Figure 3 shows a cross section of a female part with a retaining device.

Figure 4 shows a perspective view of a first embodiment of a retaining device according to the invention.

Figure 5 shows a plan view of the retaining device shown in Figure 4.

Figure 6 shows a side view of the retaining device shown in Figure 3, with the cap in cross section.

Figure 7 shows a perspective view of a female part

with two retaining devices in the cavity thereof.

Figure 8 shows a longitudinal cross section of the female part of Figure 7.

Figure 9 shows a side view of the female part of Figure 7 with the retaining device.

Figure 10 shows a perspective view of a second embodiment of a retaining device according to the invention.

Figure 11 shows a side view of the retaining device shown in Figure 10.

Figure 12 shows a plan view of the retaining device shown in Figure 10.

Figure 13 shows a side view of the retaining device shown in Figure 10, with the cap in cross section.

Figure 14 shows a perspective view of a third embodiment of a retaining device according to the invention.

Figure 15 shows another perspective view of the third embodiment of the retaining device.

Figure 16 shows a side view of a female part with the retaining device of Figures 14 and 15 joined to said female part.

Figure 17 shows a cross section of Figure 16, with the retaining device of Figures 14 and 15 coupled on a wall of the cavity of a female part, according to the cross section line A-A'.

Figure 18 shows a plan view of a tooth incorporating the retaining device (not shown) of Figures 14 and 15.

Figure 19 shows a cross section of Figure 18 according to F-F'.

Figure 20 shows a cross section of Figure 19 according to E-E'.

Figure 21 shows a perspective view of the inside of the cavity of a female part with an alternative configuration to the one shown in the previous figures for receiving a fourth embodiment of a retaining device. Figure 22 shows a perspective view of a fourth embodiment of a retaining device with a support element.

Figure 23 shows a rear perspective view of the image of Figure 22.

Figure 24 shows the female part of Figure 21 with the retaining device and support element of Figures 22 and 23, on both walls of the female part.

Figures 25 to 28 show different views of the support element of Figures 22 and 23.

Description of preferred embodiments

[0045] Starting from the previous figures, a description will be made of the different embodiments shown in said figures.

[0046] Figure 1 shows a coupling system between a female part (10) and a male part (100) by means of a pin (90) and a first exemplary embodiment of a retaining device (50) according to the present invention.

[0047] Figures 2 and 3 show a first exemplary embodiment of a female part (10) with a cavity (14), with an inner end (13), an open end or opening (15), opposite from the inner end (13) and with a perimeter surface and side walls. At least one of said walls has a first through hole (11) and a second through hole (12) separated from the first (11) and said second hole (12) located between the inner end (13) of the cavity (14) and the first hole (11).

[0048] Inside said cavity (13) a first embodiment of a retaining device (50) is arranged comprising a support element (20), with elastic properties, inserted into the second hole (12), such that the retaining device (50) is supported in the female part (10) by being coupled to the same through said support element (20).

[0049] Figures 4 to 6 show said first embodiment of the retaining device (50) object of the invention. In said figures, the retaining device (50) is seen with an elongated body (30) which is bent determining a rear section (33), an upper section (31) and a lower section (32), the latter two being substantially parallel. This body (30) extends from the first closed bend of the front section (33) to a second end, opposite from said rear section (33) and wherein the ends of the sections are free and through them they are joined to the support element (20) of the retaining device (50). Following the parallel upper (31) and lower (32) sections, an oblique section (34) starts which makes the free ends converge, and after a bending of at least 90° a section (35) approximately perpendicular to the oblique section (34) is determined which is inserted or joined to the support element (20). Both oblique sections (34) make up the front section (34) of the body of the retaining device (50). The front section (34) has, integral with it, a support element (20) forming a first embodiment of a retaining device (50). The support element (20) is secured to the body (30) by means of the section (35), formed by the free ends of the arms (31, 32), which are inserted into said support element (20).

[0050] The support element (20) has a prismatic body with a first base or external base (21) and a second base or internal base (22). The section (35) which defines the free ends of the sections (31, 32) of the body (30) is inserted into the support element (20) through the internal base (22). The external base has a data storage code, preferably a QR or BIDI code, preferably adhered to said external base (21). The shape of the cross section of the prismatic body of the support element (20) preferably coincides with the shape of the cross section of the second hole (12) of the female part (10) wherein the support element (20) will be inserted in order to ensure the position of the retaining device (50) inside the female part (10). In order to achieve a fit between the support device (20) and the second hole (12) of the female part (10), the cross section of said support device (20) must be slightly larger than the cross section of the second hole (12). To do so, the retaining device (50) is inserted into the cavity (14) of the female part (10) and the elastic body of said support device (20) fits inside the second hole, the support device remains fastened by the tension that this exerts when it is compressed in the second hole, in other

words, by the decompression force. The external base (21) with the data storage code thus remains on the outside of the female part (10), being able to be consulted by the operators and users, while the internal base remains inside the cavity (13). Said data storage code located in the external base (21) can incorporate information from any of the components of the system, in other words, it can include information about the female part, a male part, the retaining device, as well as a pin which will complete the coupling between the female part and the male part. The data storage code, in addition to enabling access to information related to the different components of the system, enables access to other types of information, such as safety instructions, instructions for the assembly or disassembly of the components, videos or images of said instructions, information about manufacturers, information about other related products, as well as products of the manufacturer, among other information. Said information is preferably accessed through a mobile device with a camera and internet access, in order to then capture the information storage code, accessing the web page or pages with the required information. Said data storage code is preferably a QR code or BIDI code.

[0051] The support element (20) has in this example an L-shaped configuration, but any other configuration would be possible depending on the constructive requirements required.

[0052] Likewise, in this first exemplary embodiment, the free ends of the sections (31, 32) of the body (30) of the retaining device (50) converge for the joining thereof with the support element (20), but it must be taken into account that other possible constructions are possible wherein, for example, the free ends do not converge and are maintained parallel until the joining thereof with the support device.

[0053] The upper (31), lower (32), rear (33) and front (34) sections of the body (30) of the retaining device (50) determine a hollow space (39) between them. Said hollow space (39) will receive a retaining pin (90) which is used to ensure the coupling between the female part (10) and the male element (100) inserted into the cavity (14) of the female part (10). The pin (90) is inserted into the female part (10) through the first hole (11) of one of the walls of the female part (10) facing each other. Said pin (90) has notches (91) into which the upper section (31) and the lower section (32) of the body (30) will be inserted, thus fastening the position of the pin (90) and ensuring the coupling between the male element (100) and the female part (10). Likewise, if a retaining device (50) is arranged in each of the two walls of the female part (10) facing each other, two pins (90) may be used which will cross through said holes in the walls, and the retaining devices will insert each of the pins (90) up to half of the duct (101) arranged in the nose (102) of the male part (100).

[0054] Figures 10 to 13 show a second embodiment of a retaining device (50') according to the present inven-

tion. This second device (50') is similar to the previous one with the difference that the upper (31) and lower (32) sections are bent approximately 90° by a bend (36) in the vicinity of the rear section (33) of the body (30). In this second example, the rear section (33) remains outside the female part (10) resting on the perimeter surface (15) of the opening of the cavity (14). Figures 7 to 9 show this retaining device (50') in the cavity (14) of a female part (10). Specifically, two retaining devices (50') arranged on two walls of the female part (10) facing each other are shown. It is observed how said retaining devices (50') cross the first hole (11) of the walls and how the support element (20) is inserted into the second hole (12) of said walls.

[0055] The elongated body (30) of the previous embodiments of the retaining device (50, 50') is preferably a steel wire with a circular cross section, although said cross section could also be square or rectangular, among others.

[0056] Figures 14 to 20 show a third exemplary embodiment of a retaining device (50'') according to the present invention. This third embodiment of the retaining device (50'') has a body similar to those of the first (50) and second (50') embodiments of the retaining device, in other words, approximately parallel upper (31) and lower (32) sections which are bent approximately 90° by a bend (36) in the vicinity of the rear section (33) of the body (30). As in the second example of the retaining device (50'), the rear section (33) remains outside the female part (10) in order to rest on the perimeter surface (15) of the opening of the cavity (14) of the female part (10).

[0057] As in the two previous configurations (50, 50'), the support element (70) of this third embodiment of the retaining device (50'') has an L-shaped longitudinal cross section, such that the front section (35), approximately perpendicular to the oblique section (34) of each upper (31) and lower (32) section, is coupled by pressure to respective slits located in the sides of the support element (70). This coupling between the body of the retaining element (50'') and the support element (70) enables, as seen in Figure 19, cross section of the female part of Figure 18, the front sections (35) of the body of the retaining element (50'') to protrude from the support element (70) such that the metal body of the front sections (35) is in contact with the inside of the second hole (12). This support element (70) has an external base (71) with the data storage code which thus remains on the outside of the female part (10), being able to be consulted by operators and users, while the internal base (72) remains inside the cavity (13) of the female element (10).

