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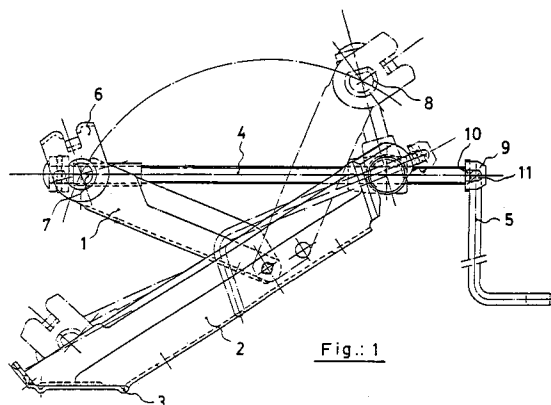
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E-48980 Santurtzi (Bizcaia) (ES)(74) Representative: **Urteaga Simarro, José**
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Principe de Vergara, 31
E-28001 Madrid (ES)(54) **Vehicle jack.**

(57) A vehicle jack with a cross shaft (7) made out of a metal sheet on a progressive dieing press, which is used either alone or in combination with a holder plate (25), also obtained by progressive dieing out of a metal sheet. The jack also has a special connection between the spindle or worm screw (4), the worm screw head (9) and one portion (5) of the crank handle, as well as a protection for the nut, based on a set of metal rings that reinforce its two side protuberances (37). The whole jack improves the technical features and provides a cheaper general item.

**EP 0 666 235 A1**

The invention relates to a vehicle jack of the mechanical type, which operate based on the action of a crank handle that causes a threaded spindle or worm screw to turn in such a way that it raises or lowers one arm with which the jack is provided, depending on the direction in which the crank handle and the said worm screw are turned.

In these mechanical jacks, the worm screw passes through a cross shaft situated at the opposite end of the worm screw to the crank handle, with this cross shaft, on occasions, being connected to a holder plate on which the vehicle body is supported.

These cross shafts are usually made of one single solid part, sometimes made of plastic, which means that they are excessively heavy and also their cost is considerable. When the cross shafts form part of the holder plates themselves, they are also usually made of one single piece of plastic material, which in general terms also causes similar disadvantages.

Moreover, the worm screw head on conventional jacks and the bent or cranked end of the crank handles connected to this head also have the disadvantage that they are complicated to assemble and costly to make. Thus, to limit the turning of the said cranked end in order that the arm of the crank handle remains perpendicular to the axis of the worm screw, the end of the worm screw is turned (machined) for a certain length and then swaged in order to form a broad end with which the cranked end makes contact by means of a longitudinal protrusion formed by stamping. Apart from this, and so that this cranked end can be inserted into the fork, it becomes necessary to make a specially-shaped hole in one wing of the said fork, and finally to make a lug on the protruding end of the said cranked area.

Another disadvantage of known jack is the nut in which the threaded worm screw is lodged in order to raise or lower the jack. In recent times, these nuts are made of plastic, with their ends being housed in holes cut in the U-shaped sections that are used for the arms of the jack. When these holes are made, it happens that on numerous occasions, the ends of the nut are sheared off due to the irregularities of the cross-section of the said holes, which concentrate stresses on a small portion of the cutting cross-section.

In those vehicle jacks which have a mobile base connected with a cross shaft on which the said base turns, with both being placed at the end of the arms, it happens that the other arm, or raising arms that includes the holder plate to support the vehicle body, usually remains, in the folded or closed position, with its free longitudinal end resting on the centre part of the said mobile base.

Given that it is interesting for the arms of the jack to be, at the start of the vehicle raising operation, in a somewhat raised position in order to allow the crank handle to be turned by the user's hand without either hitting the ground, a spring is usually fitted on the shaft of the mobile base in conventional jacks, in order to achieve this purpose.

The spring in question is one more part which has to be fitted on the jack, which undoubtedly increases the cost of the whole.

One object of the invention is a vehicle jack which is provided with a cross shaft made out of sheet metal which is both more economical and lightweight.

Another object of the invention is a car jack which is provided with a cross shaft made out of sheet metal and which in its turn is connected to a holder plate, also made out of sheet metal.

Another object of the invention is a vehicle jack which has an assembly of a worm screw head, a fork connected to this worm screw and a cranked or bent end of the crank handle; an assembly which is easy to assemble, has less material and is cheap to manufacture.

Another object of the invention is a vehicle jack which is provided with a plastic nut, with reinforced ends, to be housed in the body of the jack and preventing the said ends from being sheared off.

Another object of the invention is a protuberance by way of a hook at the end of the raising arm of those jacks which have a mobile base, with this hook making contact with the centre part of the mobile base.

In order to achieve these objectives, the invention claims a cross shaft which is obtained starting from a metal sheet and worked in a progressive dieing press, which by means of successive operations forms a hollow shaft with two circular ends, with a cut in the manner of a chord and a central portion with a rectangular cross-section and with holes passing through two of its opposite faces. Two truncated-conical transmission areas are established between its ends and this central portion.

The assembly of this cross shaft takes place on the wings of the U-shaped arms through holes or slots made previously in these wings, whose cross-section can be suited to that of the said shaft at its ends. To carry out fitting of this assembly, the ends of the shaft have a set of protruding fins, which are later crimped or folded to make them fit or adapt to the outer surface of the wings of the U-shaped arms.

During assembly, the two facing holes in the cross shaft receive a pipe or tube which is riveted to the threaded worm screw so as to avoid any kind of unwanted movement.

In those vehicle jacks in which the arrangement of the cross shaft coincides with the situation of a

holder plate to support the vehicle body, the shaft in question is connected to a holder plate also made out of sheet metal and shaped in a progressive dieing press. The holder plate in question is provided with a central area which is suited or matched in shape to the protuberance on the underbody of the vehicle in question and two wings which stand out at perpendicular planes to the said central area. The wings in question will take in the wings of the U-shaped cross-section of the jack arm and aligned holes are cut in them in order to receive the cross shaft.

The holes in question are of a particular geometry, based on a circular componente with a series of fins or lugs standing out towards its centre, between which, obviously, a series of recess are created, whose diameter corresponds to that of the basic hole. One of these recesses is greater in size than the others, for the purpose of allowing the cross shaft to be fixed in two different ways.

Thus, in one solution, the sides of the shaft will be fitted to the holes in the holder plate by proceeding to induction weld the front ends of the said sides to the fins or lugs of the holes in the holder plate.

In another variant, also covered by the invention, the facing holes in the holder plate take a trochilus shape, receiving the ends of the cross shaft and with fixing being carried out by means of electrode welding.

