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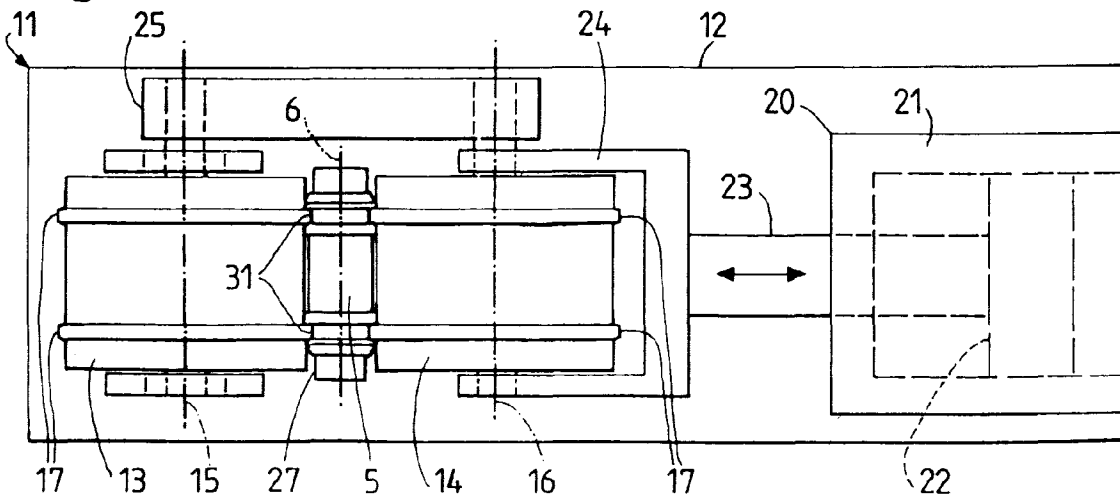
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(54) **Methods for manufacturing a pivot and a jack; a pivot and a jack**

(57) For manufacturing pivots for a jack, cylindrical work pieces (5) consisting of a ductile metallic material are prepared. Each work piece (5) is then rotated and rolled by profile rollers (13, 14), wherein at least one of the profile rollers (13, 14) is pressed against the work piece (5) by means of a hydraulic pressing and adjusting device (20). The profile rollers (13, 14) have annular ribs (17) which produce two annular grooves (31) in the work

piece (5) during rolling of the latter. This makes it possible to provide the work pieces (5) rapidly and at low costs with grooves (31). Each rolled work piece (5) is then provided with a transverse hole between the two grooves. The links of the jack have fork-shaped connection portions which can be pushed over the grounds of the grooves of the pivots so that the pivots are pivotably connected with the links by a clip in operation.

Fig. 3



Description

[0001] The invention relates to a method for manufacturing a pivot for a jack, particularly a scissors jack, which is suitable for being carried in a vehicle, e.g. a private motor car, and for raising and/or lowering the vehicle.

[0002] Known scissors jacks comprise a support, a load carrier, four elongated links, two metallic pivots and a rotatable actuating member. Each pivot has two annular grooves and a transverse hole disposed between the two grooves and connects two links pivotably with one another, the links engaging the grooves. The actuating member comprises a spindle penetrating the transverse holes of the two pivots, one of the latter having an internal thread engaging with a thread of the spindle.

[0003] In a known method for manufacturing metallic pivots for jacks, there are prepared work pieces which are provided with grooves by turning. This needs a lot of time, entails considerable costs and gives rise to metallic waste material which gets "lost" from the initial work piece and must be disposed of. Forming the grooves by detach cutting - viz. turning - may in addition weaken the pivots produced.

[0004] It is also known to assemble pivots and links for jacks by provisionally and loosely connecting the pivots and links and to secure the connections afterwards by riveting or crimping or other plastical deformations of one or the other part. Such assembling methods need a lot of time.

[0005] It is an object of the invention to overcome disadvantages of the known method for manufacturing pivots for jacks and, more specifically, to provide a method for manufacturing a pivot for a jack which can be executed rapidly and at low costs.

[0006] The foregoing object and other objects are attained according to one aspect of the invention by a method for manufacturing a pivot for a jack, the method having the features of claim 1.

[0007] According to another aspect of the invention, there is provided a method for manufacturing a jack comprising at least one pivot, wherein the method has the features of claim 6.

[0008] According to another aspect of the invention, there is provided a pivot with the features of claim 9.

[0009] According to yet another aspect of the invention, there is provided a jack with the features of claim 11.

[0010] Advantageous refinements of the methods for manufacturing a pivot and a jack, respectively, of the pivot and of the jack are evident from the dependent claims.

[0011] The grooves of the pivot are hence formed according to the invention by non-cutting shaping of a substantially cylindrical work piece or pivot by means of profile rollers. This makes it possible to form the grooves quickly and at low costs. By utilizing a rolling machine having two or possibly more profile rollers, there may be

provided for instance 10 to 15 or even more work pieces or pivots per minute with grooves. Forming the grooves by rolling has moreover the advantage that it does not give rise to waste material which would have to be disposed of. During forming of the grooves by rolling, the material having initially been in the zone of the grooves is displaced. This does not weaken the pivot like the known production of grooves by turning, but on the contrary strengthens the pivot shaped by rolling.

