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(54) **DISPLACEMENT NUT FOR A LIFTING DEVICE, AND CORRESPONDING LIFTING DEVICE**

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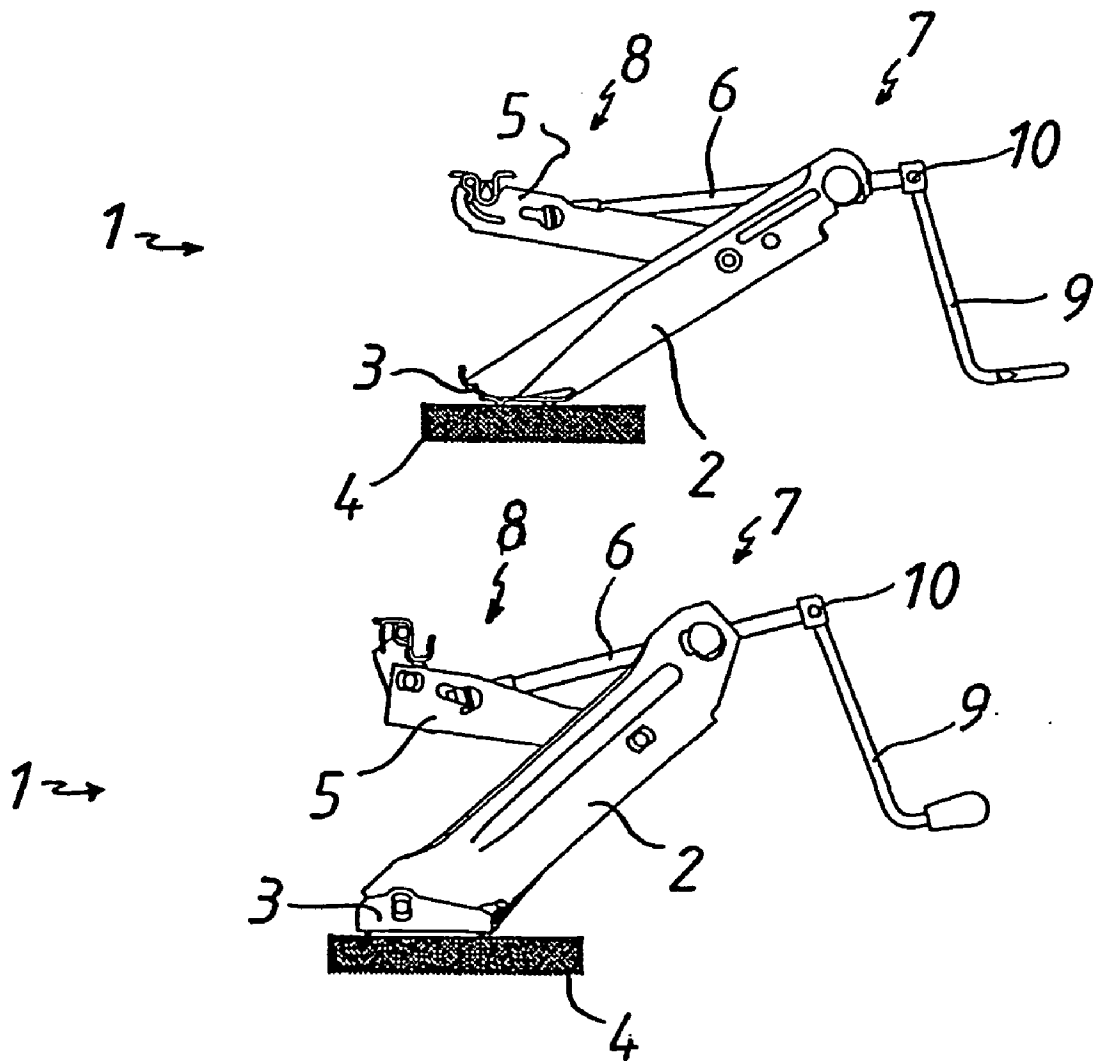
(57) **ABSTRACT**

The invention relates to a displacement nut for a lifting device, especially a mechanical jack (1) comprising a base body (7) which is provided with an internal screw thread for receiving a threaded spindle. The invention is characterised in that the base body (7) and the internal screw thread (13) are provided as a single element formed by at least two material components.

