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(54) **DEVICE FOR ADJUSTING THE PISTON STROKE AT A PRESSURE MEDIUM-ACTIVATED
PISTON-CYLINDER MEANS**

VORRICHTUNG ZUR EINSTELLUNG DES KOLBENHUBS AN EINEM
DRUCKMITTELAKTIVIERTEN KOLBEN-ZYLINDER-MITTEL

DISPOSITIF DE REGLAGE DE LA COURSE DU PISTON AU NIVEAU D'UN SYSTEME PISTON-
CYLINDRE ACTIVE SOUS PRESSION

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Description

[0001] The present invention concerns a device for adjusting the piston stroke of a pressure medium-activated piston-cylinder means as specified by the introduction to claim 1.

[0002] Pressure medium-activated piston-cylinder means are often constructed with a cylinder housing with a closed end part and an end part provided with a cylinder head provided with an opening through which a piston rod protrudes. The piston rod is attached to a piston provided with sealing rings, which piston can be displaced between an inner end location where the piston is located in association with the closed end of the cylinder housing, and an outer end location where the position is located in association with the cylinder head. The cylinder housing is provided with connections in the form of at least one inlet and one outlet for the passage of a pressure medium into and out from the cylinder housing. The inlet and the outlet are preferably located in association with the end parts of the cylinder housing. The closed end part of the cylinder housing normally demonstrates an attachment in the form of an attachment point mounted in bearings or provided with a bush, intended to constitute one attachment. The piston rod further demonstrates a second attachment point mounted in bearings or provided with a bush at its free end, intended to constitute the second attachment point.

[0003] The cylinder housing is divided by the piston, which is located between the connections, into a pressurised side and a return side. When the pressurised medium is led into the connection of the pressurised side, which is normally that side that is located closest to the closed end part, the piston is displaced, accompanied by the piston rod, in the direction towards the cylinder head with the piston rod protruding out through the cylinder head, whereby the piston and the piston rod execute the pressure stroke and adopt their extended outer end location. The medium that is present on the second side of the piston, i.e. in the return side of the cylinder housing, is led away out through the outlet connection. When the piston is to execute the return stroke, the pressurised medium is led in through the return connection and presses the piston in the direction towards the closed end of the cylinder housing. The medium that is located on the second side of the piston is thus led away out through the inlet connection.

[0004] Since hydraulic cylinders are in general constructed according to the principle described above, there are few opportunities for adjusting the piston stroke, i.e. the distance between its attachment points, since it is intended that the piston be displaced between its end points. When mounting the cylinder onto the part that is intended for displacement, the piston stroke of the cylinder must be carefully adjusted since the attachment of the attachment points may demonstrate variations that deviate from the intended dimension. The present invention aids in simplifying this careful adjustment. Further-

more, it may be necessary to make adjustments after a certain period of use, since bearings and bushes become worn. One method of adjusting the distance is to displace the attachments on the equipment that it is intended that the hydraulic cylinder is to control, but this change cannot be carefully adjusted when the components that comprise the device are worn, with the subsequent changes in the distance between the attachment points.

[0005] FR 2 231 873 A1 discloses another arrangement for setting the piston stroke.

[0006] The term "pressurised medium" may be here used to denote hydraulic oil that has been placed under pressure by a hydraulic oil pump and that is led through pipes or tubes to the cylinder through a valve, or to denote pressurised air that has been generated by a compressor. Other types of medium are also possible.

[0007] Pressure medium-activated piston-cylinder means are currently used within a large number of different areas, for example the operating tools of loading machines in which precision with respect to the piston stroke, i.e. the distance between its end positions, is not of critical significance. Other areas of use, however, involve the said precision of the end positions having great significance, one example of this is the tail lifts of lorries or busses.

[0008] A tail lift is used not only to lift a load from the ground level up to the level of the loading floor of the vehicle with the rear wall essentially horizontal, but also to enclose the loading space of the vehicle with the rear wall in an essentially vertical position. The tail lift normally comprises an end wall for a loading volume, which end wall is hinged at the lower edge of the loading volume. Furthermore, a lift arrangement is arranged with which the tail wall can be lowered and raised between the ground level and the level of the loading floor.