[0012] An example of the preferred embodiment of the invention is represented in the accompanying drawings. In the drawings, there show

Fig. 1 a schematic oblique view of a cutting device, a cylindrical rod and a work piece cut off therefrom,

Fig. 2 a schematic side elevation of a rolling machine for producing a pivot having annular grooves,

Fig. 3 a plan projection of the rolling machine,

Fig. 4 a side elevation of a first pivot having a transverse hole with an internal thread,

Fig. 5 a cross-section of the first pivot,

Fig. 6 a side elevation of a second pivot having a transverse hole with a smooth, cylindrical internal surface,

Fig. 7 a cross-section through the second pivot,

Fig. 8 an exploded view of parts of a scissors jack,

Fig. 9 a side elevation of the assembled scissors jack and

Fig. 10 a plan projection of the scissors jack.

[0013] The cutting device 1 shown in Fig. 1 consists for instance of a band saw. For manufacturing pivots or trunnions, a cylindrical bar 3 shown also in Fig. 1 is provided. The bar 3 consists of a ductile, metallic material, namely steel. An elongated work piece 5 is cut from the bar 3 for each pivot to be produced by means of the cutting device 1. Each work piece 5 designated to form a pivot has a longitudinal axis 6 and a lateral surface 7 which is initially completely rotationally symmetric to the axis 6 and completely cylindrical. The work piece has further two plane end surfaces at opposite ends.

[0014] Each cylindrical work piece 5 is processed by the rolling machine 11 shown in the Figures 2 and 3. The rolling machine 11 has a frame 12 and two profile rollers 13, 14 which are rotatable around parallel roller axes 15 and 16, respectively. Each profile roller 13, 14 has a lateral surface which is generally cylindrical, comprises however two annular ribs 17 projecting away from the corresponding roller axis and spaced along the latter

from one another. The lateral surfaces of the rollers may possibly further comprise small annular grooves disposed on both sides of each rib 17 and adjacent thereto. The two roller axes 15, 16 are parallel to one another and for instance horizontal and lying in a common horizontal plane. The profile roller 13 is rotatably supported by bearing means mounted undisplaceably on the frame 12. The rolling machine 11 comprises a hydraulic pressing and adjusting device 20 including a cylinder 21 mounted on the frame and a displaceable plunger 22. The latter is connected by a shaft 23 with a roller carrier 24 which is provided with bearing means and rotatably supports the profile roller 14. The profile roller 14 can be displaced by means of the hydraulic pressing and adjusting device 20 perpendicularly to its roller axis 16 and for instance approximately horizontally as indicated by double arrows in the Figures 2, 3. By displacing the roller 14, the distance between the two roller axes 15, 16 and thereby the distance between the two rollers themselves can be varied. The rolling machine 11 comprises only schematically represented driving means 25 which include at least one electric motor connected by transferring means with the two rollers 13, 14. The driving means 25 are adapted to rotate the two rollers with equal, preferably variable rotational speeds in opposite rotational directions indicated by arrows in Fig. 2. The rolling machine 11 may possibly comprise feeding means which are schematically shown only in Fig. 2 and designated by 26. This possibly provided feeding means 26 may comprise at least one remote controlled, electrically or pneumatically or hydraulically actuatable device for feeding work pieces one after the other into the intended space between the two rollers. The machine comprises further only schematically represented supporting and ejecting means 27 for supporting and ejecting a work piece 5 or pivot. The supporting and ejecting means 27 are configured for supporting a work piece 5 in such a way between the two rollers 13, 14 that the longitudinal axis 6 of the work piece 5 is parallel to the two roller axes 15, 16, that the work piece takes a predetermined axial position relative to the rollers and that the work piece can be rotated by the rollers around the axis 6. The latter is disposed for instance a small distance from the horizontal plane defined by the two roller axes 15, 16 above or below this plane. The means 27 may be configured so that the work piece 5 may possibly be displaced a little perpendicularly to its axis 6 during its rotation when the roller 14 is displaced towards the roller 13. The supporting and ejecting means 27 comprise further at least one remote controlled, electrically or pneumatically or hydraulically operable device for ejecting the work piece 3 when the latter has been shaped. The rolling machine 11 also comprises electric and electronic controlling means (not shown) having manually actuatable control elements, e.g. switches and the like, and means for the automatic control of the pressing and adjusting device 20, the driving means 25, the feeding means 26 and the supporting and ejecting

means 27. The rolling machine 11 may possibly be equipped with at least one transducer for measuring at least one dimension of the work piece and for supplying an electric signal representing the or each measured dimension to the controlling means.

[0015] An initially cylindrical work piece 5 is brought by utilizing the feeding means 26 into the intended space between the two profile rollers 13, 14 so that it is rotatably supported about its axis 6 by the supporting and ejecting means 27 and has a predetermined axial position in relation to the rollers. The driving means 25 rotates the two rollers 13, 14 which are brought into contact with the work piece 5 and rotate the latter. The hydraulic pressing and adjusting device 20 then presses and displaces the roller 14 towards the work piece 5 and towards the roller 13, wherein the rollers and the work piece are continually rotated. The profile rollers thereby profile the initially cylindrical lateral surface 7 of the work piece 5 by rolling and, thus, by non-cutting shaping. More particularly, the annular ribs 17 of the rollers produce two annular grooves 31 in the surface 6 of the work piece 5. When the shaping is terminated, the pressing and adjusting device 20 moves the roller 14 away from the roller 13. The supporting and ejecting means 27 moreover ejects the shaped work piece or pivot. Afterwards, a new work piece can be inserted into the space between the rollers and be shaped.