[0058] The support element (70) has in this third exemplary embodiment (50'') flexible ribs or fins (74) which contribute to a better fit between said support element (70) and the components which are in contact with it. By arranging fins (74) on the surfaces of the support element (70) in contact with the inside of the second hole (12), on the surface perpendicular to the external base (71), the

fit between said support element (70) and said hole (12) of the female part (12) will be improved. Figure 17 shows a cross-sectional view of a female part (10), shown in Figure 16, with the third retaining device (50") in use, coupled to said female part (10) wherein the contact between the fins (74) and the inside of the hole (12) is observed, increasing the fit between both elements. Likewise, the support element (70) comprises a rib or fin (75) on the surface of the support element (70) which will be facing the nose (102) of the male element (100), as seen in Figure 20, which shows a longitudinal cross section of the female part (10) with the device (50") coupled. By means of these fins (74, 75) a higher tension in the lateral movements and a better damping in the vertical movements of the female part (10) with respect to the male part (100) will be achieved.

[0059] Figure 21 shows a second exemplary embodiment of a female part (10) with holes which have an alternative configuration to that of the previous figures. Specifically, the female part (10) of this embodiment also has four walls, two upper walls (16) and two side walls (17), in pairs facing each other. Likewise, in one of the side walls (17) two holes are arranged, a first hole (11) for the insertion of the coupling pin between the female part (10) and the male part, and a second hole (12) to house the support element (60) of a third exemplary embodiment of a retaining device (80).

[0060] Both holes (11, 12) can be completely separated by a portion of the wall, as in the first exemplary embodiment of a female part (10), or, as shown in Figure 21, be connected by means of a small opening (18) in the portion of wall separating both holes (11, 12). This cavity (18) which joins both holes (11, 12) is used to release tensions in the area wherein the pin rests in the wall of the female part (10).

[0061] The third exemplary embodiment of a retaining device (80) used in the previous female part (10) is shown in Figures 22 and 23, as well as incorporated in a female part (10) in Figure 24.

[0062] This third embodiment of a retaining device (80) has a laminar body (40) which determines a closed frame, with four sides or sections, an upper section (41), a lower section (42), a rear section (43) and a front section (44), these sections determining the perimeter of the frame with a hollow space (49) inside said frame. Projecting towards the inside of the hollow space (49), at least one flexible flange (48) comes out from at least the upper section (41), and preferably also from the lower section (42), such that the free end of the flange, opposite from the joining end with the upper section (41) and/or lower section (42) moves away from the hollow space (49). These flanges (48) will be the ones intended to be inserted into the notches (91) existing in the surface of the pin (90) used for the coupling and retention between the female part (10) and the male part (100).

[0063] This retaining device (80) comprises a support element (60) which is joined to the front section (44), or to an extension thereof, by means of joining means. Said

joining means consist of an extension or elongation of the body (40) of the retaining device (80) which have a hole (45). In said hole (45), a projection (63) of the support element (60) will be inserted. The hole (45) and the projection (63) preferably have complementary cross sections, such that the projection (63), due to the elastic nature of the support element (60), is inserted by pressure into the hole (45), both elements remaining joined.

[0064] Likewise, the retaining device (80) has a second extension (46) on the side of the rear section (43) which ends in a flange (47). This flange (47) will be inserted into a suitable space existing in the perimeter surface of the opening (15) to the cavity (14) of the female part (10), thus contributing to the securing of the retaining device (80) in said cavity (14).

[0065] The body (40) of this third exemplary embodiment of the retaining device (80) is preferably obtained starting from a steel plate or flat sheet.

[0066] The support element (60) of this third embodiment is shown in Figures 25 to 28. As in the previous embodiments, the support element (60) has a second base or internal base (61) intended to be maintained inside the cavity (14) and a first base, external base or surface (62) which will be accessible from the outside and incorporates the data storage code, preferably in the form of a QR code or BIDI code. Likewise, this support element (60) has two mostly flat lateral surfaces, a projection (63) being arranged on one of them for the insertion thereof into the hole (45) of the body (40) of the retaining device (80). This side surface further incorporates a recess for the insertion therein of the extension of the laminar body (40). In order to ensure the press-fit between the support element (60) and the first hole (11) of the female part (10), the side surfaces of the support element (60), except for the one incorporating the projection (63), have ridges (64).

[0067] As in the support element of the first exemplary embodiments, the material of the support element (60) of the retaining device (80) of this third embodiment is preferably elastic and the shape of the cross section thereof is complementary to that of the hole (11) although slightly larger for the press-fit thereof.

[0068] This third embodiment of the retaining device (80) is inserted, as seen in Figures 22 and 23, into a female part (10) wherein the two holes (11, 12) thereof meet, as mentioned, connected to each other, enabling in this manner the installation of the retaining device (80) inside the cavity (14) of the female part (10). As also mentioned, alternatively, the female part (10) could have the two holes (11, 12) thereof separated as in the example of Figures 7 to 9.

[0069] In another preferred embodiment not shown in the figures, the retaining device can incorporate two support elements, one in the front section and one in the rear section of the elongated or laminar body. For the coupling thereof to the female part, it is necessary that, instead of having two holes, it has three holes, two for receiving the support elements of the retaining device and one for re-

ceiving the pin. Preferably, this third hole for receiving a support element will be arranged between the first through hole and the open end (15) or opening of the cavity of the female part. In this solution, the holes may be separated from each other, or close to each other, or two close to each other and two separated.

[0070] In accordance with the previous embodiments, and with reference to Figure 1, although it can be extrapolated to the other constructions, the coupling between a female part (10) and a male part (100) is performed by following the following steps:

- Before the coupling of the male part (100) and the female part (10), the retaining device (50, 50', 50", 80), which will serve to secure the pin (90) in the working position thereof, must be joined to the cavity (14) of the female part (10).
- For the joining of the retaining device (50, 50', 50", 80) in the female part (10), it will be necessary to insert said retaining device (50, 50', 50", 80) into said cavity (14) and then insert the support element (20, 70, 60) by pressure into the second hole (12), such that the external base (21) of the support element (20, 70, 60) with the identification code is facing the outside through said second hole (12).
- Thus, the entire retaining device (50, 50', 50", 80) is maintained inside a recess or lower surface of the wall (17) inside the cavity (14) of the female part (10), the depth of the recess being the same or slightly larger than the width of the body (30, 40) of the retaining device.
- Once the retaining device (50, 50', 50", 80) is installed inside the cavity (14) of the female part (10), the sections (31, 32) of the elongated body (30) or the flanges (48) of the laminar body (40), cross the first hole (11) wherein the pin (90) will be inserted, the distance between the parallel sections of the upper section (31) and the lower section (32) in the elongated body (30) of the first, second or third embodiments of the retaining device (50, 50', 50"), and the distance between the flanges (48) of the laminar body (40) of the fourth exemplary embodiment of the retaining device (80) being smaller than the diameter of the first hole (11).
- Once the retaining device (50, 50', 50", 80) is fastened inside the cavity (14) of the female part (10), and more specifically in the recess of the inner wall (17) of the cavity (14), the projection or nose (102) of the male part (100) slides inside the cavity (14) in order to couple said male part to the female part (10). The retaining device (50, 50', 50", 80) is seated between the surface of the recess of the cavity (14) and the surface of the projection or nose (102) of the male part (100) when the projection or nose (102) is inside the cavity (14).
- In this position, with the retaining device (50, 50', 50", 80) interfering with the first hole (11) of the female part (10) and located between said first hole

(11) and the inlet to the duct of the projection or nose (102) in the male part (100), a pin (90) is inserted through the first hole (11) of the female part (10) and into the duct (101) of the nose (102) of the male part (100). The pin (90) causes the separation of the parallel upper (31) and lower (32) sections, or the separation of the flanges (48), from the retaining device (50, 50', 50", 80) and enables the insertion of the pin (90) until at least one of said parallel upper (31) or lower (32) sections, or the flanges (48), has at least one notch or slot (91) made in the surface of the pin (90) wherein it houses the section (31, 32) or the flange (48) of the body (30, 40) of the retaining device (50, 50', 50", 80). In this position, the pin (90) is fastened inside the male (101) and female (10) parts coupled in a retaining position, both parts (101, 10) having a fitted coupling and preventing both parts from separating.

