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ANTI-SLIP DEVICE FOR LADDERS

57

Abstract (not more than 150 words) and figure of the drawings to which the abstract refers, are attached.

Number of sheets 31

Abstract

In the lower area of a ladder two pull or pressure rods (3) are arranged on either side in a pivoting manner. Via sliding sleeves (5) and joints (8) said rods are joined to telescopic support elements (6) which are each arranged at the level of an upright of the ladder. For greater stability the telescopic support elements (6) are connected to each other via an auxiliary bar whose length can also be adjusted.

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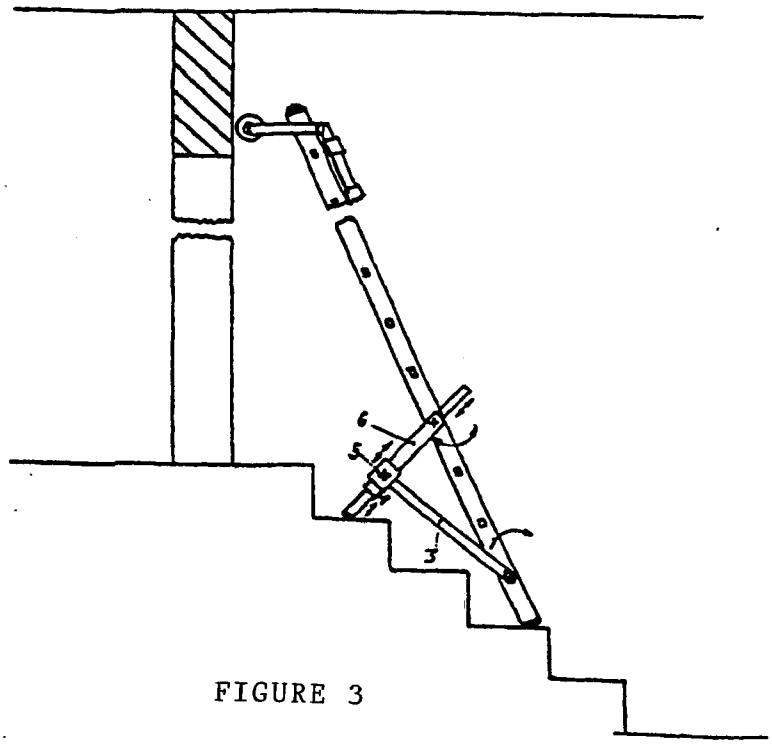

FIGURE 3

Slipping-prevention means for ladders

The novel slipping-prevention means for ladders ensures that ladder feet are completely prevented from slipping and is suitable, in particular, also for steps if the feet of the lean-to ladder are placed, for example, just right at the edge of steps because the ladder is leant against a wall parallel to the rise of the steps.

Moreover, the slipping-prevention means may be fitted at the top region of the ladder and may be used as a wall support or as a roof support equipped with load-distributing bars.

The novel slipping-prevention means can be swung in completely parallel to the ladder-stringer outer sides.

On ladders of which the rungs are led through the ladder stringers and are thus open, split spindles, in order to fasten the slipping-prevention means, are led through the rung cavities from the respectively opposite sides and screwed to one another within the ladder rungs. Centering cones on the outer sides of the split spindles allow fixed play-free bracing on all shapes and sizes of ladder rungs.

This means that the novel slipping-prevention means can be reliably retrofitted on all metal ladders irrespective of the make, ladder width, rung shape or rung size.

In order to prevent feet of a ladder leant against a wall from slipping, the ladder feet are equipped with profiled rubber elements or ground spikes.

In many cases, a second person stands at the ladder foot and secures the ladder against slipping by blocking the ladder feet against slipping using his/her own feet.

As a result of local situations, it is not always possible to comply with the correct positioning angle of the lean-to ladder.

At present, it cannot be ensured that slipping of the feet of lean-to ladders is completely ruled out.

The new invention ensures that the ladder feet are completely prevented from slipping even in very critical lean-to situations figure 6 because curved, angle-adjustable supports (6) figure 1, figure 6, figure 7 are fitted, said supports being fastened in an articulated manner on the ladder-stringer outer sides, in the bottom ladder region, can be swung in and out parallel to the ladder-stringer outer side, can be extended in length in both directions and are connected to pull and/or push rods (3) figure 1, figure 6, figure 7 which are fastened in an articulated manner likewise on the ladder-stringer outer sides, the opposite side of the pull rods (3) being connected in an articulated manner to sleeves (5). The sleeves (5) figure 1, figure 6, figure 7 are arranged on the curved supports (6) such that they can be displaced and secured, and likewise have a corresponding curvature.