[0016] The described shaping process may be controlled for instance by a person operating manually control elements of the controlling means. However, the shaping process may also be controlled automatically by the controlling means. The controlling means may thereby control the pressing and adjusting device 20 and the driving means 25, for instance according to a predetermined program as a function of time, and terminate the shaping when the roller 14 has been displaced to a predetermined position. However, it is also possible to measure at least one dimension of the work piece, e.g. the depth of at least one groove 31 - by utilization of the mentioned, possibly provided at least one transducer and to terminate the shaping process as soon as the measured dimension or a value calculated from several measured dimensions reaches a predetermined limiting value.

[0017] The shape of work pieces shaped by the rolling machine 11 can be seen particularly well in the Figures 4 to 7 which show two different pivots or trunnions 35, 41 formed from work pieces 5 which had identical dimensions and had been identically shaped by the rolling machine 11. The pivots shown in the Figures 4 to 7 have longitudinal axes, lateral surfaces and annular grooves which are designated by the same reference numerals as the axes, lateral surfaces and grooves of the work piece 3, viz. 6, 7 and 31 respectively. The annular grooves 31 are spaced from one another, wherein each groove is disposed near one of the two ends of the work piece or pivot. The annular ribs 17 of the profile rollers 13, 14 are slightly tapering towards their tops in cross-

sections of the ribs, viz. in sections along the roller axes, so that the ribs can be moved easily out from the grooves 31 when the rollers are moved away from a work piece 5 or pivot. The cross-sectional shapes of the annular grooves 31 are substantially complementary to the cross-sectional shapes of the top portions of the annular ribs 17 or of the entire ribs. Each groove 31 has a substantially cylindrical ground and two lateral surfaces. These lateral surfaces are for instance slightly conical and inclined outwards away from a middle plane of the annular groove and from one another so that the groove widens away from its ground. However, the angles between the lateral surfaces of the annular grooves 31 and the axis 6 shall preferably be nearly 90° and deviate preferably at most 10°, better at most 5° and for instance only approximately 3° from 90°.

[0018] When the annular ribs 17 of the profile rollers press two grooves 31 into a work piece 5, material having initially occupied the space of the grooves is pressed away from each groove on opposite sides thereof. This material then forms annular beads on both sides of each annular groove 31. These beads project in generally radial directions outwards over the initially present cylindrical surface of the work piece. The material pressed towards the two ends of the work piece may further lead to a small elongation of the peripheral portion of the work piece so that the initially plane end surfaces of the work piece become slightly concave.

[0019] A work piece 5 shaped by means of the rolling machine 11 may serve for forming the first pivot 35 represented in the Figures 4 and 5. The work piece is provided for this purpose with a throughgoing transverse hole 36 produced by drilling. This transverse hole 36 is disposed in the middle between the two grooves 31 and defines a hole axis 37 which intersects the longitudinal axis 6 perpendicularly. The transverse hole 36 is provided with an internal thread 38.

[0020] A work piece 5 shaped by utilization of the rolling machine 11 may serve for forming a second pivot 41 represented in the Figures 6 and 7. The work piece is provided for this purpose with a throughgoing transverse hole 42 produced by drilling. This transverse hole 42 is disposed again in the middle between the two grooves 31 and defines a hole axis 43 which intersects the longitudinal axis 6 perpendicularly. The second pivot 41 is distinguished from the first pivot 35 thereby that the transverse hole 42 comprises no thread and has an internal surface which is smooth and rotationally symmetric to the hole axis 43, namely substantially cylindrical. The diameter of the transverse hole 42 is at least equal to the maximum diameter, viz. nominal diameter, of the internal thread 38 and for instance slightly bigger than the maximum diameter of the internal thread 38.

[0021] The first pivot 35 and the second pivot 41 may constitute parts of a scissors jack 51 which is shown partly and in partly assembled state in Fig. 8 and completely and in assembled state in the Figures 9 and 10. The scissors jack 51 comprises a support 52 which can

rest on a plain, horizontal supporting surface of a ground or the like. The jack 51 comprises further a load carrier 53 which is configured to support and engage load, e. g. a part of a private motor car. A transferring mechanism 54 connects the load carrier 53 vertically adjustably to the support 32. The mechanism 54 includes a first link 55, a second link 56, a third link 57 and a fourth link 58. The four links are elongated, have two opposite ends and consist of a metallic material, e.g. steel. Each link consists of a one-piece body. The middle portions of the links are generally U-shaped in cross-section and have two opposite legs and a web connecting the two legs.

[0022] The two legs of each link are provided at both ends of the links with a projection which is contiguous and continuous with the corresponding leg. Each link is provided at one of its ends with a bore penetrating the end portions of the legs and/or projections of the legs. These end portions and/or projections of the legs are further provided with some teeth. Those ends of the first link 55 and the third link 57 which possess bores are pivotably connected by pivots - e.g. bolts or the like - with the support 52 and engage one another with their teeth. The ends provided with bores of the second link 56 and of the fourth link 58 are pivotably connected by pivots - e.g. bolts or the like - with the load carrier 53 and engage one another with their teeth.