- In order to release the pin (90), it will only be necessary to rotate it with a tool which is inserted into a housing (92) in the base of one of the ends of the pin (90) such that the rotation will release the pin (90) from the parallel upper (31) and lower sections (32), or from the flanges (48), since they will come out of said notch or notches (91) in the pin (90).

[0071] Depending on the operating needs of the assembly between the female part (10) and the male part (100), as well as the dimensions of said parts, it may be necessary to use a single retaining device (50, 50', 50", 80) between the female part (10) and the nose (102) of the male part (100), or two retaining devices (50, 50', 50", 80) arranged between two opposite walls of the female part (10) and the nose (102) of the male part (100). Once both parts (10, 100) have been coupled with the retaining device or devices (50, 50', 50", 80) between them, one or two pins (90) are then inserted through the hole or holes in the walls of the female part (100) which will completely or partially cross through the duct (101) arranged in the nose (102) of the male element (100).

Claims

1. A retaining device (50, 50', 50", 80) for a female part (10) for excavators and the like, said female part having a cavity for receiving a nose of a male part, and said device comprising a body (30, 40) with a hollow space (39, 49) determined by an upper section (31, 41), a lower section (32, 42), opposite from the previous one, and a rear section (33, 43) **characterised in that** it has a support element (20, 70, 60) with elastic properties (20, 60) joined to said body (30, 40).
2. The device (50, 50', 50", 80), according to claim 1, **characterised in that** the support element (20, 60) has a body with a first outer base (21, 62) and a

second base (22, 61) opposite from the first base (21, 62).

3. The device (50, 50', 50", 80), according to claim 2, **characterised in that** it comprises a data storage code in the first base (21, 62) of the prismatic body of the support element (20, 60). 5
4. The device (50, 50', 50"), according to any of the preceding claims, **characterised in that** the body (30) is an elongated body wherein the upper section (31) and the lower section (32) are parallel and are separated by the rear section (33), this determining a first end substantially perpendicular to both upper (31) and lower (32) sections, and each of these two sections (31, 32) having a front section (34) with a free end (35) at a second end opposite from the rear section (33), such that both free ends (35) are joined to the support element (20). 10
5. The device (50, 50'), according to claim 4, **characterised in that** the second base (22) of the support element (20) comprises an opening into which the ends (33) of the elongated body (30) are inserted for the joining thereof to the support element (20). 15
6. The device (50"), according to claim 4, **characterised in that** the support element (70) comprises two slits for the insertion thereof by pressure of the free ends (35) of the elongated body (30). 20
7. The device (50, 50', 50"), according to claim 5 or 6, **characterised in that** the support element (20, 70) has an L-shaped longitudinal cross section. 25
8. The device (80), according to any of claims 1 to 3, **characterised in that** the body (40) is a laminar body wherein the upper section (41) and the lower section (42) are parallel and are separated by the rear section (43) and a front section (44) parallel to said rear section, determining a closed frame, and having at least one flexible flange (48) joined at one of the ends thereof to one of the sections (41, 42) of said body (40) by the hollow space (49), the free end of the flange being opposite from the joining end with the section (41, 42), away from the hollow space (49) and at least the front section (44) joined to the support element (60). 30
9. A wear element for excavators and the like, **characterised in that** it comprises a data storage code accessible from outside the part. 35
10. The wear element, according to claim 9, **characterised in that** it is a female part (10) with a body with a cavity comprising an inner end (13), an open end (15) and side walls (14), wherein at least one of said walls (14) has a first through hole (11) and a second through hole (12), located between the inner end (13) of the cavity and the first hole (11), with a retaining device (50, 50', 50", 80) according to claim 1 inside the aforementioned cavity, with the support element (20, 70, 60) inserted into the second hole (12) with the second base thereof inside the cavity and the first base (21, 71, 62) thereof facing the outside through the second hole (12). 40
11. The wear element, according to claim 10, **characterised in that** the data storage code is arranged on the first base (21, 71, 62) of the retaining device. 45
12. The wear element, according to any of claims 10 to 11, **characterised in that** the thickness of the side wall (14) is larger than the distance between the first and second bases of the support element (20, 70). 50
13. The wear element, according to any of claims 10 to 12, **characterised in that** the cross section of the second hole (12) is smaller than the cross section of the support element (20, 70, 60) 55
14. The wear element, according to any of claims 10 to 13, **characterised in that** the support element (20, 70 and 60) is inserted by pressure into the second hole (12).
15. A part, according to claim 10, **characterised in that** the first hole (11) is close to the second hole (12).