As regards the arrangement between the threaded worm screw, the fork or worm screw head connected to it and the crank handle fixed to the said fork, it is pointed out that the fork takes a U-shape starting from sheet metal, that two aligned holes are made in its wings, holes which cause two side lugs to be made of the same shape as the said holes.

These two holes are essentially aligned at the base of the U-shape, in which a square hole is also made.

The end of the worm screw is housed directly into the square hole in the base of the worm screw head and is secured by welding. The cranked or bent end of the crank handle is inserted into the aligned holes in the wings of the said head, and later stamping takes place on the free end of the said cranked end, thus forming a protuberance on its circular cross-section, and this protuberance prevents the said cranked end from being extracted or removed later.

Moreover, turning of the protuberance formed on the free end of the cranked part is limited by one of the lugs on the worm screw head, so that in this way the arm of the crank handle remains essentially perpendicular to the axis of the worm screw, meaning that when the crank handle is operated in order to raise the jack, the user's hand

does not strike the ground.

This solution for the jack is particularly advantageous, since it uses less material than is used by known techniques, it is very easy to assemble and more economical.

The nut used is a basic conventional part, made out of plastic material, which logically is provided with and internally threaded axial hole to engage with the worm screw of the jack. In its turn, it is also provided with two transverse cylindrical protuberances, by means of which the nut is fixed into the openings cut in the sides of the corresponding arm of the jack.

According to the invention, and in order to prevent shearing of the said transverse ends against the thickness of the openings cut in the arms of the jack, the said ends are encircled by metal reinforcing rings, by means of which the technical imperfection of the thickness of the openings in the arms of the jack are completely prevented from shearing the transverse ends with their rings and thus the nut is preserved indefinitely.

The reinforcing rings can be secured to the transverse cylindrical ends of the nut by means of a clip-type connection cut in a non-working portion of the joint, i.e. in an area which is distant from the portion that is subject to a function, as will be better appreciated later in conjunction with the drawings.

Another solution for this connection consists of making a notch or groove in the side surface of the rings that determine an internal protuberance in the said rings, with this protuberance penetrating into the surface of the transverse cylinder ends of the nut.

With these metal rings, a very economical solution is provided to the very frequent problem of shearing of the transverse cylindrical protuberances used for securing the nut.

In those vehicle jacks which have a mobile base for resting on the ground, the two arms of the jack are gathered in, in the folded position, with the lifting arm with the holder plate supported by its longitudinal end on the centre of the mobile base.

According to the invention, the lifting arm is provided with an end protuberance in the form of a downward-facing hook, with this protuberance jutting out below the plane of the base of the U that is formed by the cross-section of the said lifting arm, with which the said hook rests in the centre of the mobile base, making contact with it and avoiding the need for any spring to be placed on the cross shaft of the said mobile base.

The accompanying sheets of drawings show the features and advantages of the invention, in specific, non-restrictive solutions of the invention. These drawings show the following:

Figure 1 shows an elevation of a vehicle jack in three positions, which shows the invention as a whole.

Figure 2 is a top view of the vehicle jack shown in Figure 1.

Figure 3 is an elevation of another vehicle jack in which the invention is also applied.

Figure 4 is an elevation of the end of the arm of a vehicle jack included in the invention.

Figure 5 is the top view of the above, folded over the base which is not illustrated in Fig. 4. Figures 4A and 5A show another way of the two previous figures.

Figures 6, 7 and 8 are three views of the shaft according to the invention.

Figure 9 shows the cross-section I-I in Fig. 6.

Figure 10 is a perspective view which represents the cross shaft and the holder plate.

Figure 11 shows a detail of the assembly of the parts shown in Fig. 10 on the worm screw of the vehicle jack.

Figure 12 shows a detail of the assembly of the cross shaft on the vehicle jack worm screw.

Figures 13, 14 and 15 are three views of the head of the worm screw.

Figure 16 represents the development of the head shown in the three previous figures.

Figure 17 shows the nut and the connection of the worm screw to the head of the worm screw.

Figure 18 is a cross-section elevation of the nut.

Figure 19 represents the ring on the nut, according to one solution of the invention.

Figure 20 is another way of arranging the ring shown in the previous figure.

Figure 21 is an elevation that represents the arrangement of the rings on the nut in relation to the vehicle jack arm.

Figure 22 shown an elevation that indicates the position of the arms of a vehicle jack provided with a mobile base to rest on the ground, according to the invention.

Figure 23 is an elevation of the lifting arm in the previous figure, according to the invention.

Looking now at Figs. 1 and 2, we can appreciate a vehicle jack made up of two arms (1, 2) connected by means of the worm screw (4), which is operated by the crank handle (5), so that when the crank handle is turned in one direction or the other, the arm (1) is raised or lowered, as shown in the two positions indicated by means of dotted lines. The end of the worm screw (4) receives the cross shaft (7) and the holder plate (6), with the cross shaft connected at the position (8) with the said holder plate.

The arm (2) is held and supported on the ground by the portion (3) which is seamed or cramped to the arm (2) by a special process.

The end of the worm screw receives the head (9) with its protuberances (10), and this head also receives the cranked end (11) of the crank handle, on which it is possible to appreciate the protuberance (12) that makes contact with the protuberance (10) on the head (9) so as to limit the turning of the end (11) of the crank handle (5).

Figure 3 shows another vehicle jack in which the invention is applied. In this case, there are two longer arms (14, 15) and two shorter arms (16, 17), whose respective meeting points receive the worm screw (4), which is connected to the head (9) and to the crank handle (5). The folded position of this jack is shown by the dotted lines. The worm screw is received by the nut (36) and the cross shaft (7), which is secured by the projections (18) being folded over the arms (16, 17) once they have been inserted. This vehicle jack stands on a base part (3).

Referring now to Figures 4 and 5, which show another type of vehicle jack, we can point out the arm (31) which is reached by the worm screw (4), being connected together by means of the cross shaft (7), which enters inside the wide inlet (32) in the arm (31). Once the shaft has entered inside this recess, the legs (33) that stand out from the windows (43) fold back as shown in the view in Fig. 5, so as to prevent the accidental extraction of the cross shaft (7).

The invention here covers a specific variant, according to which the inlet (32a) is carried out as a recess and not as a projection, inside the arm (31). In this case, the windows or openings (43) and the legs (33) are maintained, so that these legs fold back in order to hold the cross shaft (7). See figures 4A and 5A.

In this respect, the cross shaft (7) has to be shorter and logically lighter end cheaper than the ones traditionally used.