[0023] The projections of the legs of each link 55, 56, 57, 58 disposed at the end opposite the end with the bore form two fork-shaped connection portions 61 spaced from one another and opposite to one another. Each connection portion 61 projects in the longitudinal direction of the link away from the leg and is slightly broader than the latter. Each connection portion 61 has two prongs or jaws separated by an indentation 62 which opens into the free end of the link. Each indentation 62 has a ground portion limited by an arc of a circle which is at least equal to a semicircle and for instance slightly bigger than a semicircle. Each indentation 62 has a mouth portion limited by straight opposite edges which are slightly inclined away from one another in the direction from the ground to the mouth of the indentation. Each indentation 61 has accordingly a slight constriction 63 disposed between the ground and the mouth of the indentation at the border between the arcuate ground portion and the mouth portion. The circle defined by the arcuate ground portion of each indentation 62 has a diameter which is for instance approximately equal to the diameter of the cylindrical grounds of the annular grooves 31 of the pivots 35, 41 and/or a little larger than the last-mentioned diameter. The narrowest portion of each constriction 63 has a width which is smaller than the diameters of the arcuate ground portion of the indentation 62 and of the grounds of the annular grooves 31. The fork-shaped connection portion 61 of each link 55, 56, 57, 58 can therefore be connected in one of the grooves 31 of one of the pivots 35, 41 to the respective pivot by a clip in and snap in operation.

[0024] The width of the ground of each annular groove

31 is slightly larger than the sum of the thicknesses of two connection portions 61. When the pivots 35, 41 and the links 55 to 58 have been assembled, each connection portion 61 embraces pivotably one of the grooves 31 at least along half the circumference of the groove. Each groove then contains sections of connection portions 61 of two different links and connects these two links pivotably with one another and with the pivot. The lateral surfaces of the annular grooves 31 being almost perpendicular to the axes 6 then secure the connection portions 61 with small clearance against axial displacements. The connection portions 61 of the first link 55 and of the second link 56 engage with the grooves of the first pivot 35. The connection portions 61 of the third link 57 and of the fourth link 58 engage with the grooves of the second pivot 41. The webs of the two lower links 55 and 57 connected with the support 52 are disposed on the lower side of the links, whereas the webs of the two upper links 56, 58 connected with the load carrier 53 are disposed on the upper side of the two links. The two lower links 55, 57 are for instance a little broader than the two upper links 56, 58 connected with the load carrier 53 so that the upper links can be lodged partly between the legs and the connection portions 61 of the lower links.

[0025] The scissors jack 51 comprises further an elongated actuating member 65 which is represented only in the Figures 9 and 10. The actuating member 65 possesses an axis and a spindle 67 having a portion with an external thread 68 and a cylindrical portion 69 with a smooth, threadless, cylindrical surface. When the scissors jack is assembled, the spindle is inserted into and through the transverse hole 42 of the second pivot 41 and screwed with the external thread 68 into and through the internal thread 38 of the first pivot 35. The hole axes 37, 43 of the two pivots 35, 41 are thereby aligned so that the axis of the actuating member 65 coincides with the hole axes 37 and 43 and is approximately horizontal. The smooth cylindrical portion 69 of the spindle then penetrates the transverse hole 42 of the second pivot and is rotatably supported with radial play by the cylindrical surface of the hole 42. The actuating member 65 is provided at the end of the spindle projecting out from the second pivot 41 with a head forming an adapter 70. The latter is rigidly connected to the spindle and at least in part polygonal, namely hexagonal in cross-section. The adapter 70 has moreover a stopping and/or bearing surface which is planar and at right angles to the axis of the actuating member. The stopping and/or bearing surface is supported over an annular bearing means 71 on the lateral surface of the second pivot on that side of the latter which faces away from the first pivot. The bearing means 71 may comprise for instance two metallic washers and a plastic ring disposed inbetween.

[0026] It can be inferred from the foregoing that each pivot 35, 41 connects a pair of links. The first pivot 35 forms simultaneously a pivotable nut for the spindle of

the actuating member 65. The second pivot serves further as a pivotable yoke and forms a bearing for the actuating member. Hence, the two pivots 35, 41 are together rotatably supporting the actuating member 65.

[0027] When the scissors jack 51 is assembled, the two fork-shaped connection portions 61 of each link are pushed into the two grooves 31 and over the grounds of the grooves of one of the pivots 35, 41 so that the respective pivot is clipped into the connection portions 61 of the respective link. The two prongs of each connection portion 61 are thereby temporarily slightly spread away from one another under an elastic deformation and snap afterwards in so that the pivot gets pivotably caught in the indentations 62 of the link.

[0028] All four links can be clipped substantially simultaneously into the grooves of the two pivots. There are different possibilities for doing so. One may for instance connect first the two lower links 55, 57 with the support 52 and the two upper links 56, 58 with the load carrier 53 as shown in Fig. 8. The links can thereby be brought into positions in which they form relatively large angles with a vertical plane similar as in Fig. 9. The four links are then provisionally and loosely connected by sliding the two pivots 35, 41 into the mouth portions of the indentations 62 of the links. Moreover, the actuating member 65 is stuck through the hole 42 of the pivot 41 and screwed into the internal thread 38 of the hole 36 of the pivot 35. The spindle 67, the adapter 70 and the bearing means 71 hold then the two pivots together. The provisionally assembled jack is then arranged within a press so that the support 52 rests on a support of the press. The load carrier 53 is then pressed toward the support 52 by a vertically displaceable pressure ram of the press. The links are thereby spread so that the connection portions 61 are pushed against the pivots and pressed completely over the grounds of the grooves 31 of the pivots. The pivots are thereby clipped into the indentations 62 of the links.