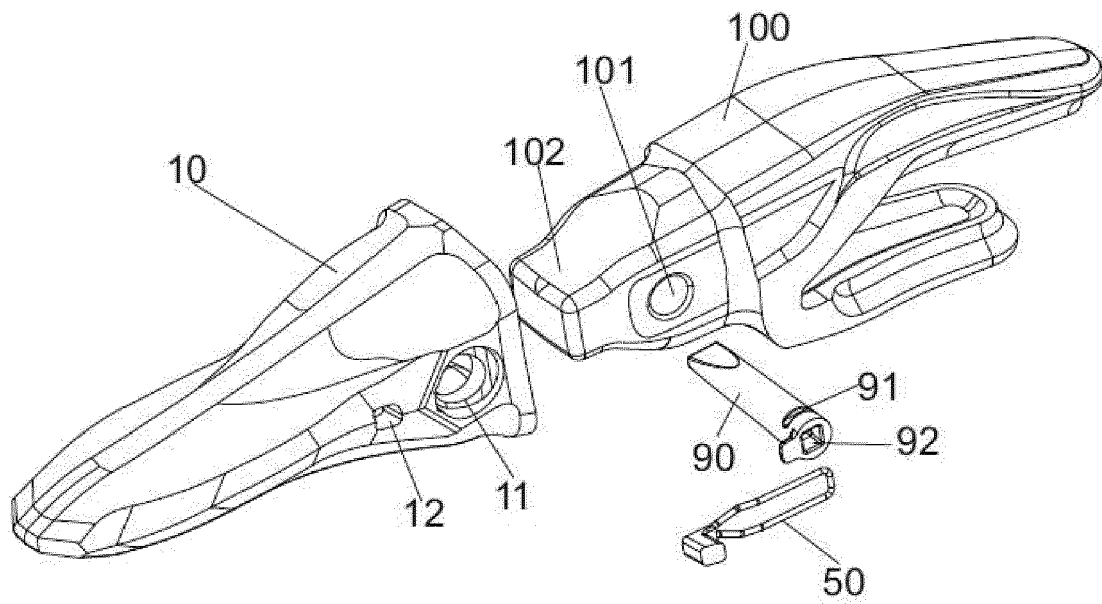


Fig. 1

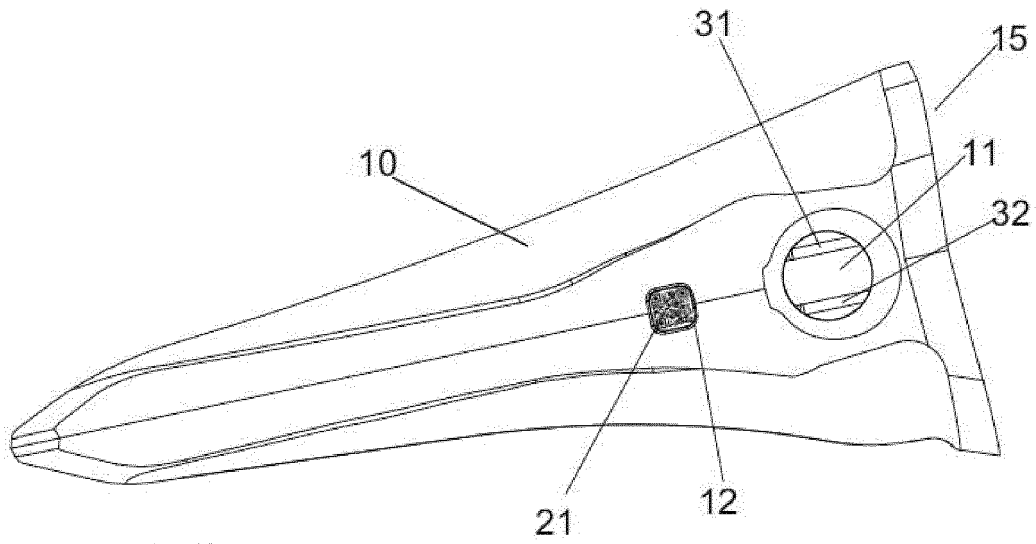
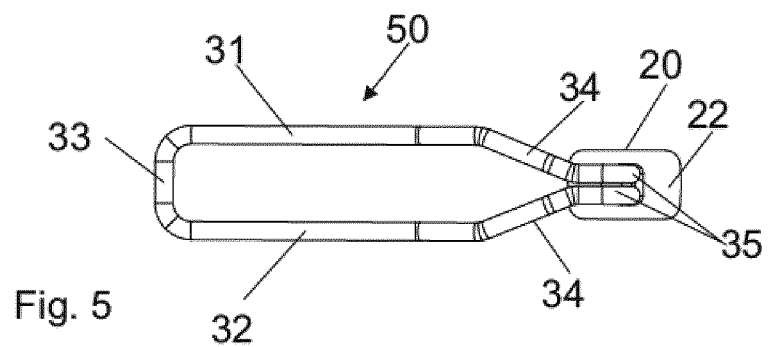
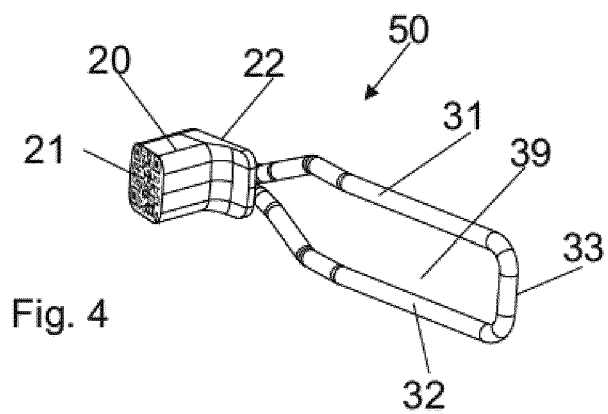
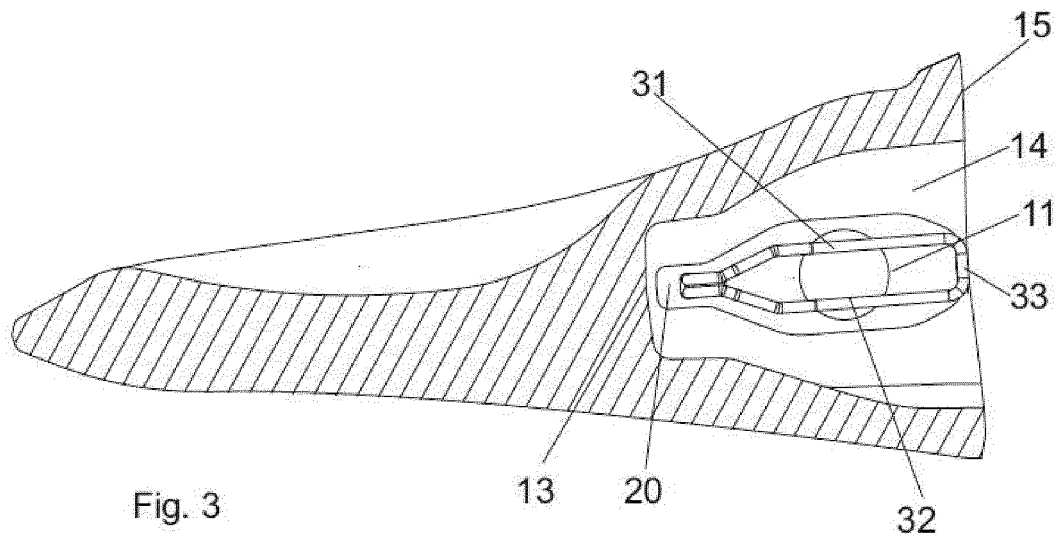
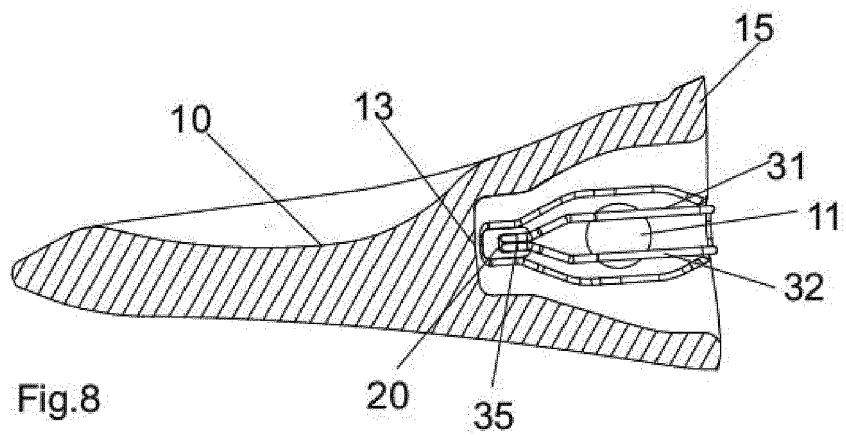
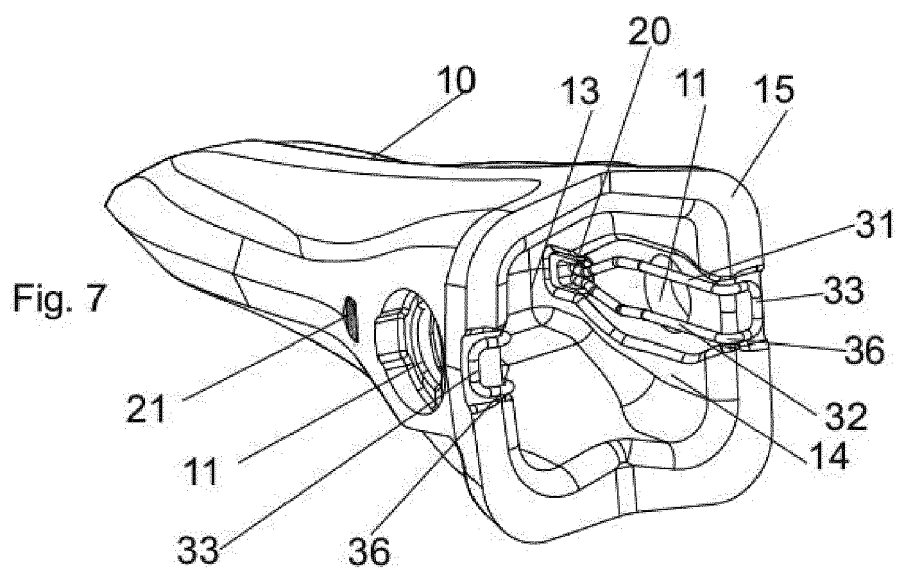
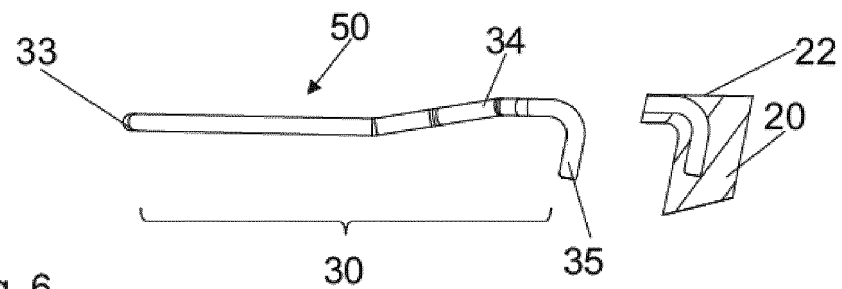
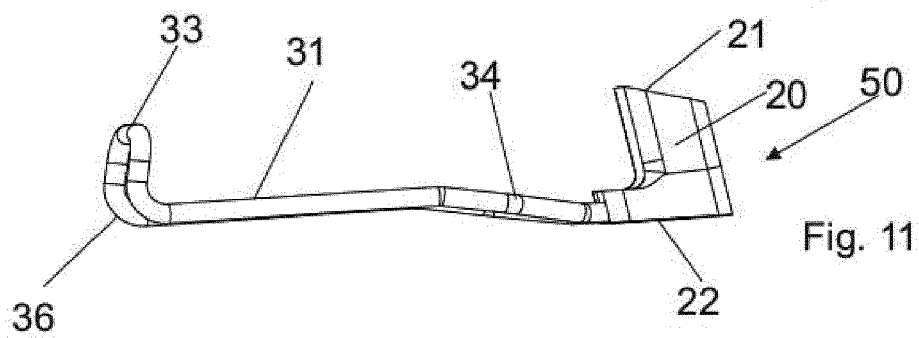
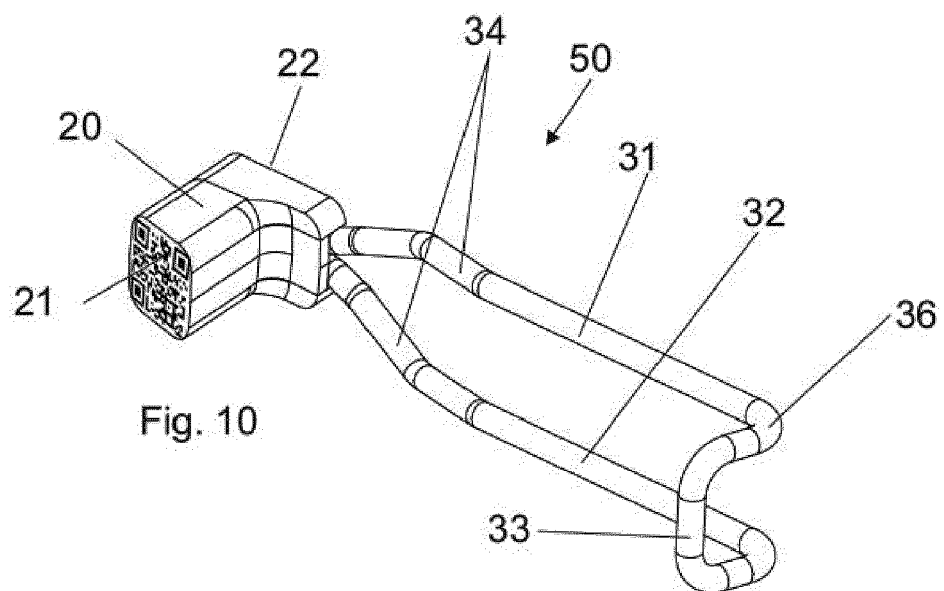
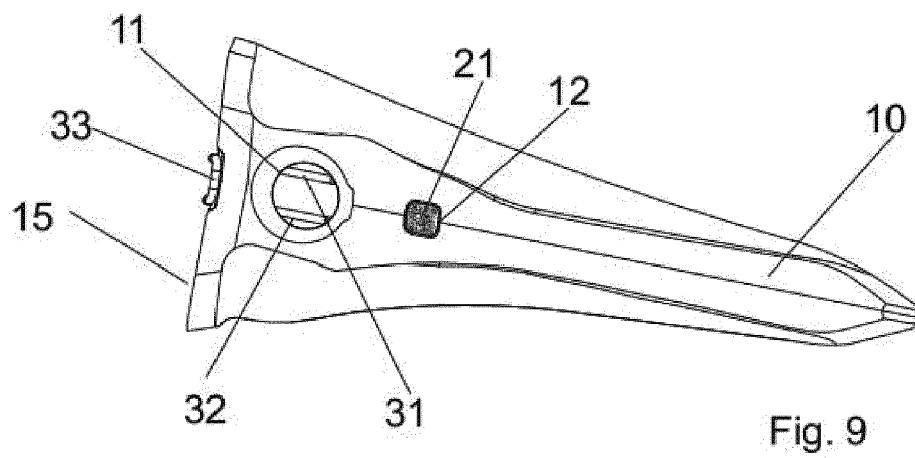
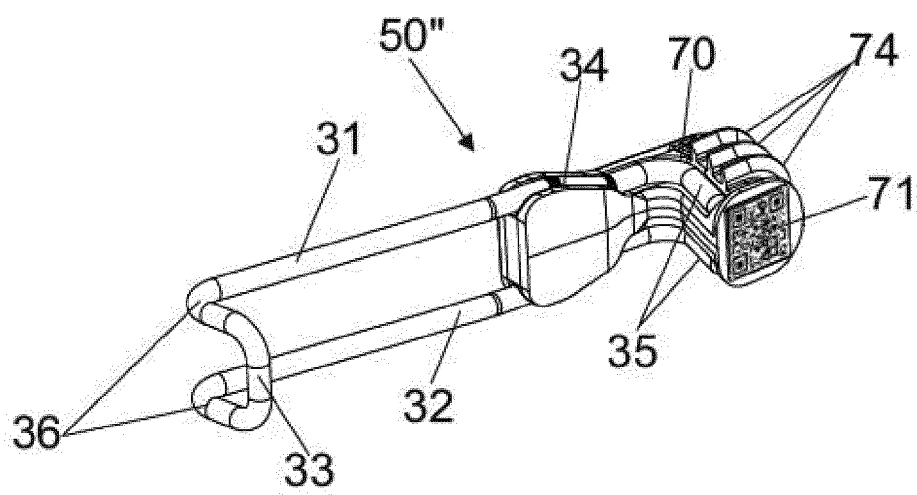
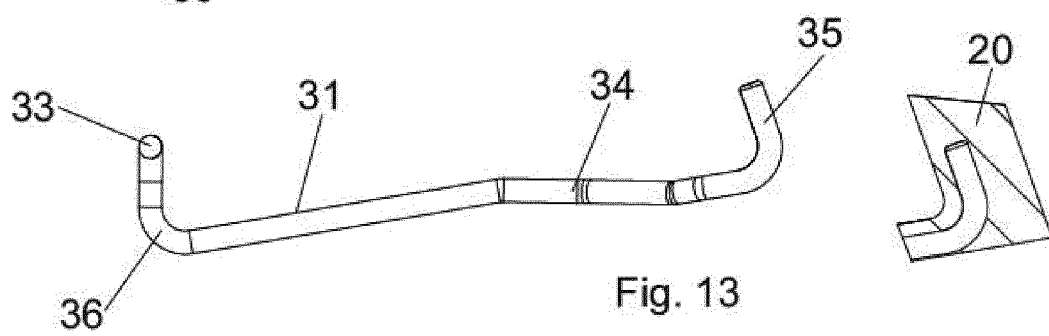
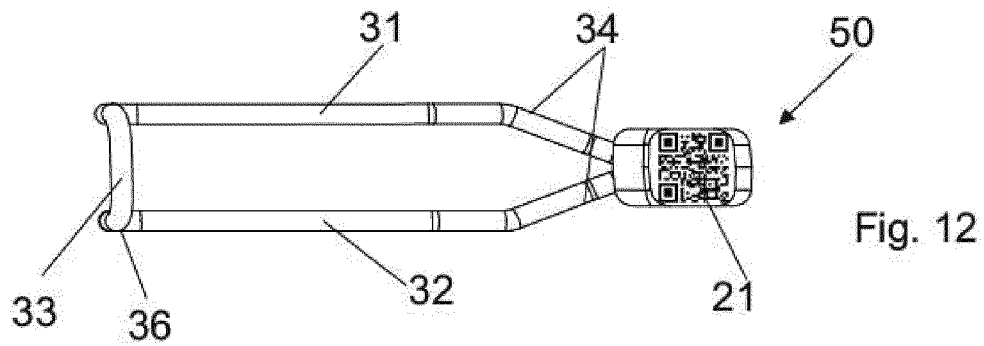