[0009] From an initial condition with the tail wall at the level of the ground, the tail lift is used as follows: the tail wall in its horizontal position is first raised to the level of the loading floor with the aid of the lift arrangement. The lifting motion ceases when the tail wall reaches the level of the loading floor. The tail wall is subsequently rotated around the hinged edge with the aid of one or several piston-cylinder means arranged between the loading floor and jointed control arms that are arranged at the tail wall. When the piston rod of the piston-cylinder means is pressed out towards its outer end position, the tail wall is rotated around its joints towards the vertical position. When the piston-cylinder means reaches its outer end position, the tail wall is pressed against the edges of the loading volume, and this loading volume is closed. If the piston stroke, i.e. the distance between the cylinder head and the outer end position of the piston rod, of the piston-cylinder means is too long, this means that the tail wall will press too hard against the edges of the loading volume, whereby the edges of the loading volume may be damaged. One of the attachments of the piston-cylinder means must be displaced if this occurs, something that requires a great deal of work. Furthermore, such a dis-

placement of the attachment point entails a change in the lowered position of the tail wall, and further adjustment is required for this reason. Furthermore, the arrangement requires subsequent adjustments as the attachments and fittings become worn.

[0010] One aim of the present invention is to provide an arrangement that solves these shortcomings.

[0011] This aim is achieved through an adjustment arrangement that demonstrates the properties and characteristics that are defined in the attached patent claims.

[0012] An embodiment will be described with reference to the attached drawings, of which:

Figure 1 shows a pressure medium-activated piston-cylinder means according to the invention;

Figure 2 shows an enlarged drawing of the arrangement according to the invention shown in Figure 1; and

Figure 3 shows a locking nut with a locking screw.

[0013] The pressure medium-activated piston-cylinder means shown in Figure 1 is of the type that is activated by a pressurised hydraulic oil, and the term "hydraulic cylinder" will for this reason be used in the following text, with reference number 1. It should, however, be realised that the adjustment arrangement can be used for piston-cylinder means that are activated by other types of pressure medium. The hydraulic cylinder 1 comprises a cylinder housing 2 with a first end 3 that is closed by, for example, an end wall in the form of a cap 4 that has been welded onto it or that permanently seals the end of the cylinder housing 2 by another method. Furthermore, the cylinder housing 2 comprises a second end 5 provided with an end wall in the form of a cylinder head 6 demonstrating an opening 7 equipped with seals and essentially centred in the cylinder head 6. Connections 8, 9 for the passage of a flow of the activating medium are arranged in association with the ends 3, 5 of the cylinder housing 2. The cylinder housing 2 is divided into a pressurised side 10 and a return side 11 by a piston (not shown in the drawings) to which a piston rod 12 that extends out through the opening 7 in the cylinder head 6 is attached. The return side 11 is normally also termed the "piston rod side" since the return flow is pressed out from the cylinder housing 2 through the connection 8 by the piston when this moves in the direction towards the cylinder head 6.

[0014] The piston rod 12 is composed of two parts, the first one 13 of which is attached to the piston (not shown). The end of the first part 13 that is directed towards the piston (not shown) is provided with threads that fit a threaded hole in the piston. A guide 15 in the form of a drilled hole whose central axis coincides with the longitudinal axis of the piston rod 12 is arranged at the free end 14 of the first part 13, i.e. the end that is directed out through the cylinder head 6. At a distance from the free end 14 of the first part 13 a groove 16 in the first part 13 has been created for a locking ring 17 by lathing or by

another method, the role of which locking ring will be described below.