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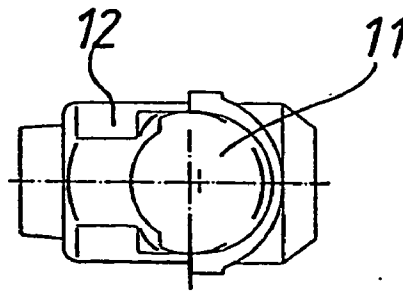


Fig. 2

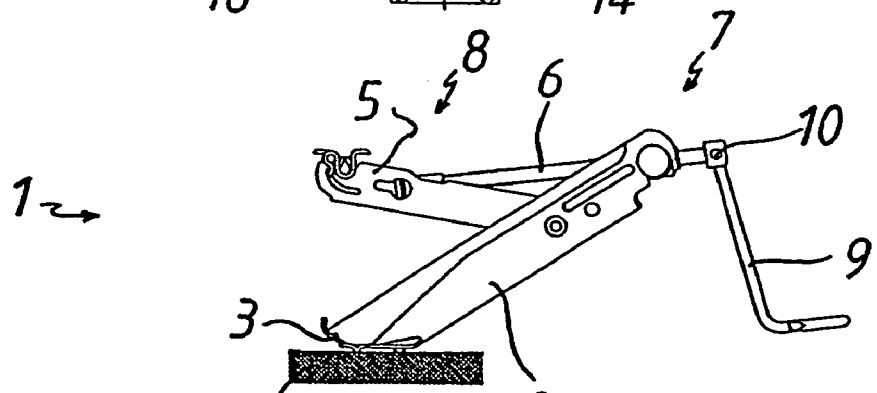
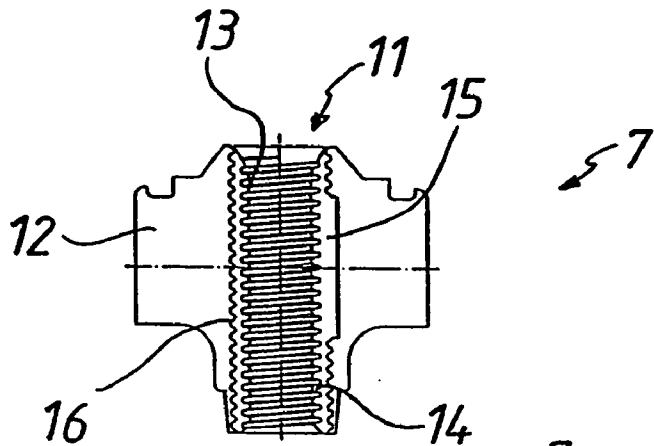
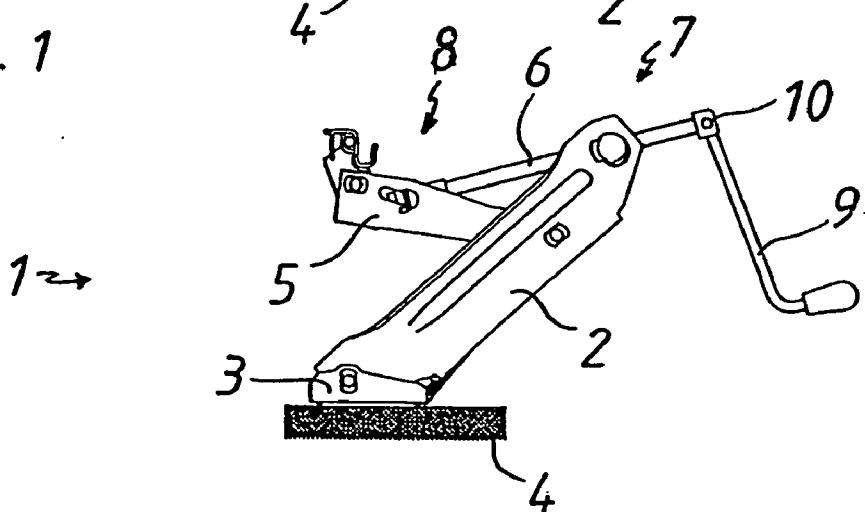


