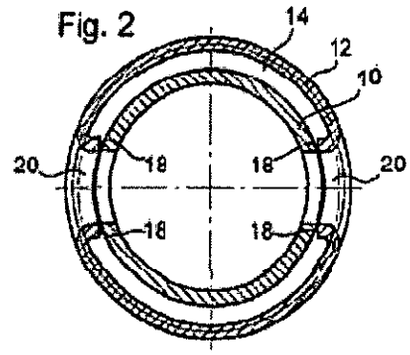
ABSTRACT

The invention relates to a strut for the construction industry, comprising an inner (10) and an outer tube (12), which have a gap (14) between each other at least in the region of a thread on the outer tube (12), wherein said strut is characterized in that at least two guides (18), which are distributed over the circumference, are provided in the gap (14), wherein at least one guide (18) is designed to adjoin a slot-shaped opening (20).

Fig. 2



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We Claim:

1. Strut for the construction industry comprising an outer tube (12) having two essentially diametrically opposed slot-shaped openings (20), and an inner tube (10), which have a gap (14) between each other at least in the region of a thread on the outer tube (12), wherein at least two guides (18, 22) distributed around the circumference are provided for guiding the inner tube (10) in the outer tube (12),

characterised in that

at least one rib-shaped guide (18) is formed adjacent to a slot-shaped opening (20) of the outer tube (12) and extending substantially axially along the edge of said opening (20) and can be formed when punching the openings (20).

2. Strut according to claim 1,

characterised in that

at least two guides (18, 22) are substantially diametrically opposed.

3. Strut according to one of the preceding claims,

characterised in that

at least one guide (18) is formed as a bead (22).

4. Strut according to one of the preceding claims,

characterised in that

at least one guide (18, 22) is formed integrally on the outer tube (12).

5. Strut according to one of the preceding claims,

characterised in that

at least one guide (18, 22) is arranged integrally on at least one guide sleeve (16).

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6. Strut according to claim 5,

characterised in that

the guide sleeve (16) is supported by means of a cover (24) on the outer tube (12).

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Technical Field

The invention relates to a strut for the construction industry according to the preamble of claim 1.

Struts are particularly necessary in the construction industry to support objects or arrangements, such as slab formwork, against the subfloor. In order to create a substantially flat formwork surface and at the same time to compensate unevennesses in an existing foundation or an existing floor slab, and to be able to implement different storey heights with one and the same type of strut, the struts used are usually height-adjustable.

Prior Art

In this regard, the applicant's DE 101 32 253 A1 describes a strut in which the outer tube is formed in one piece, wherein a taper is provided in the region of the thread which serves as safety device for preventing drop-out of the inner tube. In use, a nut is provided on the thread, on which a bolt or so-called fastening clamp is supported, which during rough adjustment above the nut is pushed through slots of the outer tube provided in the region of the thread which extend essentially vertically and through suitable fixing holes in the inner tube. Fine adjustment is carried out by turning the nut.

On one hand, it is necessary to consider the production costs for the manufacture of such struts. On the other hand, the strut must fulfill the load requirements.

Presentation of the Invention

The object of the invention is to create a strut for the construction industry which is improved as regards the production costs and at the same time reliably absorbs the loads which occur.

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This object is achieved by the strut described in claim 1.

Accordingly, said strut is designed in respect of the inner and the outer tube such that they have an essentially cylindrical gap between each other at least in the region of a thread on the outer tube. This version is beneficial in production engineering terms as it is possible to dispense with the taper, which takes some effort to manufacture, in the region of the thread. However, there is still a need to cater for a safety device which prevents drop-out of the inner tube. Moreover, with high ultimate loads there is a risk, as was discovered during extensive investigations, that the zones of the outer tube which are threaded will yield inwards, virtually into the gap. The nut could then skip over at least a few thread turns and the load-bearing behavior would not be in line with requirements.

According to the invention, at least two guides distributed around the circumference are therefore provided in the gap between the inner and outer tube. In tests, it emerged that as a result the "yielding" described can be reliably prevented. The threaded zones of the outer tube are virtually supported on the inner tube via the guides and therefore remain essentially undeformed so that there is also no risk of the nut moving along the thread. A further effect is that rib or bead-shaped guides, extending substantially axially, considerably improve the flexural rigidity of the outer tube so that for this reason too, the risk of the outer tube "yielding" into the gap between the inner and outer tube in this region is minimized.