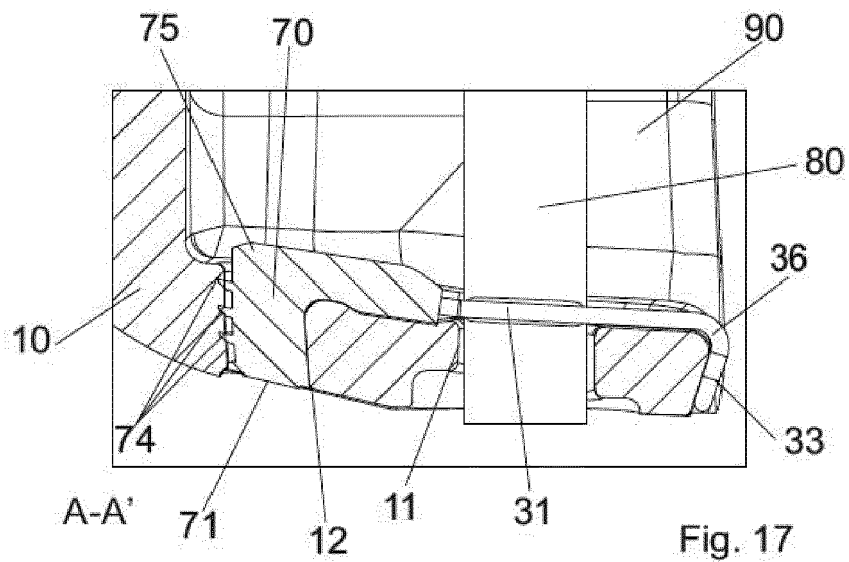
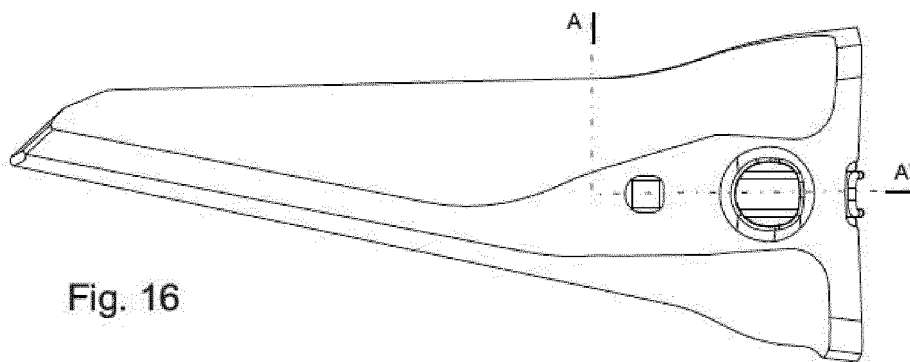
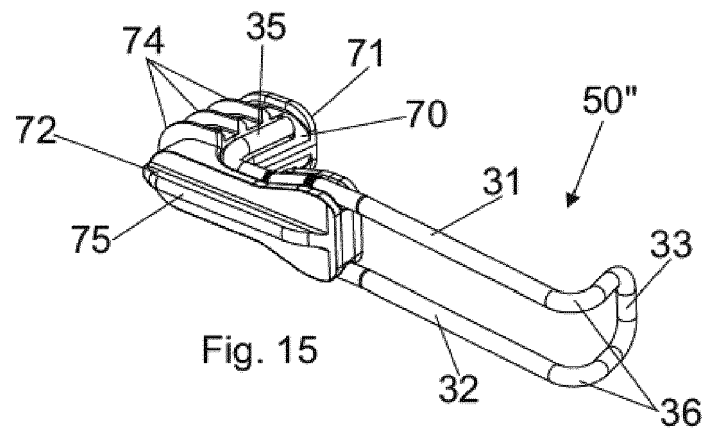
Fig. 2