[0015] Given the construction of the hydraulic cylinder 1 as described above, the piston (not shown) executes its stroke from one end 3 of the cylinder housing 2 to the second end 5, with a length that is determined by the distance between the end walls 4, 6 of the cylinder housing 2. In order to adjust the stroke length, a junction 18 having the form of a sheath is arranged in association with the cylinder head 6, which junction has the form of a length-adjustment sheath, a stop 19 with the form of a sheath, and a locking nut 20. Furthermore, the first part 13 of the piston rod 12 is extended with an extended second part 21, the extension of whose longitudinal axis coincides with the longitudinal axis of the first part 13. The second part 21 is provided with grooves 22 with the form of a screw with threads at one 23 of its ends, which second part is located with this end in contact with the free end 14 of the first part 13. Furthermore, the end of the second part 21 that is directed towards the free end 14 of the first part 13 is provided with a section having a somewhat smaller diameter that forms a peg 24 that fits into the guide 15 in the end of the first part 13, and that is taken up into the guide 15 by sliding. This arrangement means that the total length of the piston rod 12, i.e. the total length of the first part 13 and the second part 21, can be increased by withdrawing the peg 24 a certain amount from the guide 15, without drawing it out completely. The second part 21 is provided at its free end 23 with a mounting head 25 mounted in bearings or on bushings, intended to be mounted into the unit that is to be controlled, in this example this is the rear wall of a tail lift (not shown). Thus it should be realised that the peg 15 and the guide 24 of the parts 13, 21 that constitute the piston rod 12 can be arranged in the inverse manner, i.e. that the second part 21 possesses the guide while the first part 13 possesses the peg.

[0016] The area at which the first part 13 and the second part 21 are in contact with each other is surrounded by the junction 18. The junction comprises, as is shown in Figure 2, a sheath with an outer spanner grip 26 at one of its ends and it is further provided with inner 27 and outer 28 grooves having the shape of screws and in the form of threads. It is intended that the inner threads 27 interact with the threads of the second part 21 and they extend into the junction 18 to be terminated with a groove 29 for the locking ring 17 corresponding to the groove 16 in the first part 13. It is intended that the locking ring 17 locks the axial displacement of the junction 18 at the first part 13 but allows the junction 18 to rotate at the first part 13. It is intended that the outer threads 28 interact with the stop 19, and extend from the end of the junction 18 that is opposite to the end that has the spanner grip 26.

[0017] The stop 19 comprises, as can be seen in Figure 2, a sheath that has grooves 30 having the form of screws and in the form of threads at its inner surface intended to interact with the outer threads 28 of the junction 18 when this is screwed into the stop 19. The stop 19 has

been given an inner diameter that corresponds to the outer diameter of the junction 18, and it is an advantage if the outer diameter that it has been given is less than the diameter of the cylinder housing 2. It is intended that the stop 19 make contact with its contact surface 32 against the cylinder head 6 when the piston (not shown) is located at its inner end position. Furthermore, the stop is provided with a stop screw 31 for locking the rotation of the stop 19 around the junction 18.

[0018] The locking nut 20 is arranged at the second part 21 of the piston rod 12, and it locks the junction 18 to the second part 21 in a known manner by the nut 20 and the junction 18 being screwed in a direction towards each other. A locking screw 33 can also be arranged at the locking nut 20. The purpose of the locking screw 33 is to lock further the rotation of the nut 20 around the second part 21 in such a manner that the locking screw 33 is directed radially inwards from the outer surface of the nut 20 through the body thickness of the nut and onto the second part 21. Thus the nut 20 is prevented from rotating around the second part 21 when the locking screw 33 is tightened.

[0019] The parts that constitute the stroke adjustment arrangement are arranged in a second embodiment such that the junction 18 surrounds the stop 19 with the form of a sheath in a manner that allows rotation.