From Figures 6, 7 and 8 we wish to point out the special shape of the cross shaft, made starting from a metal sheet and shaped in a progressive dieing press. The ends of the cross shaft (7) are shaped according to a circular component (19) finishing in straight sections (22) in the form of chords, whereas the central portion (20) is rectangular in shape, with two aligned holes (23, 24) (Fig. 9).

This cross shaft (7), as described, is arranged directly in the vehicle jack illustrated in Figs. 4 and 5, and secured by folding the legs (33) which prevent its being extracted later. These legs are a part of the cross shaft itself.

The vehicle jack in Fig. 3 has two pairs of protuberances or projections (18), not shown in Figs. 6 to 9, which are folded at both ends once that cross shaft (7) has been inserted.

The assembly shown in Figure 10 is composed of the said cross shaft (7) and the holder plate (25), which is also made from sheet metal and pressed in a progressive die. This holder plate has the upper centre area of a specific shape, as well as some wings (26, 27), in which the aligned holes between which the cross shaft is situated can be appreciated.

The holes in question have radially arranged lugs (29), between which recesses are formed. The lugs (29) are situated in an irregular manner, so that one of the recesses (30) is greater in size than the rest. In this way, two forms of arranging the cross shaft (7) in the holder plate are made possible.

One of them is as defined in Fig. 10 itself and in the later Fig. 11, whereas the other is as shown in Fig. 1. In the first of these cases, the front edges (19) of the cross shaft are induction welded to lugs (29) of the aligned holes in the holder plate (25), and in the second case, the facing holes in the holder plate would be of a trochilus shape, receiving the ends of the cross shaft (7), and with both being electrode welded together to secure them.

Figure 12 shows the position of the cross shaft (7) on the worm screw (4), which corresponds with that of the end of the jack also shown in Fig. 5.

According to Figures 13, 14 and 15, we can observe the worm screw head (9) with its "U" shape, in which the wings (35) are provided with the aligned holes (34) in order to allow the cranked portion (11) of the crank handle to pass through. The protuberances (10), resulting from making these holes (34), and on which the protuberance (12) on the previously mentioned cranked portion (11) makes contact, are shown on both sides of the base.

The base of the worm screw head has a square hole (44) to receive the end of the worm screw (4), which is then welded to secure it in place. The worm screw head (9) is the result of the transformation of the piece of sheet metal (9), as can be seen in Fig. 16.

The arrangement of the worm screw head (9) on the worm screw (4) and on the cranked portion (11) of the crank handle can also be seen in Fig. 17. In this case, the worm screw is connected to the nut (36), which has already been represented in Fig. 2, and appears again, in a different perspective, in Fig. 18.

The worm screw (4) goes through the threaded axial hollow (39) in the nut (36) and is connected to the sides of the arm of the jack by means of the cylindrical protuberances (37). In the case of Fig. 17, these protuberances receive the reinforcing rings that are proposed by the invention, which preserve the whole of the nut from establishing direct contact with the wings of the arm (39) of the

jacks, as shown in Fig. 21.

In order to secure the rings (38) to the protuberances (37), a connection is made between both in a position (M), which is not submitted to any kind of work, as shown in the said Fig. 21, as it is distant from the contact with the thickness of the wings on the arm (39).

Figure 19 shows how, in this position, the protuberance (37) and reinforcing ring (8) are fastened together by means of a clip-type connection (40).

Figure 20 shows another variant, based on the groove or notch (49) in the outer body of the ring, which creates a lug (42) that penetrates into the protuberance (37).

Another complementary detail of the jack is the fixing of the holder plate (13) (Fig. 3), on which a portion of the vehicle body rests. This holder plate, which in itself is known, has the particularity of its being fixed by means of a set of outer fins (43), which, once that the holder plate is housed inside its inlet in the arm (14), fold back to fit tight with the outer surface.

As regards Figs. 22 and 23, we point out the special shape of the lifting arm of the vehicle jack provided with a mobile base (52), which corresponds to the model shown in Figs. 4 and 5. Here we can appreciate the provision of the protuberance (50) in the form of a hook, made on the arm (31), more specifically at its end below the portion (45) for the holder plate, with this hook protruding below the base (48) of the arm and after the position of the recess (49) that receives the cross shaft (54) of the mobile base. On this arm (31), the position (46) has been shown of the situation of the worm screw cross shaft and the position (47) in which it pivots on the other arm (55) of the vehicle jack.

We wish to point out how the end (51) of the hook (50) is supported on the centre (56) of the mobile base (52) of the vehicle jack, with the other arm (55) being in the initial lifting position, resting on the internal protuberance (53) on the base (52). In this case, no spring is needed on the cross shaft (54), as it was, in the case mentioned previously, when the arm (31) is supported on the base (52) by means of its longitudinal end (44) (Fig. 4).