[0029] The links and pivots can instead be clipped into one another before the actuating member 65 is inserted into the pivots. The four links are for this purpose again connected with the support 52 and load carrier 53. The links are brought into nearly vertical positions and again provisionally and loosely connected by inserting the pivots into the mouth portions of the indentations 62. The preliminarily assembled parts of the jack are then arranged between a support and a pressure ram of a press. When the pressure ram presses the load carrier 53 toward the support 52, the connection portions 61 of the links are pressed toward the pivots so that the latter are clipped in. Thereafter, the actuating member 65 is mounted. Hence, the four links and the two pivots can be connected very quickly and simply by one or the other described clip in method.

[0030] There is also shown a crank-like device 75 in Fig. 9. This device 75 includes a socket 76 which has an axial hole. At least a portion of this hole is polygonal, namely hexagonal in cross-section so that it fits on the

hexagonal portion of the adapter 70. The device 75 comprises further an elongated handle 77 pivotably connected with the socket.

[0031] When the scissors jack shall be used for raising and/or lowering a load, particularly a vehicle such as a private motor car, a person can push the socket 76 onto the adapter 70 and manually rotate the actuating member 65 about the axis thereof. By this rotation, the distance between the two pivots 35, 41 can be varied. This entails in turn a variation of the height of the load carrier 53 relative to the support 52, so that the load resting on the load carrier can be raised and/or lowered. The jack is by the way shown in Fig. 9 in an intermediate position and in Fig. 10 in the position in which the two pivots 35, 41 have the maximum possible distance from one another and the load carrier 53 has accordingly the lowermost possible position. When the utilization of the scissors jack 51 is terminated, the crank-like device 75 is removed from the adapter 70. The jack 51 and the device 75 can then for instance be stowed in the motor car.

[0032] The manufacturing method and the manufactured pivots and jacks may be modified. The annular grooves of the pivots might for instance be formed by a rolling machine having three profile rollers of which one or two are displaceable by an associated plunger. The annular bearing means 71 might possibly be omitted so that the stopping and/or bearing surface of the adapter 70 can engage directly with the second pivot 41. The latter might then be provided with a planar or conical bearing surface on which the planar or conical stopping and/or bearing surface of the adapter 70 can rest.

[0033] It might also be possible to utilize pivots with rolled annular grooves for other types of jacks having a support, a load carrier, at least one link and an actuating member. The jack can have for instance only two elongated links, viz. a first link and a second link. The first link can then be connected at one of its ends pivotably to the support. The second link can be connected at one end thereof pivotably to an intermediate portion of the first link. The other end of the second link can be connected pivotably to the load carrier. The two links are again generally U-shaped in cross-sections. The actuating member can be connected by means of two pivots having a pair of grooves and a transverse hole pivotably to an intermediate portion of the second link and to that end of the first link which is remote from the support. The transverse hole of the pivot connected to the second link can comprise an internal thread. The pivot connected to the first link can have a transverse hole with a smooth, cylindrical surface.

[0034] It is also possible to produce a jack which has only one pivot with rolled grooves.

Claims

1. A method for manufacturing a pivot (35, 41) for a

jack (51), the pivot (35, 41) having an axis (6), two annular grooves (31) encompassing the axis (6) and a transverse hole (36, 42) intersecting the axis (6) between the grooves (31), wherein a substantially cylindrical work piece (5) is provided for forming the pivot (35, 41), characterised in that the work piece (5) is provided with the grooves (31) by rotating the work piece (5) about the axis (6) and by non-cutting shaping of the work piece (5) by means of profile rollers (13, 14).

2. A method as claimed in claim 1, characterised in that each of said profile rollers (13, 14) comprises two annular ribs (17) for forming both grooves (31) simultaneously.
3. A method as claimed in claim 1 or 2, characterised in that at least one profile roller (14) is displaced and pressed against the rotating work piece (5) during the formation of the grooves (31) by means of a hydraulic device (20) including a plunger (22).
4. A method as claimed in any of claims 1 to 3, characterised in that the transverse hole (36, 42) is drilled through the work piece (5) having been provided previously with the grooves (31).
5. A method as claimed in claim 4, characterised in that the transverse hole (36, 42) is provided with an internal thread (38) or an internal surface which is smooth and rotationally symmetric to an axis of the transverse hole (36).
6. A method for manufacturing a jack (51) comprising at least one pivot (35, 41) manufactured as claimed in any of claims 1 to 5, wherein at least one link (55, 56, 57, 58) and an actuating member (65) are produced, characterised in that the link (55, 56, 57, 58) is provided with two connection portions (61) having an indentation (62), that the pivot (35, 41) is pivotably clipped into the connection portions (61) of the link (55, 56, 57, 58) so that a ground of each groove (31) of the pivot (35, 41) is partially embraced by one of the connection portions (61) of the link (55, 56, 57, 58) and that the actuating member (65) is inserted into and through the transverse hole (36, 42) of the pivot (35, 41).
7. A method as claimed in claim 6, characterised in that a first pivot (35), a second pivot (36), a support (52), a load carrier (53), a first link (55), a second link (56), a third link (57) and a fourth link (58) are prepared, that the links (55, 56, 57, 58) are configured elongated and having two opposite ends, wherein the transverse hole (36) of the first pivot (35) is provided with an internal thread (38), that the transverse hole (42) of the second pivot (41) is provided with an internal surface being smooth and ro-

tationally symmetric to an axis of the transverse hole (36), that the first link (55) is connected pivotably at one end to the support (52) and at the other end to the first pivot (35), that the second link (56) is connected pivotably at one end to the first pivot (35) and at the other end to the load carrier (53), that the third link (57) is connected pivotably at one end to the support (52) and at the other end to the second pivot (41), that the fourth link (58) is connected pivotably at one end to the second pivot (41) and at the other end to the load carrier (53) and that the actuating member (65) is provided with a spindle (67) having an external thread (68) engaging the internal thread (38) of the first pivot (35) and with a portion rotationally supported by the internal surface of the transverse hole (42) of the second pivot (41).