[0020] The function of the stroke adjustment arrangement is as follows: when the end position for the piston stroke is to be adjusted, i.e. the total length of the first part 13 and the second part 21, the piston (not shown) is placed at its outer end position directed towards the cylinder head 6 accompanied by the first part 13, the second part 21 and the parts that are included in the adjustment arrangement. Initially, both the stop 19 and the junction 18 can be placed in contact with the cylinder head 6 when the piston is located at its inner end position. If the piston stroke is too small, the locking nut 20 is loosened, after which the second part 21 is threaded outwards in the direction away from the first part 13, or the junction 18 is threaded outwards away from the stop 19, until the correct piston stroke is achieved. The distance between first part 13 that is part of the piston rod 12 and the second part 21 is in this way adjusted continuously with the peg 15 of the second part 21 located in the guide 24 in the first part 13 but withdrawn somewhat from the guide, i.e. the total length of the piston rod 12 is increased. A spanner (not shown) is placed against the spanner grip 26 of the junction and rotated, with the locking screw 31 at the stop 19 in its withdrawn position. The piston stroke obtained is subsequently locked through the rotation of the junction 18 around the second part 21 being locked through the locking nut 20 being tightened against the junction 18 using a spanner (not shown) designed for this purpose and the locking screw 33 of the nut 20 being tightened against the second part 21.

[0021] It should be realised that the inner end position of the hydraulic cylinder, i.e. the shortest distance between the attachments of the hydraulic cylinder, has been

changed after this adjustment. The piston is moved to its inner end position in order to adjust this second end position. When the piston has reached its inner end position, the stop 19 is turned using a suitable spanner (not shown) with its contact surface 32 making contact with the cylinder head 6. The first part 13 that is part of the piston rod 12 is drawn by this turning operation outwards from its inner end position accompanied by the piston since the stop 19 is placed in contact with the cylinder head 6 and the threads 30 inside the stop 19 interact with the external threads 28 on the junction 18, whereby the distance between the attachments increases. Since the locking ring 17 locks the displacement of the junction 18 in the longitudinal direction of the piston rod 12 while allowing the junction 18 to rotate around the first part 13, the first part 13 is drawn continuously outwards while the stop 19 lies simultaneously in contact with the cylinder head 6. The rotation continues until the correct distance has been achieved, and when this position has been reached the locking screw 31 is tightened whereby the stop 19 is locked to the junction 18.

[0022] It should be realised that the term "groove with the form of a screw" can be used to denote also a groove with a steep rise in which a rider runs.

[0023] The description above describes the piston stroke adjustment arrangement in association with a tail lift, but it should be realised that also other areas of application are fully possible.

[0024] Furthermore, concepts such as "hydraulic cylinder" and "hydraulic oil" have been used for the arrangement described above, but it should be realised that the arrangement can be applied for other types of pressure medium-activated piston-cylinder means, such as pneumatic piston-cylinder means, or piston-cylinder means activated in another way.

[0025] The present invention is not limited to what has been described above and shown in the drawings: it can be changed and modified in a number of different ways within the framework of the innovative concept specified by the attached patent claims.

Claims

1. An arrangement for setting the piston stroke of a pressure medium-activated piston-cylinder means (1) comprising a cylinder (2) in which is placed an extended piston rod (12), one end of which extends out through an opening (7) in an end wall (6) that is part of the cylinder and to the second end of which is attached a piston, whereby the piston rod (12) can be displaced between an inner and an outer end position through the influence of the piston, whereby the piston rod (12) comprises a first part (13) and a second part (21), one of which is taken up in the other in a manner that allows sliding, and a junction (18) provided with a groove (27) with the form of a screw, which junction can be rotated relative to the

two parts (13, 21) but cannot be displaced axially relative to one of the parts, whereby the degree to which one part is taken up into the second part can be determined by rotating interaction with the junction (18), **characterised in that** the first part (13) can be adjusted axially relative to the end wall (6) of the cylinder through rotating interaction between the junction (18) and a stop (19) with the form of a sheath that is provided with a groove (30) with the form of a screw, which stop makes contact with the end wall (6) of the cylinder at the inner end position of the piston.