Claims

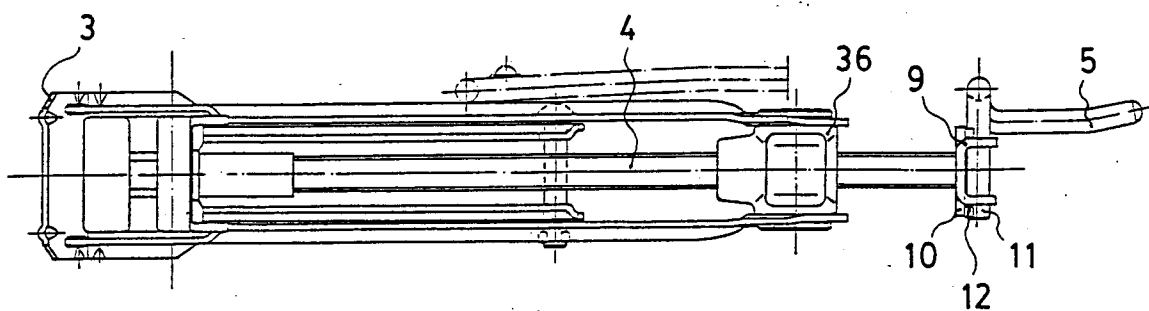
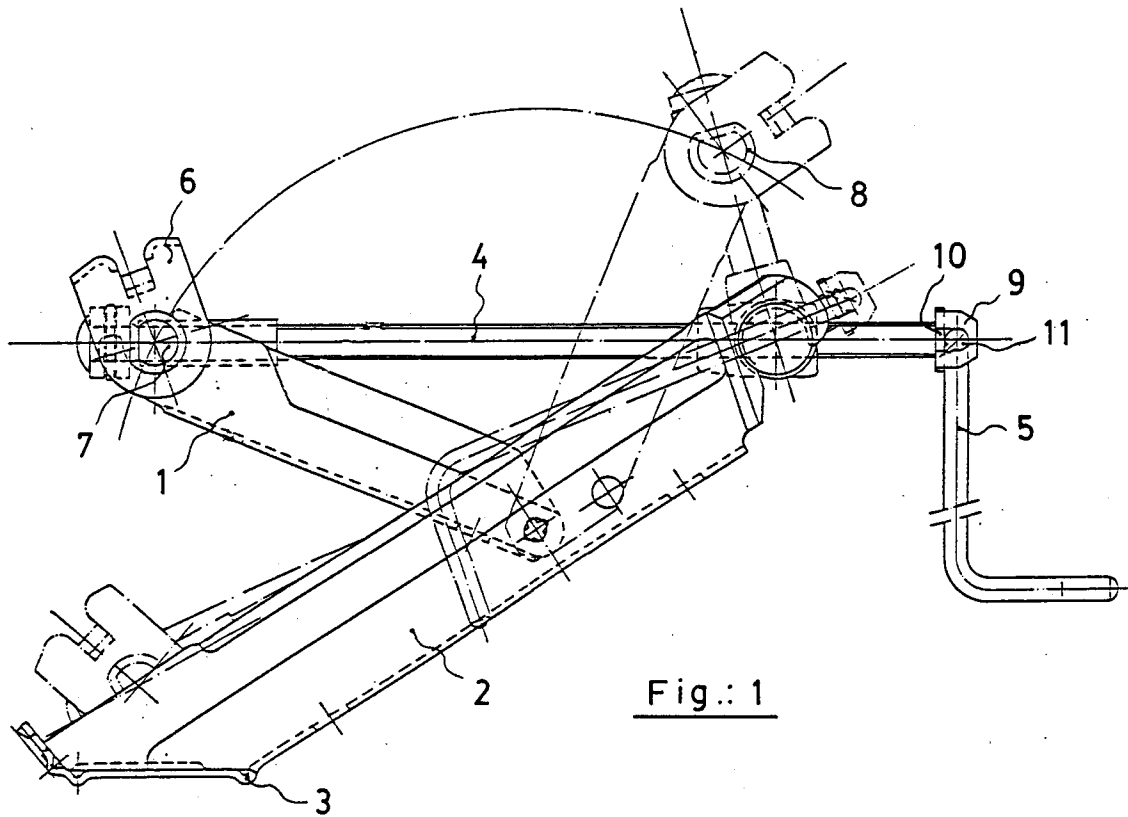
1. Vehicle jack, which has arms (1, 2) connected by a threaded worm screw (4) operated at one of its ends by a crank handle (5), with a cross shaft (7) that receives the end of the worm screw and on the end of which a holder plate can be fixed, with a nut (36) operated by the worm screw, which is characterized by:
 - a cross shaft (7), obtained from sheet metal and by pressing in progressive

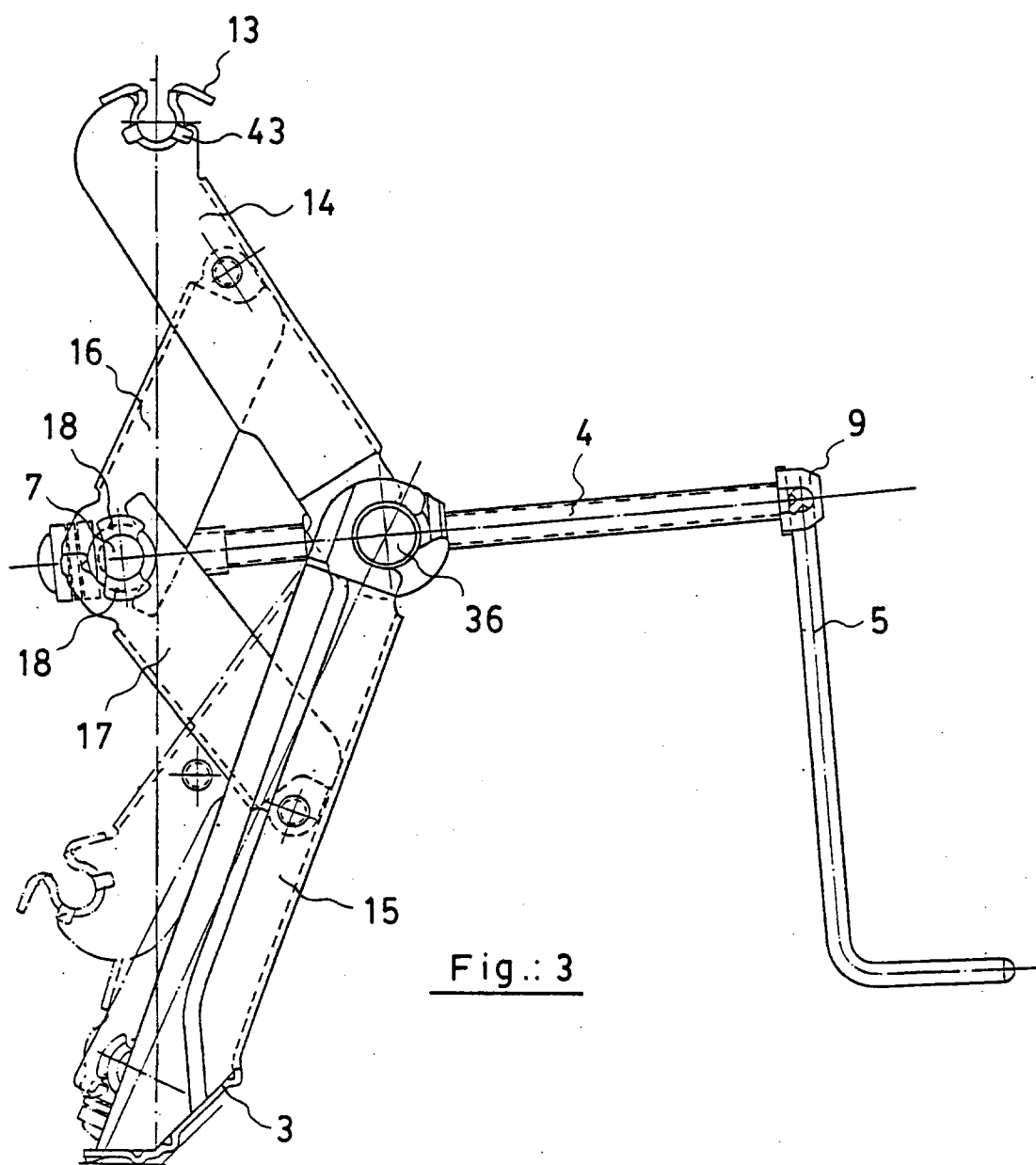
dies, which is situated between the wings of the arms (1) of the jack in holes cut in the said wings.