8. A method as claimed in claim 7, characterised in that the two pivots (35, 41) and the four links (55, 56, 57, 58) are provisionally connected by inserting the pivots (35, 41) only into mouths of the indentations (62) of all four links (55, 56, 57, 58) and that the load carrier (53) is afterwards pressed toward the support (52) so that the pivots (35, 41) and the connection portions (61) of the four links (55, 56, 57, 58) are clipped substantially simultaneously into one another under a temporary elastical deformation of the connection portions (61).

9. A pivot for a jack, having an axis (6), two annular grooves (31) encompassing the axis (6) and a transverse hole (36, 42) intersecting the axis (6) between the grooves (31), the annular grooves (31) being circular in cross-sections perpendicular to the axis (6), characterised in that the grooves (31) have been formed by non-cutting rolling.

10. A pivot as claimed in claim 9, characterised in that the transverse hole (36, 42) comprises an internal thread (38) or an internal surface which is smooth and rotationally symmetric to an axis of the transverse hole (42).

11. A jack comprising at least one pivot (35, 41) as claimed in claim 9 or 10 and further comprising at least one link (55, 56, 57, 58) and an actuating member (65), wherein the actuating member (65) penetrates the transverse hole (36, 42) of the pivot (35, 41) and is rotatable about an axis of the hole (36, 42), characterised in that the link (55, 56, 57, 58) has two connection portions (61) each of which being provided with an indentation (62) configured so that each connection portion (61) can be connected to one of the grooves (31) by clipping and is then partially and pivotably embracing a ground of the groove (31).

12. A jack as claimed in claim 11, characterised in that it comprises a support (52), a load carrier (53), a first link (55), a second link (56), a third link (57), a fourth link (58), a first pivot (35) and a second pivot (41), that the links (55, 56, 57, 58) are elongated and have two opposite ends, that the first link (55) is connected pivotably at one end to the support (52) and of the other end to the first pivot (35), that the second link (56) is connected pivotably at one end to the first pivot (35) and at the other end to the load carrier (53), wherein the third link (57) is connected pivotably at one end to the support (52) and at the other end to the second pivot (41), that the fourth link (58) is connected pivotably at one end to the second pivot (41) and at the other end to the load carrier (53), that the transverse hole (36) of the first pivot (35) comprises an internal thread (38), that the transverse hole (42) of the second pivot (41) comprises an internal surface which is smooth and rotationally symmetric to an axis of the transverse hole (47) and that the actuating member (65) includes a spindle (67) penetrating the transverse holes (36, 42) of the two pivots (35, 41) and having an external thread (68) engaging with the internal thread (38) of the first pivot (35) and a portion rotatably supported by the internal surface of the transverse hole (42) of the second pivot (41).

13. A jack as claimed in claim 11 or 12, characterised in that each connection portion (61) is fork-shaped and has two elastically deformable prongs bounding the indentation (62) and that the indentation (62) of each connection portion (61) is at least partly arcuate and has a ground, a mouth and a constriction (63) arranged between the ground and the mouth.