Fig. 1



DISPLACEMENT NUT FOR A LIFTING DEVICE, AND CORRESPONDING LIFTING DEVICE

[0001] The invention relates to a motion nut for a lifting device, especially a mechanical car jack, comprising a basic body, which is provided with an internal thread for seating a threaded spindle.

[0002] The EP-B 0320613 relates to a car jack with a platform leg, at which a supporting arm, which can be swiveled about a horizontal axis, is hinged and which is engaged by a threaded spindle, which is mounted at the platform leg in an articulated fashion with a plastic spindle nut, which engages, with stud axles, bearing recesses of the platform leg form as a shaped sheet-metal part. A metal bracket is connected positively with the plastic spindle nut and has, at its ends, the stud axles of the spindle nut in the region of the bearing recesses of the supporting segments covering the platform leg. Disadvantageously, it may be noted here that the region, accommodating the threaded spindle, must be reinforced by a further component (metal bracket), structural changes also having to be made to the plastic spindle nut, so that the two components can be positioned accurately relative to one another.

[0003] A similar construction is described in the EP-A 0340551. The spindle nut consists of a plastic body, which interacts with a metallic reinforcing element. The reinforcing element comprises a sleeve-like projection of the plastic body and is constructed as a sheet-metal ring. The criteria, which apply here, are identical with those already described.

[0004] A spindle nut connection can be inferred from U.S. Pat. No. 2,664,023. The region of the spindle nut is formed here by a two-part sleeve, the two parts of which are connected together by means of a spring element and over which a one-part bushing, having an internal contour corresponding to the sleeve accommodation region, is pushed later on. Aside from the tolerances, which must be maintained here between the threaded spindle and the divided, threaded nut, this type of structural configuration of a motion nut must be regarded as cumbersome and component-intensive.

[0005] It is therefore an object of the invention to develop a motion nut for a lifting device which, while simple to construct, nevertheless has good sliding and friction properties in the spindle region and, at the same time, ensures an optimum tensile load and torque support in the region of the lifting device. Moreover, a lifting device, especially a mechanical car jack, is to be optimized so that, while having good sliding and friction properties in the spindle mounting area, nevertheless provides optimum tensile loads and a torque support to the body of the lifting device, a reduction in the number of components, in comparison to the state of the art, being brought about.

[0006] Pursuant to the invention, this objective is accomplished owing to the fact that the basic body is provided as a one-part component, which is formed by at least two material components.

[0007] Advantageous further developments of the object of the invention can be inferred from the associated dependent claims.

[0008] This objective is also accomplished by a lifting device, especially a mechanical car jack, comprising at least

one stand element and at least one lifting element, which are connected with one another over at least one motion nut, which accommodates a threaded spindle, and, optionally, a counter-bearing, the motion nut being formed by at least two material components.

[0009] For the advantageous developments of the inventive lifting device can be inferred from the associated dependent claims.

[0010] The object of the invention preferably is used for mechanical car jacks, other application cases in the area of motor-driven lifting devices also being conceivable. Due to the inventive object, additional reinforcing elements become dispensable, so that new customer requirements with regard to higher grade static stresses as well as increased dynamic stresses can be realized without problems and the operator comfort of the state of the art is retained. Compared to the state of the art, installation space and costs are also not increased.

[0011] The object of the invention combines the functions of

[0012] nut-spindle mounting and sliding

[0013] force and torque support

[0014] Materials with a low coefficient of friction book, such as plastic, bronze and casting, are used for the function of mounting the nut-spindle.