- a holder plate (25), with a generally "U" shape, obtained by the progressive die pressing of sheet metal, in which aligned holes are cut in its wings (26, 27) in order to receive the ends of the cross shaft, and with these wings (26, 27) being round the exterior of the wings on the arms (1). 10
 - a worm screw head (9), with a U-shaped cross-section, with aligned holes (34) in its wings (35) and side protuberances (10) on both sides, made with the material removed to make the said holes, which extend to both sides of the base of the head (9) and are aligned with it, in the base of which a square hole (44) is made to receive the threaded end of the worm screw (4), which is then welded to the hole. 15
 - a portion (11) of the crank handle (5) housed between the wings (35) of the head (9), which is flat, with one end outside one of the wings (35) which is provided with a protuberance (12) and is limited in turning by one of the protuberances (10) of the head (9). 20
 - a nut (36), whose transverse protuberances (37) are housed in holes in the wings of the arm (39) by means of metal reinforcing rings (38) which are around the said protuberances. 25
 - a protuberance (50) in the form of a hook, made on the lifting arm (31) and which protrudes downwards towards the base (48) of the U-shaped arm (31), whose end (51) makes contact with the central area (56) of the mobile base (52) until the raising of the jack begins. 30
2. Vehicle jack, in accordance with claim 1, characterized in that the cross shaft (7) is provided with a geometry with its circular ends (19) profiled or trimmed into straight areas (72) like chords and a central area (20) with a rectangular cross-section and with two of its opposite faces pierced by aligned holes (23, 24), one of whose sides is established as a continuation of the straight portion of the ends, with trunco-conical areas (31) being established on both sides between the centre and the ends. 35
3. Vehicle jack, in accordance with claim 1, characterized in that the free ends of the cross shaft (7) are provided with protuberances (18) which are folded directly over the arms (16, 40

17) of the jack.

- 4. Vehicle jack, in accordance with claim 1, characterized in that the cross shaft (7) is lodged in a widened portion (33) of the arm (31) of the jack, with windows or openings (43) being provided in these arms, into which the legs (33) are folded inwards once that the cross shaft has been inserted. 45
- 5. Vehicle jack, in accordance with claims 1 and 2, characterized in that the cross shaft (7) is induction welded to the aligned holes in the holder plate, with these holes being provided with a series of radial lugs (29), against which the front ends (19) of the cross shaft are lodged. 50
- 6. Vehicle jack, in accordance with claims 1 and 2, characterized in that the aligned holes in the holder plate (25) take a trochilus shape, with both parts being fastened together by means of electrode welding. 55
- 7. Vehicle jack, in accordance with claim 1, characterized in that the reinforcing rings (38) fitted onto the protuberances (37) of the nut (36) include a fixing element between the two, arranged in one non-work area (M) of the arm (39) of the jack. 60
- 8. Vehicle jack, in accordance with claims 1 and 7, characterized in that the reinforcing rings (38) are fixed to the protuberances (37) by means of a clip-type connection (40). 65
- 9. Vehicle jack, in accordance with claims 1 and 7, characterized in that the reinforcing rings are fixed to the protuberances (37) by means of grooves or notches (41) in the rings which determine internal lugs (42) in the surface of the protuberances. 70
- 10. Vehicle jack, in accordance with claim 1, characterized in that a holder plate (13) is provided, which is equipped with some protruding fins (43) at one longitudinal end which are folded back over the outsides of the arms (14) once that the holder plate has been fitted. 75
- 11. Vehicle jack, in accordance with claims 1 and 4, characterized in that the portion (33) of the arm (31) is made in the form of an inlet or recess, which receives a shorter cross shaft (7). 80