2. The arrangement according to claim 1, whereby the groove (27, 28) with the form of a screw comprises threads that are taken up into the outer surface and the inner surface of the junction (18), which inner threads (27) interact with threads (22) taken up into the second part (21).
3. The arrangement according to claim 2, whereby the groove (30) of the stop (19), which has the form of a screw, comprises threads that are taken up into its inner surface interacting with outer threads (28) of the junction (18).
4. The arrangement according to claim 2, whereby a locking nut (20) is arranged for the second part (21) for locking the junction (18) to the second part (21).
5. The arrangement according to claim 4, whereby the locking nut is provided with a locking screw (33) that prevents the rotation of the nut around the second part.
6. The arrangement according to any of the preceding claims, whereby a locking screw (31) is arranged for the stop (19) for locking the stop to the junction (18).
7. The arrangement according to any one of the preceding claims, whereby the parts (13, 21) of the piston rod (12) comprise a guide and a peg (15, 24).
8. The arrangement according to any one of the preceding claims, whereby a locking ring (17) is mounted in a groove (16, 29) that is taken up into the first part (13) or the junction (18) around which locking ring the junction can be rotated.
9. Use of an arrangement according to any one of claim 1 - 8 at a vehicle provided with a tail lift.

Patentansprüche

1. Vorrichtung zur Einstellung des Kolbenhubs an einem druckmittelaktivierten Kolben-Zylinder-Mittel (1), umfassend einen Zylinder (2), in welchem eine

verlängerte Kolbenstange (12) angeordnet ist, deren eines Ende sich durch eine Öffnung (7) hindurch in eine Stirnwand (6) erstreckt, welche einen Teil des Zylinders darstellt, und an deren zweitem Ende ein Kolben befestigt ist, wobei die Kolbenstange (12) unter Beaufschlagung des Kolbens zwischen einer inneren und einer äußeren Endstellung verschieblich ist, wobei die Kolbenstange (12) ein erstes Teil (13) und ein zweites Teil (21), von denen eines in dem anderen derart aufgenommen ist, dass ein Gleiten ermöglicht wird, und eine mit einem Schlitz (27) versehene, in Form einer Schraube ausgebildete Verbindungsstelle (18) umfasst, welche Verbindungsstelle relativ zu den beiden Teilen (13, 21) drehbar ist, aber relativ zu einem der Teile nicht axial verschieblich ist, wobei der Ausmaß, zu welchem ein Teil in dem anderen Teil aufgenommen ist, durch drehendes Zusammenwirken mit der Verbindungsstelle (18) bestimmt werden kann, **dadurch gekennzeichnet, dass** das erste Teil (13) durch drehendes Zusammenwirken zwischen der Verbindungsstelle (18) und einem Anschlag (19) mit der Form einer Hülse relativ zur Stirnwand (6) des Zylinders axial einstellbar ist, welche Hülse mit einem Schlitz (30) mit der Form einer Schraube versehen ist, welcher Anschlag in der inneren Endstellung des Kolbens mit der Stirnwand (6) des Zylinders in Berührung gelangt.

2. Vorrichtung nach Anspruch 1, wobei der Schlitz (27, 28) mit der Form einer Schraube Gewinde umfasst, welche in der Außenfläche und in der Innenfläche der Verbindungsstelle (18) aufgenommen sind, welche Innengewinde (27) mit in dem zweiten Teil (21) aufgenommenen Gewinden (22) zusammenwirken.
3. Vorrichtung nach Anspruch 2, wobei der Schlitz (30) des Anschlags (19), welche die Form einer Schraube aufweist, Gewinde umfasst, welche in ihrer Innenfläche aufgenommen sind, wobei sie mit Außengewinden (28) der Verbindungsstelle (18) zusammenwirken.
4. Vorrichtung nach Anspruch 2, wobei eine selbstsichernde Mutter (20) für das zweite Teil (21) vorgesehen ist, welche die Verbindungsstelle (18) mit dem zweiten Teil (21) verriegelt.
5. Vorrichtung nach Anspruch 4, wobei die selbstsichernde Mutter mit einer Verriegelungsschraube (33) versehen ist, welche das Drehen der Mutter um das zweite Teil herum verhindert.
6. Vorrichtung nach einem der vorgehenden Ansprüche, wobei eine Verriegelungsschraube (31) für den Anschlag (19) vorgesehen ist, welche den Anschlag mit der Verbindungsstelle (18) verriegelt.