It should be noted as regards the position of the guides that they are preferably evenly distributed around the circumference. As is explained in greater detail in the following, it is obvious to form the guides particularly in the region of the slots in the outer tube. The reason for this is, firstly, that the outer tube is weakened at this point due to the formation of the slot and in this respect the risk of the outer tube "yielding" into the gap between inner and outer tube is particularly high. Secondly, processing, by punching for example, must be carried out anyway in the region of the slots with the result that the guides can be formed particularly efficiently in this region. Regarding the inner or insertion tube, it should also be mentioned that, as customary, it has a widening at the bottom end, for example, which as a safety device for

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preventing drop-out cooperates with the at least one guide extending into the gap, said guide being provided in the region of the thread, that is to say in the region of the top end of the outer tube.

Advantages therefore emerge with regard to manufacturing and also to meeting the load requirements if, as provided according to the invention, at least one guide is formed adjacent to a slot-shaped opening, in particular a slot of the outer tube which extends substantially axially (vertically in normal use).

Preferred developments of the strut according to the invention are described in the other claims.

Since a minimum of two guides can be present, it is preferable for them to be substantially diametrically opposed. As the following description of preferred embodiments will show, further "pairs" of guides can be provided which are then also substantially diametrically opposed.

The guides can be provided, on one hand, as radially extending lugs, shoulders or "noses" which, in the event that they illustrate a certain extension in the peripheral direction, are provided with a substantially circular arc-shaped inner contour in order to sit in particularly close contact with the inner tube which normally has a circular cross-section. At present, however, substantially rib-shaped guides are preferred which essentially extend axially on the inside of the outer tube. A circular arc-shaped inner contour need not necessarily be provided due to the slight expansion of such ribs in the peripheral direction. Particularly in the case of a large number of ribs or beads provided around the circumference, when viewed in cross-section, a sufficiently large number of point-shaped contact points (extending vertically and linearly around the circumference) arise which guide the inner tube and do not allow the outer tube any opportunity to yield into the gap between outer and inner tube under load.

Moreover, in certain situations, it has turned out to be advantageous to form at least one guide as a bead.

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To a certain extent, it is possible to utilize the production advantages of the strut according to the invention if at least one guide is formed integrally on the outer tube.

Alternatively, it may be advantageous in certain application cases if at least one guide sleeve is arranged in the gap between the inner and outer tube and at least one guide is formed integrally on this guide sleeve.

In addition, it is currently preferable to support the guide sleeve by means of a cover on the outer tube.

Brief description of the drawings

Preferred embodiments of the invention illustrated by way of example in the Figures will be explained in detail below. The drawings show:

Fig. 1 a longitudinal section through an outer tube of a strut according to the invention;

Fig. 2 a cross-section through a further embodiment of the strut according to the invention;

Fig. 3 a cross-section through a further embodiment of the strut according to the invention;

Fig. 4 a cross-section through a further embodiment of the strut according to the invention;

Fig. 5 a longitudinal section through a further embodiment of the strut according to the invention; and

Fig. 6 a cross-section of the strut shown in Fig. 5.

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Detailed Description of Preferred Embodiments of the Invention

Fig. 1 illustrates the upper region of an outer tube 12 of a strut according to the invention in longitudinal section which in this region has an outer thread as indicated by the detail. Cooperating with this outer thread is a nut (not shown) above which, during rough adjustment, a bolt or fastening clamp is pushed through two essentially diametrically opposed slots or slot-shaped openings 20. In use, an inner tube (not shown in Fig. 1) is located inside outer tube 12, said inner tube having openings through which said bolt or clamp is pushed during rough adjustment.