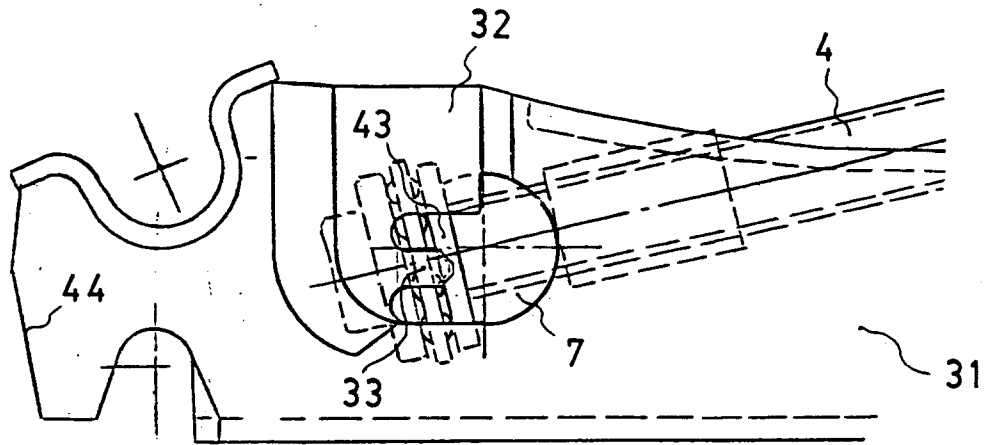


Fig.: 4

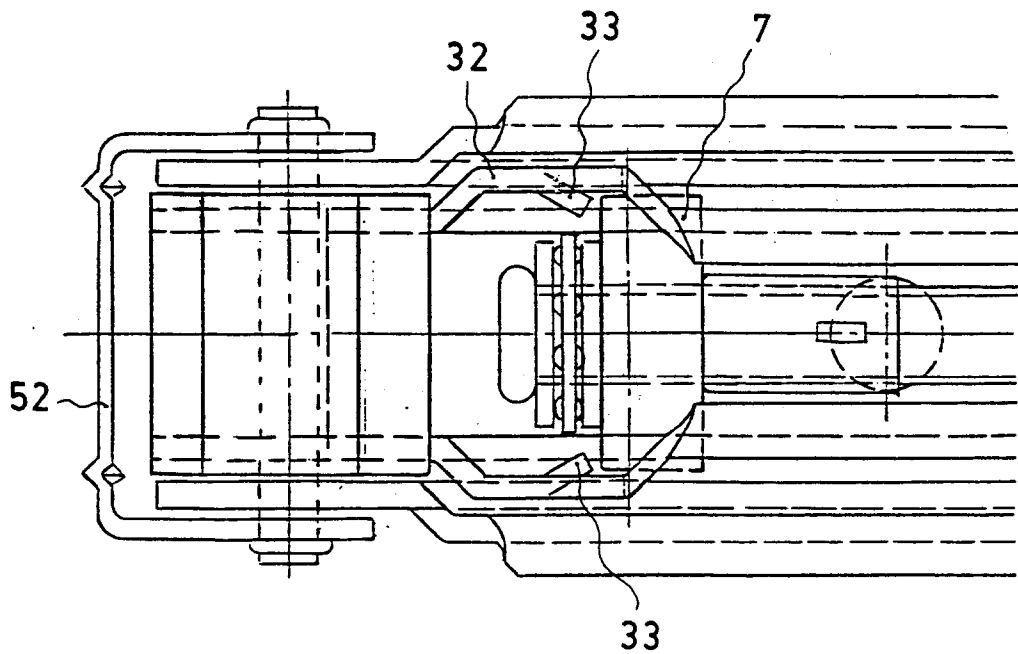


Fig.: 5

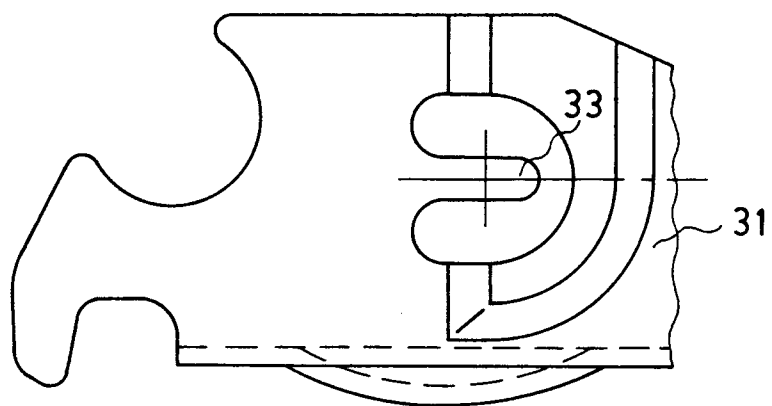


Fig.: 4A

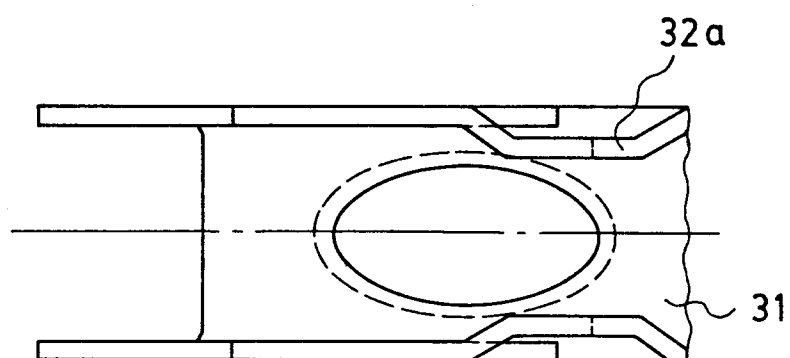


Fig.: 5A

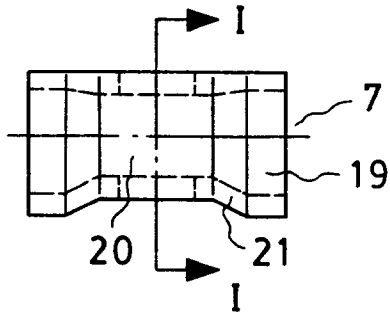


Fig.: 6

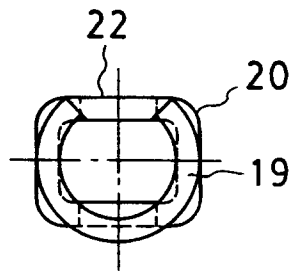


Fig.: 7

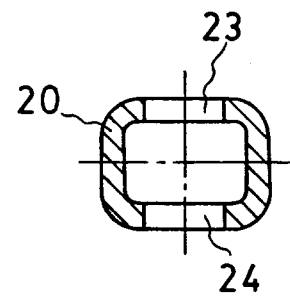


Fig.: 9

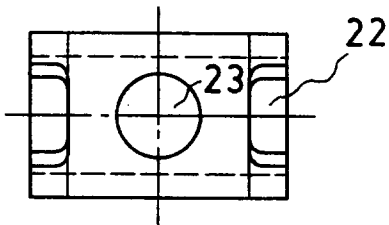


Fig.: 8

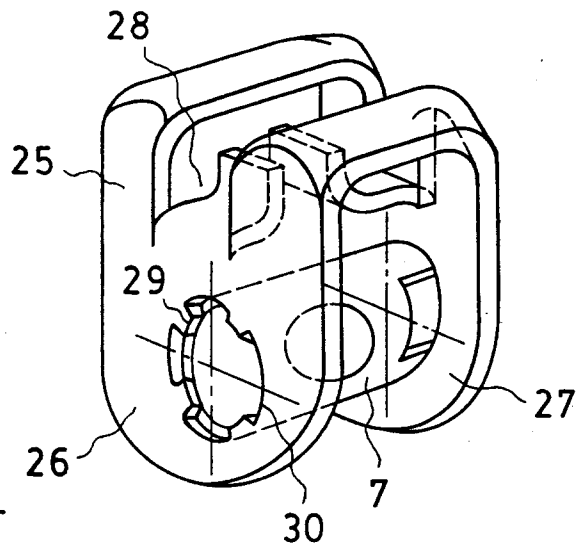


Fig.: 10

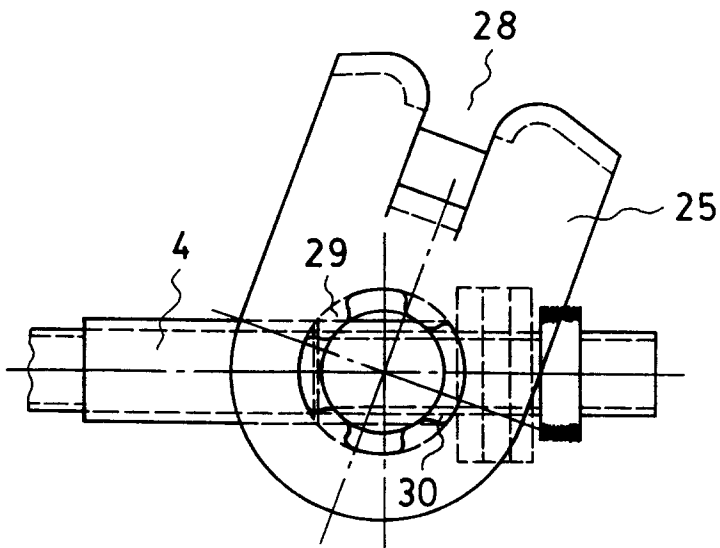


Fig.: 11

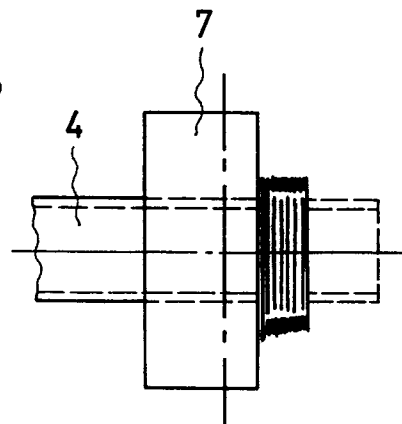


Fig.: 12

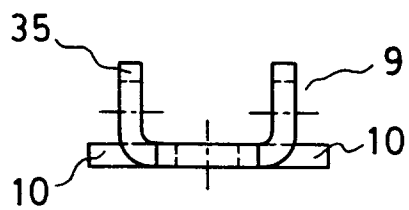


Fig.: 13

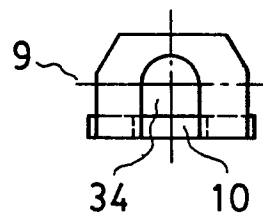


Fig.: 14

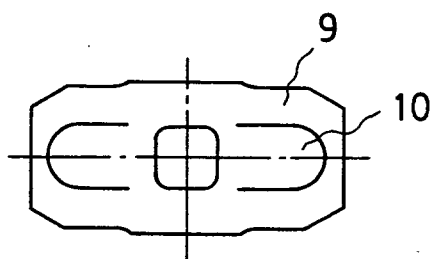