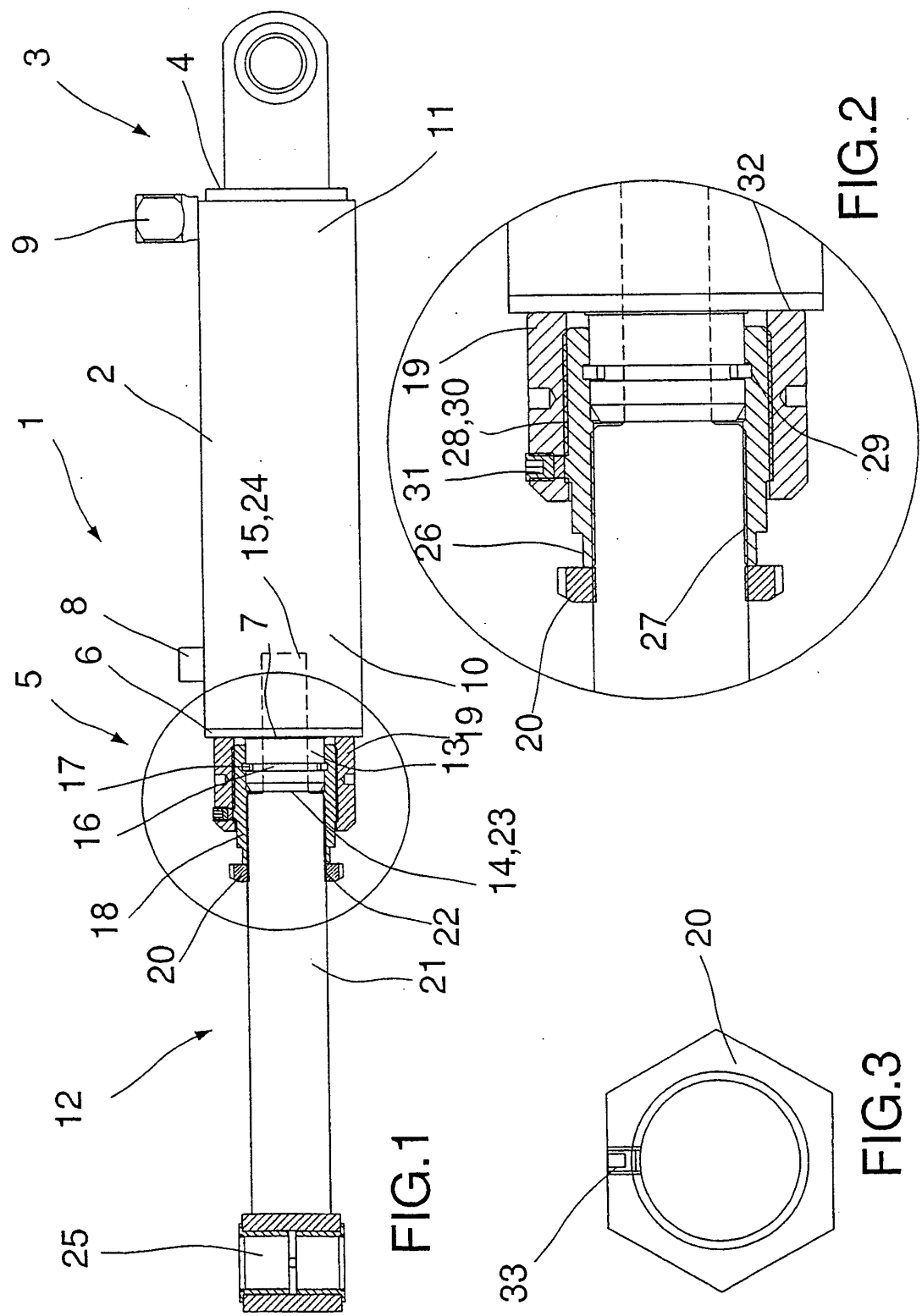
7. Vorrichtung nach einem der vorgehenden Ansprüche, wobei die Teile (13, 21) der Kolbenstange (12) eine Führung und einen Dübel (15, 24) umfassen.
8. Vorrichtung nach einem der vorgehenden Ansprüche, wobei eine Sicherungsring (17) in einem Schlitz (16, 29) montiert ist, welcher in dem ersten Teil (13) oder in der Verbindungsstelle (18) aufgenommen ist, um welche Sicherungsring herum die Verbindungsstelle drehbar ist.
9. Verwendung einer Vorrichtung nach einem der Ansprüche 1 bis 8 an einem mit einer Ladebordwand versehenen Fahrzeug.