The novelty resides, inter alia, in that by means of the curved supports (6) figure 6, figure 7 which are fastened in an articulated manner and can be extended in both directions, in conjunction with the pull and push rods (3), which are fastened in an articulated manner, and with the sleeves (5), which can be displaced and secured, the novel slipping-prevention means is of pivotable configuration, with the

result that, merely by pivoting, for example, the lean-to side to the climbing side of the ladder, a wall support or a roof bearing or roof support is produced and the pull rod (3) figure 6, figure 7, by virtue of the advantageous curvature of the support (6) figure 6, figure 7, need not be lengthened in order to maintain the lean-to point of the resulting wall support at right angles or perpendicularly to the vertical height of the fastening point of the extensible curved supports (6) figure 6 on the ladder leant against a wall. It is merely by way of the curvature of the supports (6) that sufficient freedom of movement thus remains in the lateral direction despite the unchanged length of the pull and/or push rods (3) figure 6.

Furthermore, the novelty resides in that a load-distributing bar (11) figure 9 which is adapted to all roof inclinations may be fastened in an articulated manner at the bottom end of the extensible curved supports (6).

By virtue of the load-distributing bar (11) figure 9, which is provided in an articulated manner, the bearing forces of the supports (6) on roofs are distributed uniformly over the length of the load-distributing bar (11), and punctiform loading on sensitive roof surfaces is avoided.

The load-distributing bar (11) figure 9 is curved over its length and angled (12) figure 9 at the ends. The curvature provides for bridging over abutment edges, projections, etc. of the roof surface in the central region of the load-distributing bar (11) figure 9. The angled ends allow the load-distributing bar (11) which has been swung in on the support (6) and retained in position by spring tensioning (10) figure 8 and figure 9, to be swung out for positioning on a

roof. Easy displacement in the longitudinal direction is ensured by the rollers provided on the underside.

It proves to be particularly advantageous that, in the region of the articulated fastening, the load-distributing bar (9), (11) figure 8 and figure 9 is connected to the curved extension and retraction element of the support (6), on the inner side of the curve, by a tension spring (10), with the result that, in addition to the supports (6) swung in parallel to the ladder-stringer outer sides, the load-distributing bars (9), (11) are also located, with the aid of the tension springs (10), parallel to the ladder stringers and do not swing out and in in an uncontrolled manner.

The curvature of the extensible supports (6) figure 8 provides the swung-in load-distributing bars (9), (11) with sufficient space for the load-distributing bars (9), (11) not to project beyond the ladder-stringer undersides. This advantage is a condition in order for the ladder, with the slipping-prevention means swung in and equipped with load-distributing bars, to be pushed, for example, onto a roof rack in an unobstructed manner without catching.

A further novelty resides in the method of fastening the slipping-prevention means on ladders of which the rungs are led through the ladder stringers and are open on the end sides.

The curved supports (6) figure 6, figure 7 have a branching-off protrusion (7) figure 1 in the top region. The branching-off protrusion (7) figure 1 serves for fastening the support (6) on the outer side of the ladder. This means that the curved or else rectilinear support (6) figure 1, figure 3,

figure 6, figure 7 remains fully extensible or telescopic in an unobstructed manner in both directions.

At the same time, the supports (6) figure 1 may be fastened in an articulated manner with the aid of split spindles, which are led through a ladder rung and are screwed within the ladder.

Conical centering stops (1) and (2) figure 1, figure 2 are particularly advantageous here. The conical centering stops (1) and (2) allow the split spindles to be braced within the ladder rungs irrespective of the shape and diameter of the ladder rungs, and are centered automatically when the spindles are screwed together. The supports (6) or the pull rods (3) are screwed to the threaded ends projecting on both sides. The split spindles allow the slipping-prevention means to be fastened on different ladder widths.

One way of implementing the invention is described as follows:

The supports (6) figure 1, figure 6 and figure 7 comprise hollow profiles and are curved over their length. Located at the top region of each support (6) is a branching-off protrusion (7) figure 1 which is welded on at a distance below the end of the continuous support profile (6) figure 1 which is at least equal to the hollow-profile dimension.

The branching-off protrusion (7) figure 1 is fastened in an articulated manner to the ladder. Since the continuous hollow profile of the support (6) is not fastened directly on the ladder, a telescopic curved extension and retraction element may be extended and retracted in an unobstructed manner in both longitudinal directions figure 1. Furthermore, the branching-off protrusion (7) figure 1 of the support (6)

figure 1 allows a spacing between itself and the ladder stringer, and thus a clearance, in order for the pull rod (3) to be swung in, likewise in an unobstructed manner, parallel on the ladder stringer, and to the rear of the swung-in support.

Located on the outer side of the support (6) is a sleeve (5) figure 1, figure 6, figure 7 which is configured in accordance with the radius of curvature and the profile and is designed such that it can be displaced and secured. On one side of the sleeve (5) figure 1, a pull and/or push rod (3) figure 1, figure 6, figure 7 is fitted in an articulated and rotatable manner by way of one end. The opposite end of the pull rod (3) is provided in an articulated manner on the ladder figure 1, preferably beneath the support fastening.