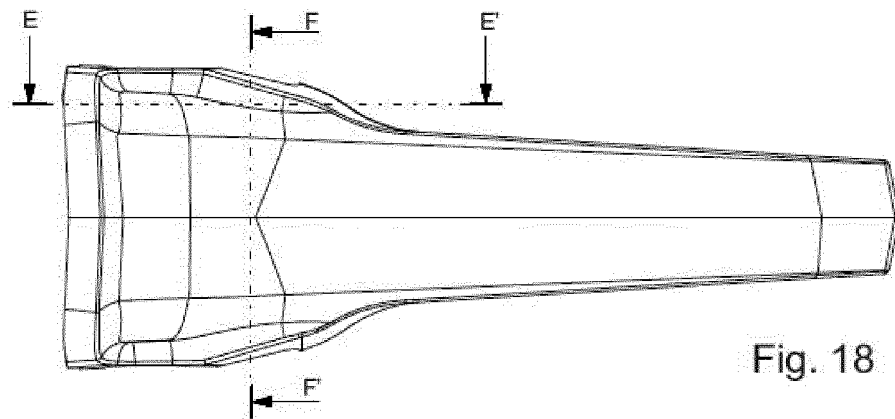
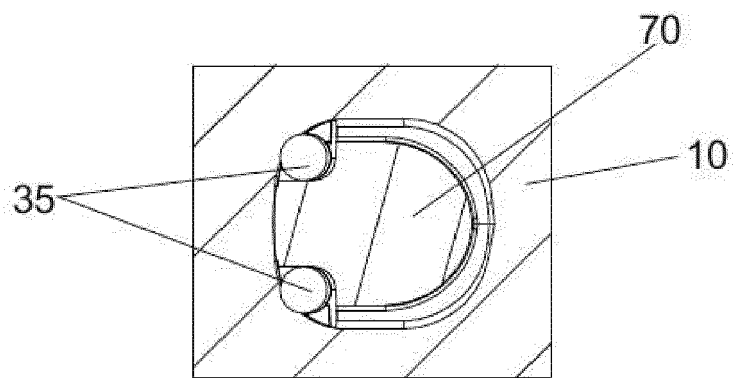
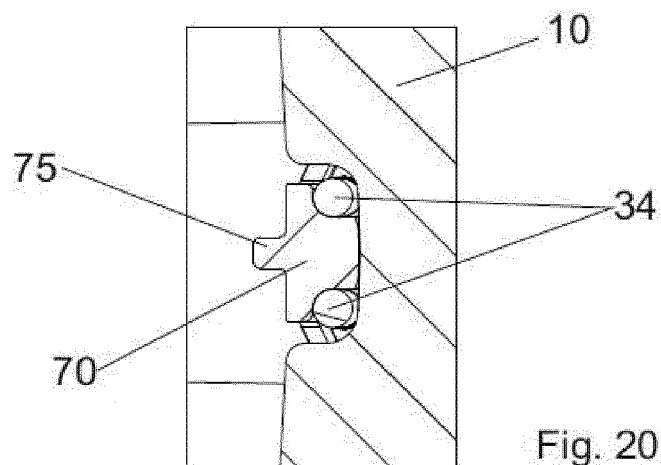


Fig. 18



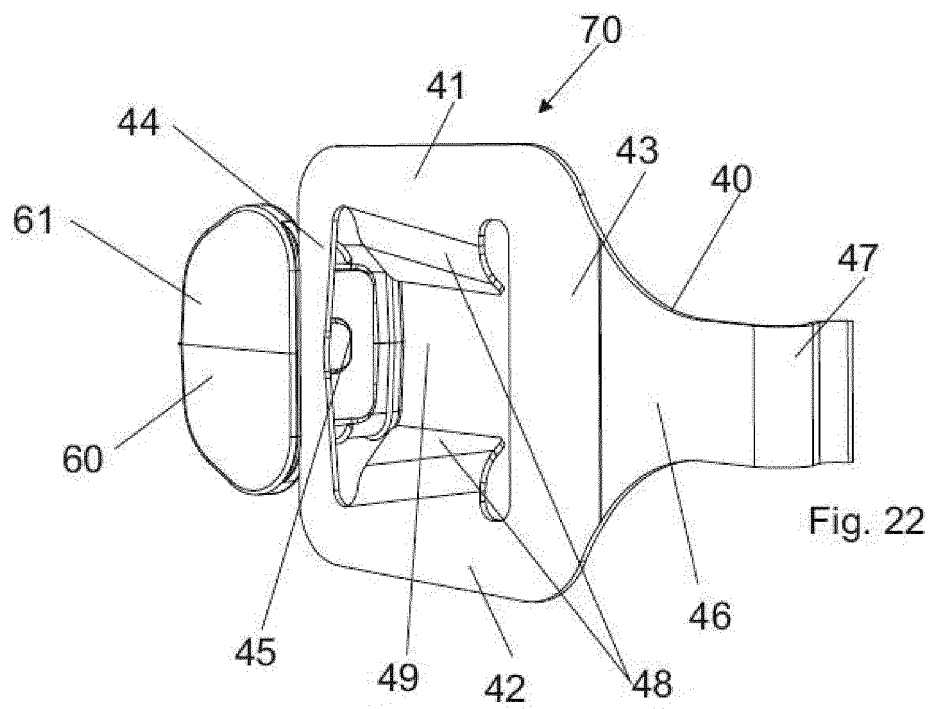
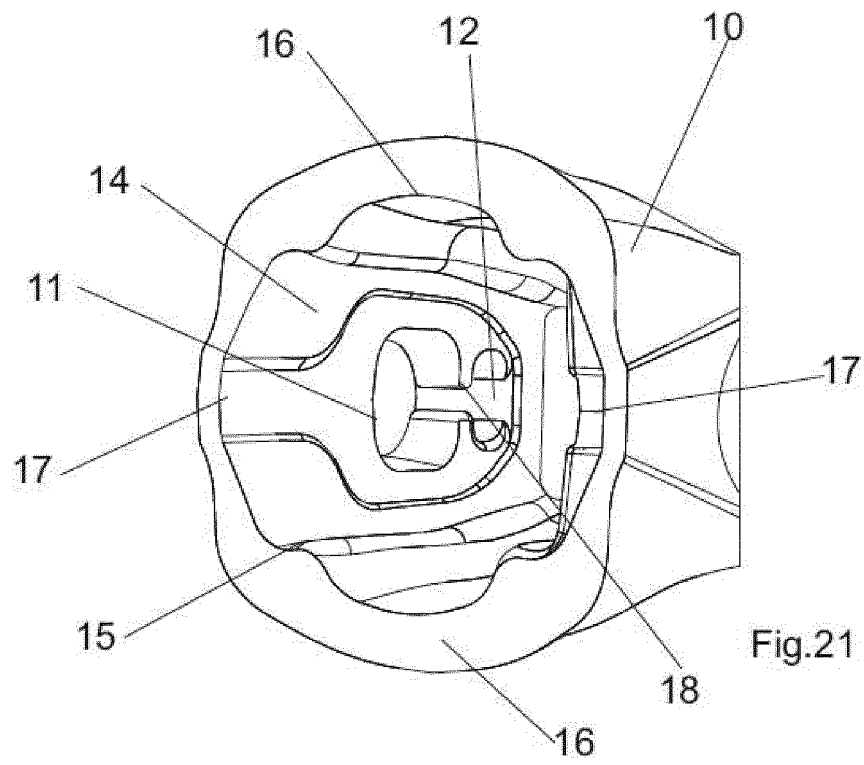
F-F'