Revendications

1. Dispositif pour le réglage de la course du piston d'un moyen piston-cylindre activé sous pression (1) comprenant un cylindre (2) dans lequel est placée une tige de piston allongée (12), dont une extrémité s'étend à l'extérieur à travers une ouverture (7) dans une paroi d'extrémité (6) qui fait partie du cylindre et à la deuxième extrémité de laquelle est fixé un piston, la tige de piston (12) pouvant être déplacée entre une position d'extrémité intérieure et extérieure par l'influence du piston, la tige de piston (12) comprenant une première partie (13) et une deuxième partie (21), dont l'une est reprise dans l'autre d'une manière qui permet le glissement, et une jonction (18) pourvue d'une rainure (27) avec la forme d'une vis, ladite jonction pouvant être mise en rotation par rapport aux deux parties (13, 21) mais ne pouvant pas être déplacée axialement par rapport à l'une des parties, le degré auquel l'une partie est reprise dans la deuxième partie pouvant être déterminé par l'interaction rotatoire avec la jonction (18), **caractérisé en ce que** la première partie (13) peut être ajustée axialement par rapport à la paroi d'extrémité (6) du cylindre par l'interaction rotatoire entre la jonction (18) et une butée (19) avec la forme d'une gaine qui est munie d'une rainure (30) avec la forme d'une vis, ladite butée entrant en contact avec la paroi d'extrémité (6) du cylindre à la position d'extrémité intérieure du piston.
2. Dispositif selon la revendication 1, dans lequel la rainure (27, 28) avec la forme d'une vis comprend des fils qui sont repris dans la surface extérieure et la surface intérieure de la jonction (18), lesdits fils intérieurs (27) coopérant avec des fils (22) repris dans la deuxième partie (21).
3. Dispositif selon la revendication 2, dans lequel la rainure (30) de la butée (19), qui a la forme d'une vis, comprend des fils qui sont repris dans sa surface

intérieure coopérant avec des fils extérieurs (28) de la jonction (18).

4. Dispositif selon la revendication 2, dans lequel un écrou de blocage (20) est agencé pour la deuxième partie (21) pour le blocage de la jonction (18) à la deuxième partie (21).
5. Dispositif selon la revendication 4, dans lequel l'écrou de blocage est pourvu d'une vis de blocage (33) qui empêche la rotation de l'écrou autour de la deuxième partie.
6. Dispositif selon l'une quelconque des revendications précédentes, dans lequel une vis de blocage (31) est agencée pour la butée (19) pour le verrouillage de la butée à la jonction (18).
7. Dispositif selon l'une quelconque des revendications précédentes, dans lequel les parties (13, 21) de la tige de piston (12) comprennent un guide et une cheville (15, 24).
8. Dispositif selon l'une quelconque des revendications précédentes, dans lequel une bague de verrouillage (17) est montée dans une rainure (16, 29) qui est reprise dans la première partie (13) ou la jonction (18), bague de verrouillage autour de laquelle la jonction peut être mise en rotation.
9. Utilisation d'un dispositif selon l'une quelconque des revendications 1 à 8 avec un véhicule pourvu d'un hayon élévateur.



REFERENCES CITED IN THE DESCRIPTION

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