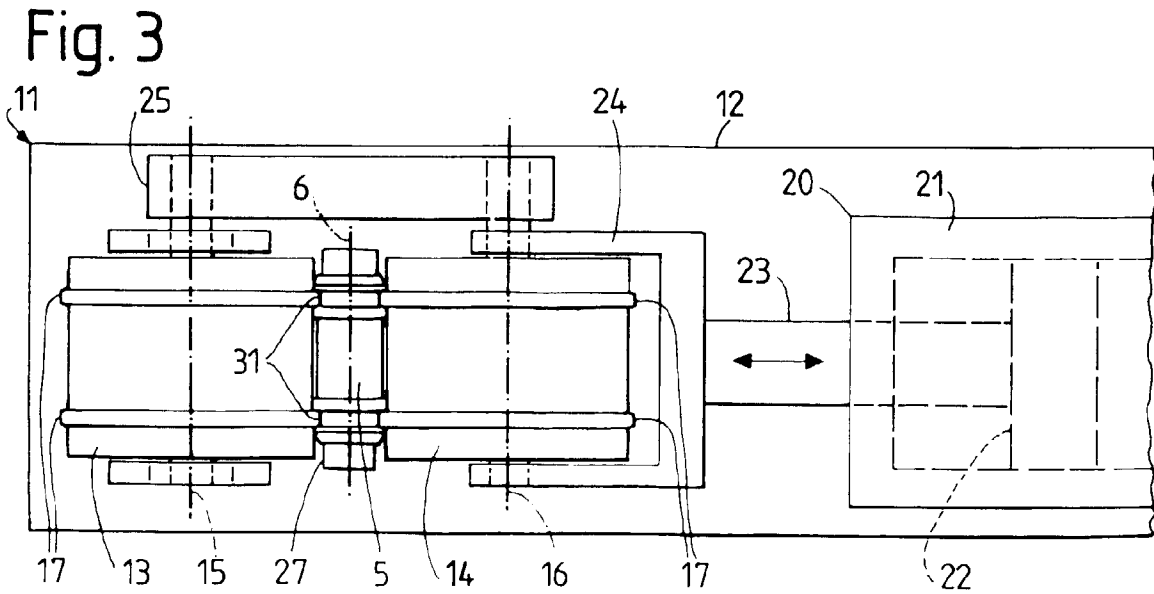
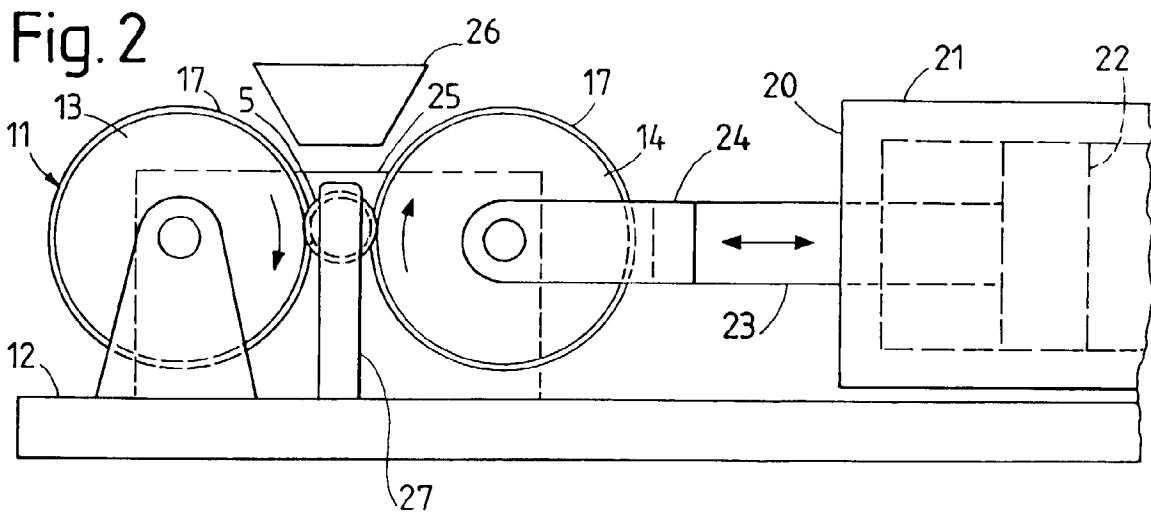
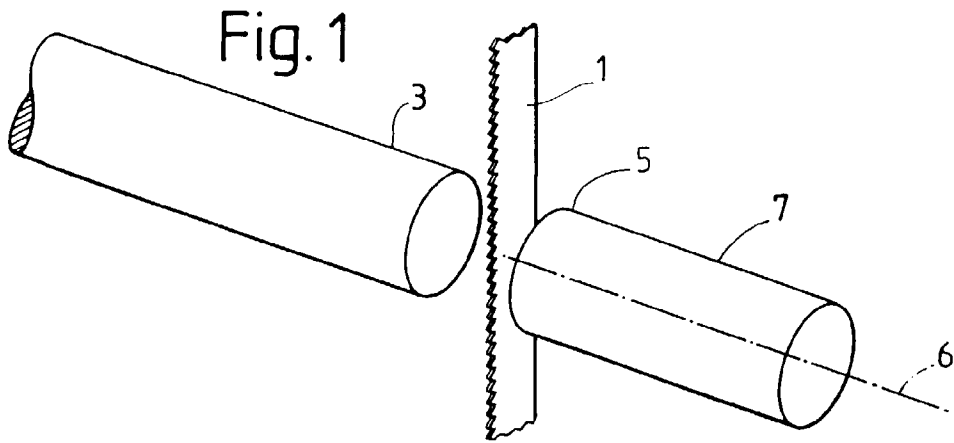