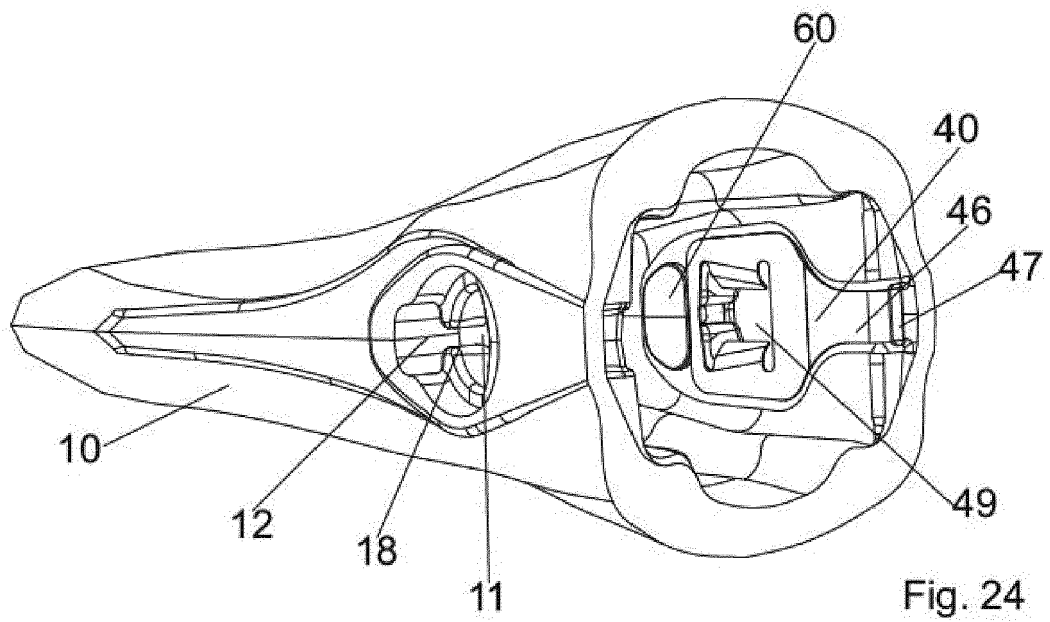
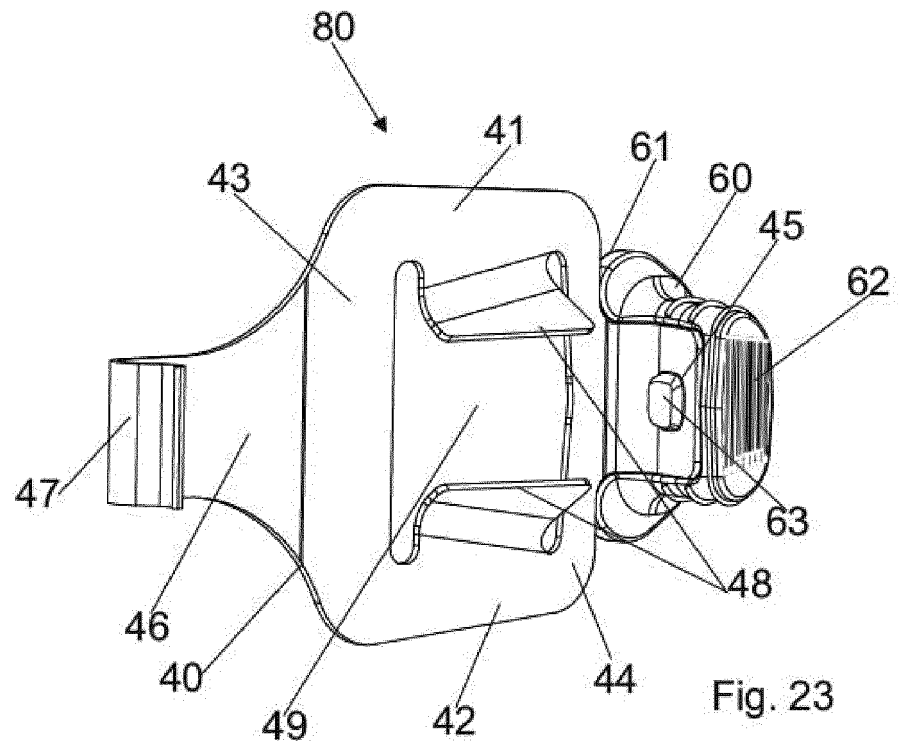
Fig. 19



E-E'