Fig.: 16

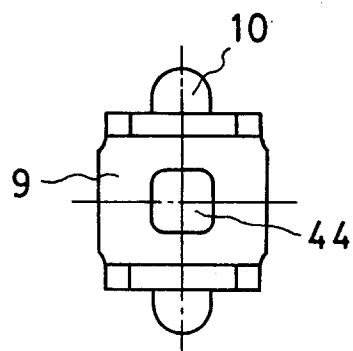


Fig.: 15

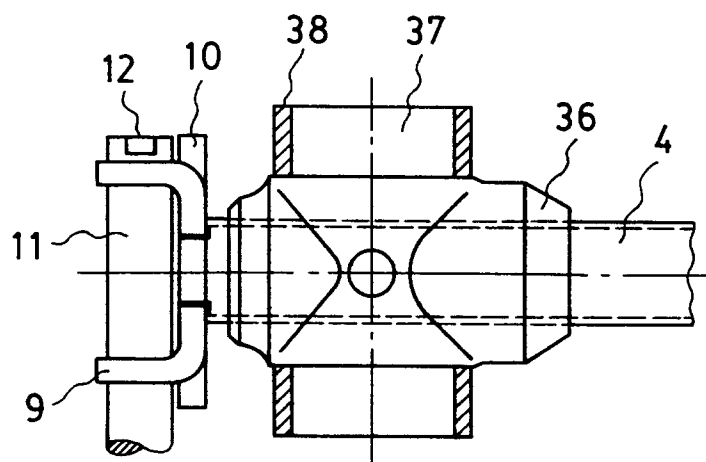


Fig.: 17

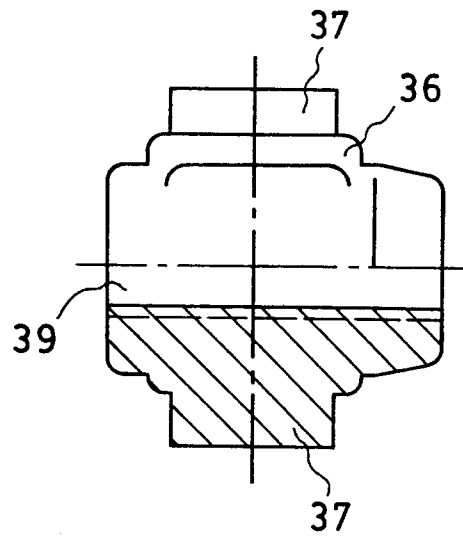


Fig.: 18

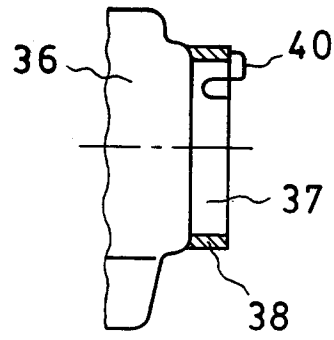


Fig.: 19

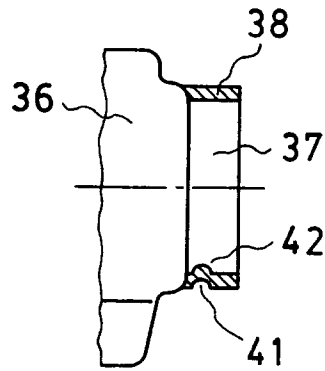


Fig.: 20

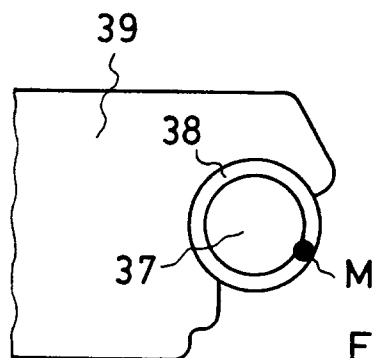


Fig.:21

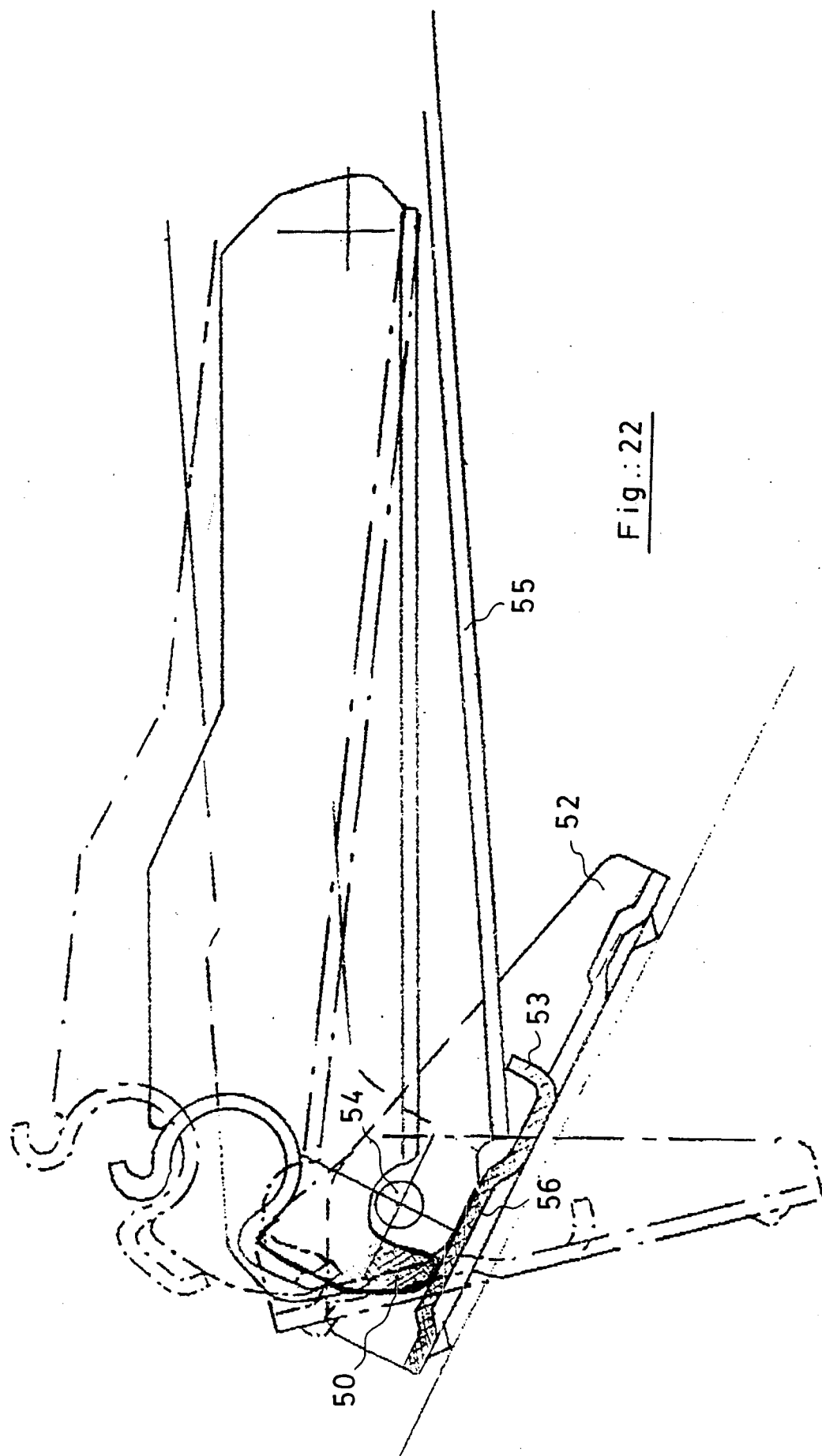


Fig.: 22

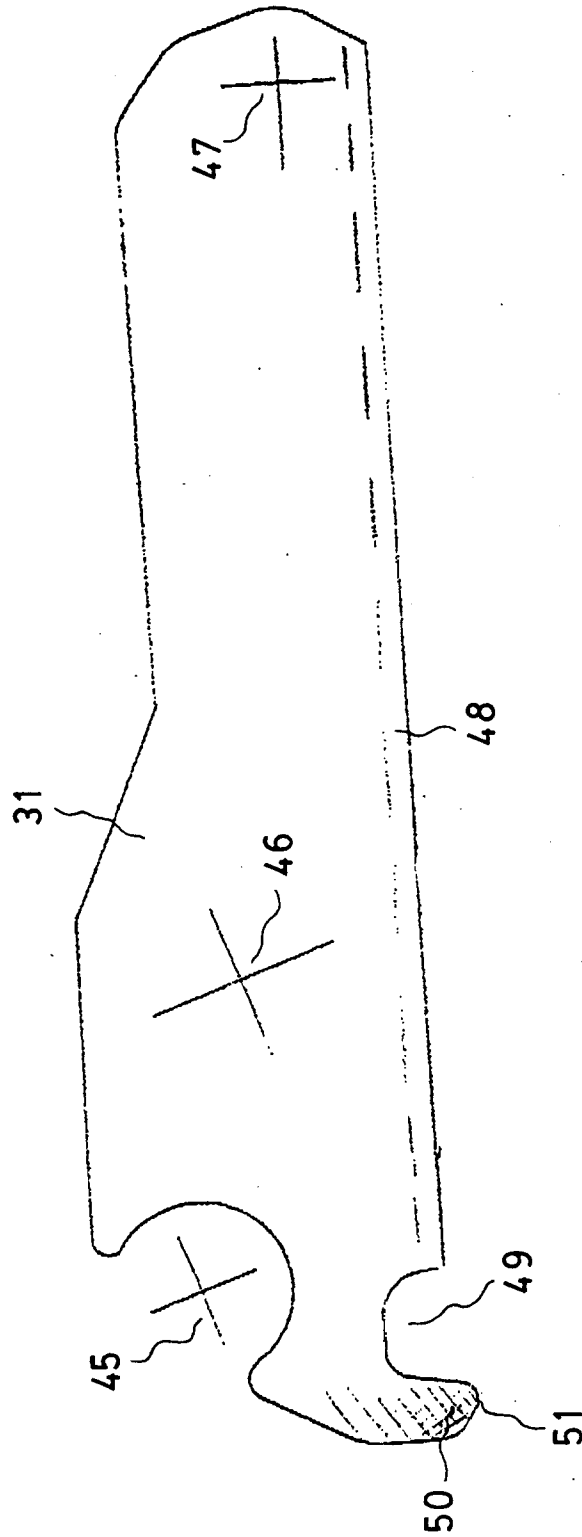


Fig.: 23



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 50 0113

DOCUMENTS CONSIDERED TO BE RELEVANT																			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)																
A	US-A-3 741 524 (MORGAN) * the whole document *	1	B66F1/00 B66F3/12																
A	EP-A-0 340 551 (E. A. STORZ & CO.) * the whole document *	1																	
A	EP-A-0 485 765 (AUGUST BILSTEIN & CO)																		
A	DE-A-41 30 108 (E. A. STORZ & CO)																		
A	DE-A-29 36 002 (E. A. STORZ & CO)																		
A	EP-A-0 515 803 (AUGUST BILSTEIN & CO)																		
A	DE-A-24 53 260 (ALFRED TEVES)																		
A	US-A-1 664 579 (TWYMAN)																		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)																
			B66F																
The present search report has been drawn up for all claims																			
Place of search THE HAGUE		Date of completion of the search 8 December 1993	Examiner Van den Berghe, E																
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