[0015] Preferably, materials of high strength, such as filled plastics or metallic materials, are used to fulfill the function of force and torque support.

[0016] In its simplest construction, the motion nut consists of a basic body, containing two material components, for example, an internal thread region, consisting of nylon with carbon fibers, connected with an outer nylon part containing glass fibers and surrounding the internal thread region.

[0017] Mechanical car jacks are preferably equipped with such motion nuts, so that they are enclosed by a circumference of protection. If necessary, more than two material components can also be used; however, this may have a slightly disadvantageous effect on the cost situation.

[0018] The torsion- and tension-resistant connection of the two partial components (internal thread region and outer part) is brought about, for example, by longitudinal ribs or by thread-like ribs, which extend in the circumferential direction and may be integrally molded at the internal thread region and/or the outer part. Alternative embodiments, namely grooves in this internal thread region and/or outer part, are, of course, also conceivable. All customary cross-sectional variations (round, angular or the like) can be used as profiles for such groove-like depressions or ribs.

[0019] The object of the invention is distinguished owing to the fact that a material with good sliding properties and appropriate strength is used for the internal thread region and a material of very high strength and stiffness is used for the outer part.

[0020] The object of the invention is described in the following by means of an example and represented in the drawing, in which

[0021] **FIG. 1** shows a mechanical car jack in various lifting positions and

[0022] FIG. 2 shows a motion nut for the car jack of FIG. 1 in various views.

[0023] The inventive car jack 1 comprises a platform leg 2, which can be set down on level ground 4 by means of a foot 3. The platform leg 2 is connected with a pivotable supporting arm 5. A threaded spindle 6 extends between the free end region of the platform leg 2 and the supporting arm 5, a basic body 7, in the form of a motion nut being provided on the platform leg side and a counter-bearing 8 being provided on the supporting arm side. The supporting arm 5 can be moved up or down relative to the platform leg 2 over a crank handle of 9, which is connected over a connecting piece 10 with the threaded spindle 6.

[0024] FIG. 2 shows the inventive motion nut 7 in different views.

[0025] The motion nut 7 is formed by a basic body, containing two material components, namely an internal thread region 11 and an external part 12 surrounding the internal thread region 11. The latter contains the internal thread 13, which accommodates the threaded spindle 6, and is produced by injection molding from a nylon containing a proportion of carbon fibers. Rib-like projections, on the one hand, in the form of ribs 15 extending in the longitudinal direction, and as thread-like profiles 16, extending in the peripheral direction, are integrally molded to the outer periphery 14 of the internal thread region 11. The outer part 12, which is molded in a second step, for example, by injection molding, about the internal thread region 11, consists of nylon with a proportion of glass fibers. The rib-like projections 15, 16 accordingly form a connection, resistant to torsion and tension, between the two partial components 11, 12. The material, selected for the internal thread region 11, ensures the mounting and sliding function of the nut-spindle, whereas the material, selected for the outer part 12, ensures the force and torque support, for example, at the platform leg 2.

[0026] The selection of other materials, depending on the case for which they are to be used, is also conceivable. Alternatively, bronze or cast alloys can be used for the internal thread region 11. Furthermore, a plastic with an alternative reinforcing material, such as carbon fibers, aramide, mineral fibers or metal fibers, can be used as material for the internal thread region 11. Alternatively or additionally, lubricants such as PTFE, graphite, silicone, or PE can be admixed with the plastic.

[0027] Reinforcing materials, such as fibers of glass, carbon, aramide, boron, ceramic, and/or fabric can be added to the outer part 12.

[0028] The distance between the profile, extending in the peripheral direction, extends here approximately to the lead of the internal thread 13.