In the embodiment shown in Fig. 1, guiding of the inner tube takes place by means of guides which in this case are formed at the top and bottom end respectively of opening 20 and can be described as inwardly extending undercuts, noses, shoulders or lugs. For particularly reliable guidance of the inner tube (not shown in Fig. 1), guides 18 can each be provided with a circular arc-shaped inner contour (when viewed in a plan view or in cross-section). However, guidance at selective points has also proven suitable in initial tests. Both bottom guides 18 also ensure that drop-out is prevented and in this respect cooperate with a widening provided in particular at the bottom end of the inner tube. Indicated in the region of the middle of Fig. 1 are further guides which in this case are rib-shaped and in this respect correspond to the embodiment of Fig. 3 described below. It should be mentioned for guides 18, extending radially and visible in Fig. 1, that they may be provided alternatively or in addition to rib-shaped guides which extend around the edges of openings 20 in the preferred embodiment.

This is illustrated in cross-section in Fig. 2 in which inner tube 10 and also gap 14 present between inner 10 and outer tube 12 can be seen. In the embodiment of Fig. 2, rib-shaped guides 18 which extend substantially axially, i.e. vertically in normal use, are formed on both sides adjacent to respective opening 20. Even though both openings 20 have such ribs on both sides, the ribs could also be provided only on one side in each case. In this case, they are preferably, but not necessarily, formed to be diametrically opposing. As can be seen in the Figures described so far, guides 18 are preferably formed integrally with outer tube 12.

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In the embodiment of Fig. 3, the rib-shaped guides present in the embodiment of Fig. 2 are combined with further guides which are provided virtually in the middle between diametrically opposed openings 20, i.e. in the 12 o'clock and 6 o'clock position. In the embodiment shown, also formed in this region are slots 20 which, as indicated in Fig. 1, can have approximately the same axial length as slots 20 in the 3 o'clock and 9 o'clock position. Since "additional" slots 20 according to Fig. 3 do not require the insertion of a bolt or fastening clamp, they may, as indicated in Fig. 3, be narrower than other slots 20 also present in the embodiment of Fig. 2.

In the embodiment of Fig. 4, beads 22 are provided as guides virtually instead of the guides in the region of narrower slots 20. In other words, the outer tube in this embodiment bulges out towards the inner tube in the 12 o'clock and 6 o'clock position such that a sort of bead is produced on the inside with the wall thickness of outer tube 12 being substantially unchanged, while an essentially slot-shaped recess is correspondingly found on the outside. At this point, it should also be mentioned for the guide lugs and guide ribs shown in the preceding and following embodiments that they may have essentially the same wall thickness as the outer tube around the remaining circumference.

Fig. 5 shows an alternative embodiment in which a guide sleeve 16 is arranged in the gap between inner and outer tube, said sleeve acting as a guide for the inner tube. As can be seen in Fig. 5, the sleeve may be supported on outer tube 12 by means of a cover 24. It further emerges from Fig. 6 that the sleeve in the embodiment illustrated is provided with such a wall thickness that it fills the gap between inner 10 and outer tube 12. However, the gap can basically be larger and/or the sleeve can have a smaller wall thickness and can be provided in this case with all the measures shown in Figs. 1 to 4 in order to ensure guidance for the inner tube in the gap. The connection between the cylindrical sleeve arranged in the region between inner and outer tube 12 and the cover visible in Fig. 5 can be made for example, just as the attachment of cover 24 to outer tube 12, by means of welding. As indicated in Fig. 5, cover 24 may be curved circumferentially on its edge in such a manner that there is little or no play between it and the outer contour of outer tube 12.

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As can be seen additionally in Fig. 6, the sleeve may have openings 26 which essentially correspond with slots 20 provided on outer tube 12 or it may be wider around the circumference such that there is not obstacle to pushing through a bolt or bracket. In addition, the sleeve may consist merely of two (in cross-section) circular arc-shaped shells which correspond to a partial circumferential surface of a cylinder and can be seen in Fig. 6. In other words, the two shells to be seen in Fig. 6 are attached in a suitable manner to a cover 24 in order to form the guide according to the invention for the inner tube.

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characterised in that

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characterised in that

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3. Strut according to one of the preceding claims,

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at least one guide (18) is formed as a bead (22).

4. Strut according to one of the preceding claims,

characterised in that

at least one guide (18, 22) is formed integrally on the outer tube (12).

5. Strut according to one of the preceding claims,

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at least one guide (18, 22) is arranged integrally on at least one guide sleeve (16).

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6. Strut according to claim 5,

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the guide sleeve (16) is supported by means of a cover (24) on the outer tube (12).

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