Fig. 4

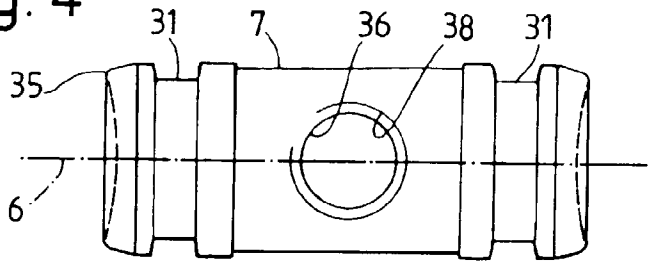


Fig. 5

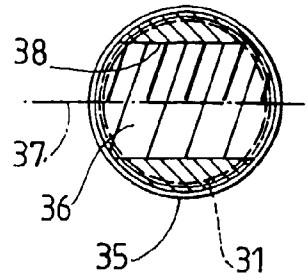


Fig. 6

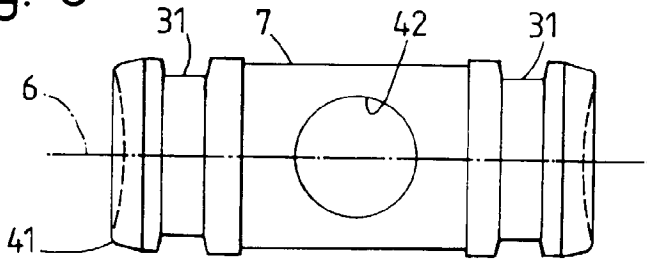


Fig. 7

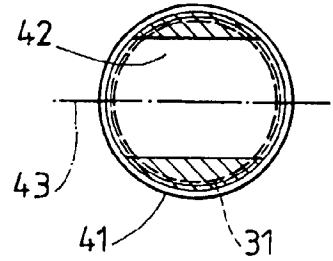
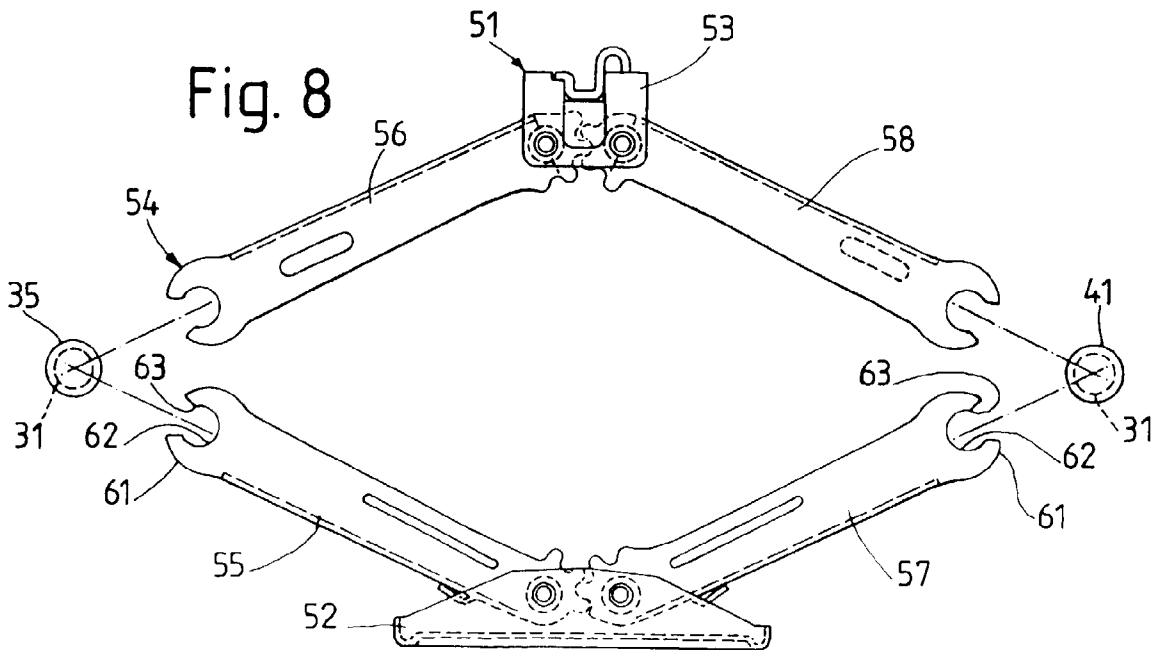
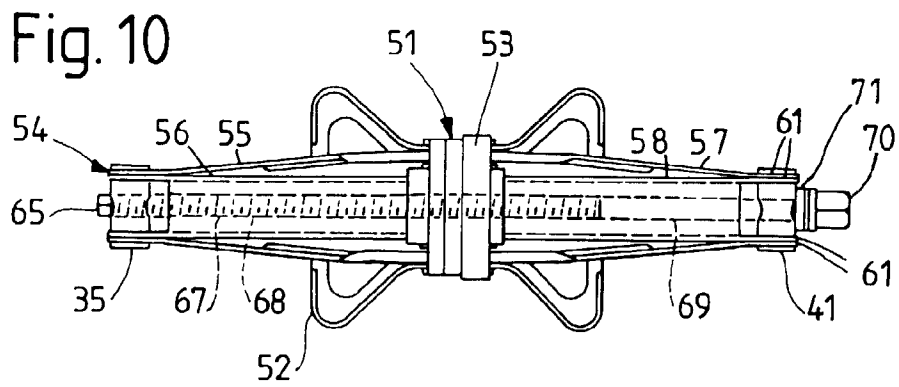
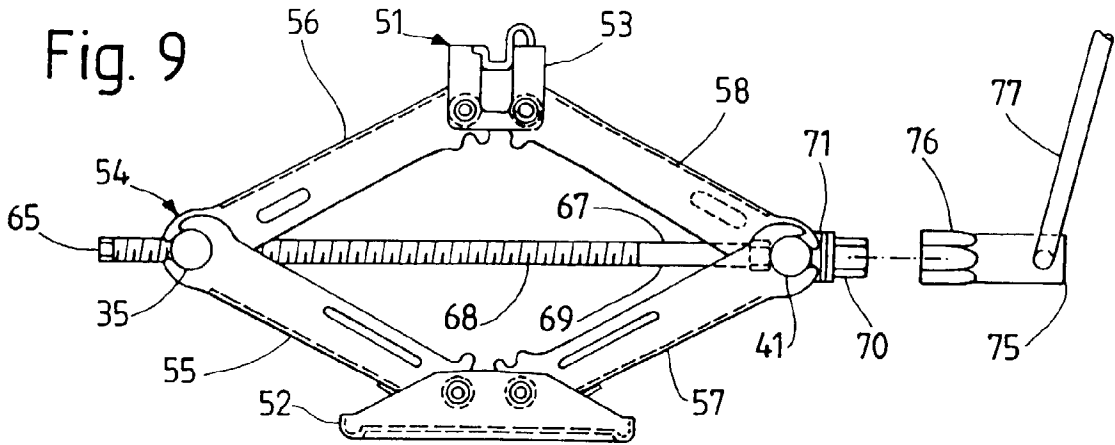


Fig. 8







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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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Place of search THE HAGUE		Date of completion of the search 27 November 1998	Examiner Plastiras, D
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 November 1998	Examiner Plastiras, D
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