List of Reference Symbols

- [0029] 1. car jack
- [0030] 2. platform leg
- [0031] 3. foot
- [0032] 4. ground
- [0033] 5. supporting arm

[0034] 6. threaded spindle

[0035] 7. motion nut

[0036] 8. counter-bearing

[0037] 9. jack handle

[0038] 10. connecting piece

[0039] 11. internal thread region

[0040] 12. outer part

[0041] 13. internal thread

[0042] 14. outer periphery

[0043] 15. ribs

[0044] 16. thread-like profiles

1. A motion nut for a lifting device, especially a mechanical car jack (1), comprising a basic body (7), which is provided with an internal thread (13) for seating a threaded spindle (6), wherein the basic body (7), together with the internal thread (13), is provided as a single component, formed by at least two material components, preferably an internal thread region (11) and an external part (12).

2. The motion nut of claim 1, wherein the approximately sleeve-like internal thread region (11) is formed by an optionally filled plastic.

3. The motion nut of claim 1, wherein the approximately sleeve-like internal thread region (11) is formed by a bronze or cast alloy.

4. The motion nut of one of the claims 1 to 3, wherein the approximately sleeve-like internal thread region (11) is formed by a nylon material with a specifiable carbon fiber content.

5. The motion nut of one of the claims 1 to 4, wherein, for forming the basic body (7), the outer part (12), surrounding the internal thread region (11), comprises a high strength material, especially a filled plastic or a metallic alloy.

6. The motion nut of one of the claims 1 to 5, wherein the outer portion (12) of the basic body (7), surrounding the internal thread region (11), consists of a nylon material with a specifiable glass fiber content.

7. The motion nut of one of the claims 1 to 6, wherein the internal thread region (11), as well as the outer part (12), which surrounds the internal thread region (11), are produced from a plastic, initially the approximately sleeve-like inner region (11) being produced and being surrounded in a second step, especially in an injection mold, by material of the outer part (12).

8. The motion nut of one of the preceding claims 1 to 7, wherein a device (15, 16) is provided to prevent rotation between the internal thread region (11) and the outer part (12).

9. The motion nut of one of the claims 1 to 8, wherein the device for preventing rotation is formed by rib-like projections (15, 16) or groove-like depressions extending in the longitudinal direction and/or in the peripheral direction of the internal thread region (11) and/or of the outer part (12).

10. The motion nut of one of the claims 1 to 9, wherein the rib-like projections (15, 16) or the groove-like depressions are provided in a rounded or angular form.

11. The motion nut of one or several of the claims 1 to 10, wherein the internal thread region (11) is formed from a plastic, in which lubricants are incorporated.

12. The motion nut of claim 11, wherein PTFE is incorporated as lubricant.

13. A lifting device, especially a mechanical car jack (**1**), containing at least one stand element (**2**) and at least one lifting element (**5**), which are connected to one another by means of at least one basic body (**7**), which accommodates a threaded spindle (**6**) and is formed by a motion nut and optionally a counter-bearing (**8**), wherein the motion nut (**7**) is formed by at least two material components, preferably an internal thread region (**11**) and an outer part of when (**12**).

14. The lifting device of claim 13, wherein the motion nut (**7**) is formed by an internal thread region (**11**) of plastic with a specifiable carbon fiber content and, surrounding this, by an outer part (**12**) of plastic with a specifiable glass fiber content.

15. The lifting device of claims **13** or **14**, wherein the internal thread region (**11**) consists of nylon with a specifi-

able carbon fiber content and the outer part (**12**) consists of nylon with a specifiable glass fiber content.

16. The lifting device of one of the claims 13 to 15, wherein rotation is prevented between the internal thread (**11**) and the outer part (**12**) especially by rib-like projections (**15**, **16**) and/or groove-like depressions.

17. The lifting device of one of the claims 13 to 16, wherein the motion nut (**7**) is constructed as an injection molded part, optionally produced in several steps.

18. The lifting device of one or several of the claims 13 to 17, wherein the internal thread region (**11**) is formed from a plastic with incorporated lubricants.

19. The lifting device of claim 18, wherein PTFE is incorporated as lubricant.

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