Fig. 20





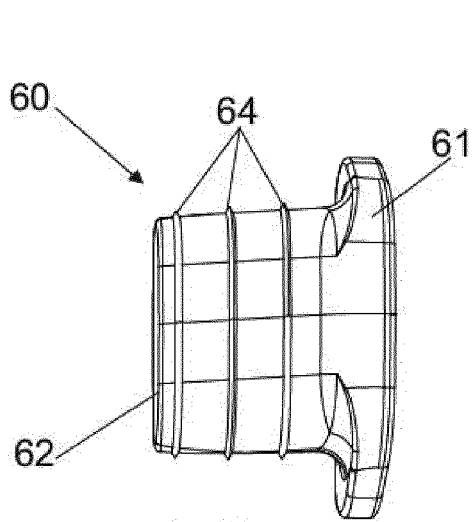


Fig. 25

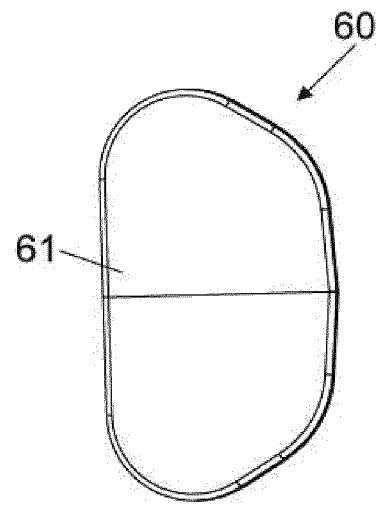


Fig. 26

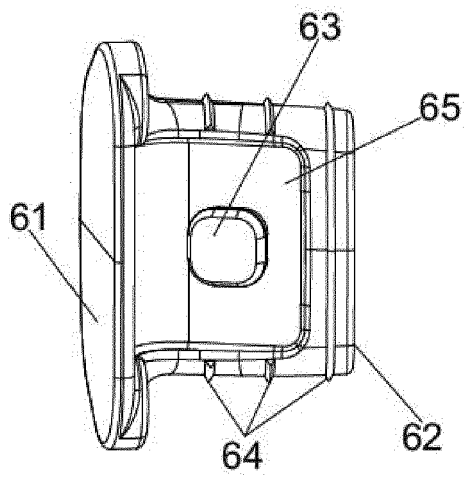


Fig. 27

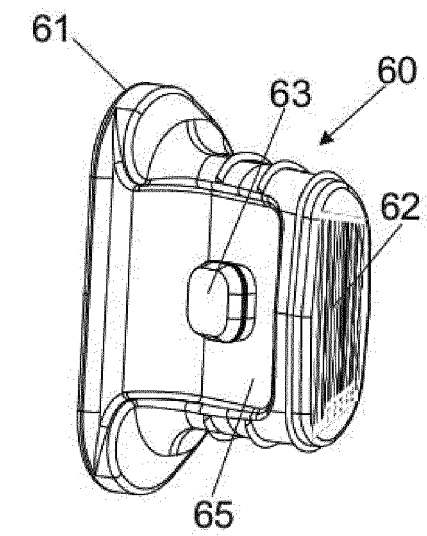


Fig. 28



EUROPEAN SEARCH REPORT

Application Number

EP 21 38 2611

5

10

15

20

25

30

35

40

45

50

55

EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 952 433 A (HEINOLD LLOYD K ET AL) 27 April 1976 (1976-04-27)	1, 2, 4-6	INV. E02F9/28
Y	* abstract; figure 3 *	1, 3, 6, 7	
A	* column 2, line 65 - column 3, line 5 * -----	8	
X	US 11 015 324 B2 (ESCO CORP [US]; ESCO GROUP LLC [US]) 25 May 2021 (2021-05-25)	9	
Y	* column 13, last paragraph; figure 12 * -----	3	
Y,D	WO 2017/137619 A1 (METALOGENIA RES & TECH S L [ES]) 17 August 2017 (2017-08-17)	1, 6, 7, 10, 12-15	
A	* abstract; figure 1 * -----	8	TECHNICAL FIELDS SEARCHED (IPC) E02F
Y	WO 2016/131015 A2 (ESCO CORP [US]) 18 August 2016 (2016-08-18)	9, 10, 12-15	
A	* paragraphs [0068], [0116]; figures 5-13b *	11	
Y	US 2017/372534 A1 (STEKETEE BRIAN B [US] ET AL) 28 December 2017 (2017-12-28)	9, 10, 12-15	
A	* abstract *	11	
A	* paragraph [0169]; figures 8, 9 * -----	3, 9	
A	WO 2015/126923 A1 (VERMEER MFG CO [US]) 27 August 2015 (2015-08-27)	3, 9	
	* abstract; figures 1-8 * * page 7, paragraphs 2, 3 * -----		
A	US 6 522 964 B1 (MIKI MASATOSHI [JP] ET AL) 18 February 2003 (2003-02-18)	3, 9	
	* abstract * * column 29, lines 27-67; figures 12, 13 * -----		
3 The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 January 2022	Examiner Ferrien, Yann
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			



Application Number

EP 21 38 2611

5

10

15

20

25

30

35

40

45

50

55

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 21 38 2611

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-8

Retaining device for a female part for excavators and the like characterized by the following potential special technical feature: the particular shape of the retaining element and the support element having elastic properties

2. claims: 9-15

Wear element for excavators and the like characterized by the following potential special technical feature: the comprises a data storage code accessible from outside the part

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 21 38 2611

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-01-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3952433	A	27-04-1976	NONE
US 11015324	B2	25-05-2021	AR 098123 A1
		AU 2014240371 A1	04-05-2016
		AU 2018232959 A1	07-05-2015
		AU 2018264149 A1	11-10-2018
		AU 2020210254 A1	06-12-2018
		AU 2021202483 A1	20-08-2020
		BR 112016008626 A8	20-05-2021
		CA 2928485 A1	17-03-2020
		CL 2016000945 A1	30-04-2015
		EP 3060372 A1	11-11-2016
		JO 3590 B1	31-08-2016
		JP 6590799 B2	05-07-2020
		JP 6709306 B2	16-10-2019
		JP 6925482 B2	10-06-2020
		JP 2016536489 A	25-08-2021
		JP 2019124118 A	24-11-2016
		JP 2020125685 A	25-07-2019
		PE 20160700 A1	20-08-2020
		PE 20210073 A1	28-07-2016
		PE 20210074 A1	11-01-2021
		PE 20210621 A1	11-01-2021
		TW 20210621 A1	23-03-2021
		TW 201525244 A	01-07-2015
		TW 201908572 A	01-03-2019
		US 2015107075 A1	23-04-2015
		US 2021372092 A1	02-12-2021
		WO 2015061232 A1	30-04-2015
WO 2017137619	A1	17-08-2017	AU 2017218608 A1
			BR 112018016237 A2
			CA 3013663 A1
			CL 2018002195 A1
			CL 2019001731 A1
			EP 3205781 A1
			EP 3414402 A1
			ES 2804602 T3
			RU 2018131033 A
			US 2019024349 A1
			US 2020392704 A1
			WO 2017137619 A1
			ZA 201805236 B
WO 2016131015	A2	18-08-2016	AU 2016219005 A1
			AU 2016219013 A1
			AU 2018201628 A1

EPO FORM P0459

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

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 21 38 2611

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-01-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		AU 2018201630 A1	29-03-2018
		AU 2018201631 A1	29-03-2018
		AU 2018201632 A1	29-03-2018
		AU 2018201633 A1	29-03-2018
		AU 2018201634 A1	29-03-2018
		AU 2018201635 A1	29-03-2018
		AU 2019201394 A1	21-03-2019
		AU 2020233769 A1	15-10-2020
		AU 2020264339 A1	03-12-2020
		BR 112017017086 A2	10-04-2018
		BR 112017017214 A2	03-04-2018
		CA 2976372 A1	18-08-2016
		CA 2976374 A1	18-08-2016
		CL 2017002057 A1	16-03-2018
		CL 2017002058 A1	16-03-2018
		CL 2019002016 A1	04-10-2019
		CL 2019002017 A1	04-10-2019
		CL 2021000995 A1	15-10-2021
		CN 107208394 A	26-09-2017
		CN 107208395 A	26-09-2017
		CN 110056036 A	26-07-2019
		CN 110067279 A	30-07-2019
		CN 110067280 A	30-07-2019
		CN 111188381 A	22-05-2020
		CN 111197324 A	26-05-2020
		CN 111255009 A	09-06-2020
		CN 111350229 A	30-06-2020
		CN 111764457 A	13-10-2020
		CN 113152548 A	23-07-2021
		CN 113152567 A	23-07-2021
		CO 2017009208 A2	31-01-2018
		EA 201791824 A1	29-12-2017
		EP 3256650 A1	20-12-2017
		EP 3256651 A2	20-12-2017
		EP 3530818 A1	28-08-2019
		EP 3530819 A1	28-08-2019
		EP 3530820 A1	28-08-2019
		EP 3530821 A1	28-08-2019
		JP 6748651 B2	02-09-2020
		JP 6751785 B2	09-09-2020
		JP 6751786 B2	09-09-2020
		JP 6751787 B2	09-09-2020
		JP 6884252 B2	09-06-2021
		JP 2018505331 A	22-02-2018
		JP 2019112930 A	11-07-2019
		JP 2019112931 A	11-07-2019

EPO FORM P0459

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

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 21 38 2611

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-01-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		JP 2019112932 A	11-07-2019
		JP 2019112933 A	11-07-2019
		JP 2020125680 A	20-08-2020
		JP 2021119291 A	12-08-2021
		KR 20170116141 A	18-10-2017
		KR 20190028573 A	18-03-2019
		KR 20190028813 A	19-03-2019
		PE 20171393 A1	20-09-2017
		PE 20171437 A1	29-09-2017
		PE 20190877 A1	18-06-2019
		PE 20190878 A1	18-06-2019
		PE 20190879 A1	18-06-2019
		PE 20210227 A1	05-02-2021
		US 2016237640 A1	18-08-2016
		US 2016237657 A1	18-08-2016
		US 2018298588 A1	18-10-2018
		US 2018298589 A1	18-10-2018
		US 2018298590 A1	18-10-2018
		US 2018298591 A1	18-10-2018
		US 2018298592 A1	18-10-2018
		US 2018305901 A1	25-10-2018
		US 2020370280 A1	26-11-2020
		WO 2016131007 A1	18-08-2016
		WO 2016131015 A2	18-08-2016

US 2017372534 A1	28-12-2017	AU 2016206568 A1	24-08-2017
		CN 107614802 A	19-01-2018
		EP 3245340 A1	22-11-2017
		US 2017372534 A1	28-12-2017
		US 2018005461 A1	04-01-2018
		US 2021074180 A1	11-03-2021
		WO 2016115499 A1	21-07-2016

WO 2015126923 A1	27-08-2015	AU 2015219163 A1	18-08-2016
		CN 106029993 A	12-10-2016
		EP 3108071 A1	28-12-2016
		RU 2016134945 A	20-03-2018
		US 2017067229 A1	09-03-2017
		WO 2015126923 A1	27-08-2015

US 6522964 B1	18-02-2003	AU 720175 B2	25-05-2000
		CA 2278177 A1	03-06-1999
		DE 69838064 T2	03-04-2008
		EP 0989242 A1	29-03-2000
		JP 3323791 B2	09-09-2002
		JP H11158940 A	15-06-1999

EPO FORM P0459

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

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 21 38 2611

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-01-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 6522964 B1	18-02-2003
		WO 9927195 A1	03-06-1999

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2017137619 A1 [0009] [0010]