For ladders of which the rungs are led through the ladder stringers, and thus have cavity openings which are accessible from the end sides, the following fastening method is recommended.

A threaded sleeve is pushed in on one side of the ladder-rung opening, the opposite end of said threaded sleeve having a centering cone (2) figure 2 of which the largest external diameter is larger than the largest inner dimension of any ladder rung. In this case, the length of the threaded sleeve corresponds approximately to half the largest common ladder width. Located at the outer end of the centering cone (2) figure 2 is a threaded bolt, to which the pull rod (3) figure 1 or the branching-off protrusion (7) figure 1 can be screwed. A threaded rod is introduced into the opposite side of the ladder-rung opening and is screwed into the threaded sleeve with fixed centering cone (2). Depending on the ladder width, the threaded rod may always be screwed in in a precisely

fitting manner such that the only threaded length projecting is that which is necessary for fastening the pull rod (3) or the branching-off protrusion (7) figure 1. A separate centering cone (1) figure 2 has a longitudinal through-bore in the center and is pushed into the ladder rung, over the projecting threaded end, until it comes to a stop. By virtue of a nut being screwed against the centering cone (1) figure 2, the two centering cones (1) and (2) press against the edge of the ladder-rung openings and center and brace themselves irrespective of the rung shape or rung dimension.

The abovedescribed fastening method is particularly suitable for the individual retrofitting of ladder supports, etc. on ladders of different makes, ladder widths, rung dimensions and rung shapes.

Furthermore, load-distributing bars (11) figure 9 are fastened in an articulated manner on one side of the two telescopic extension and retraction elements of the curved supports (6) figure 7. The load-distributing bars are angled (12) figure 9 at the ends and are provided with rollers at the two outer ends and in the angle region. The central region of the load-distributing bar (11) is curved over the entire length. By way of the upper side or outer side of the curve, the load-distributing bar (11) is fastened in an articulated manner on the curved telescopic support (6) figure 8 and figure 9. A tension spring (10) figure 9 is connected to the inner side of the curve of the curved extension and retraction element of the support (6) and to the outer side of the curve of the load-distributing bar (11), preferably in the articulation region.

Figure 1 shows a slipping-prevention means which is fitted, and swung in, at the bottom ladder region, on both sides.

Figure 2 shows split spindles in the screwed state, with a displaceable separate centering cone (1) and a threaded sleeve with a fixed centering cone (2).

Figure 3 shows a lean-to ladder leant against a door lintel by way of a conventional wall support, the ladder standing on a step and being secured against slipping of the ladder feet by a rectilinear slipping-prevention means.

Figure 4 shows a lean-to ladder leant against a wall by way of a conventional wall support and secured by a rectilinear swung-out slipping-prevention means.

Figure 5 shows a lean-to ladder leant against a wall by way of a conventional wall support. The slipping-prevention means has been swung in parallel to the stringer.

Figure 6 shows a lean-to ladder leant against a door lintel with the aid of a pivoted-round curved slipping-prevention means functioning as a wall support, the ladder standing on a step and being secured against slipping of the ladder feet by a second curved slipping-prevention means.

Figure 7 shows a lean-to ladder leant and supported against a saddleback roof with the aid of a curved slipping-prevention means and a load-distributing bar. In this case, the dashed drawing shows the advantage of the curved extension and retraction element of the curved support, it being possible for said element to be pivoted round and pushed through in the opposite direction. The pull rod (3) remains unchanged in terms of length.

Figure 8 shows a curved slipping-prevention means on a lean-to ladder, swung in parallel to the ladder stringer, it being possible to see the further advantage of the curvature of the support (6). As a result of the space obtained in the region of the inner side of the curve of the support, the swung-in load-distributing bar (9) does not project beyond the bottom longitudinal side of the ladder stringer.

Figure 9 shows a load-distributing bar (11) which is angled (12) at the ends, curved over its length and has supporting rollers.

List of designations:

1 = separate centering cone with a through-bore

2 = threaded sleeve with fixed centering cone

3 = pull and/or push rod

4 = length-adjustable auxiliary rod

5 = sleeve which can be displaced and secured

6 = curved or rectilinear support which is telescopic in both directions

7 = branching-off protrusion, screwed to the outer side of the ladder and fastened on the support, beneath the end of the same.

8 = articulated fastening of the pull rod (3) on the displaceable sleeve (5)

9 = rectilinear load-distributing bar

10 = tension spring

11 = load-distributing bar which is angled at the ends and curved over its length

12 = angled ends of the load-distributing bar with rollers

Patent Claims:

1. A slipping-prevention means for ladders which, with the aid of dividable length-adjustable spindles which are positioned within ladder-rung hollow profiles, and braced on the ladder-stringer outer sides or ladder-rung openings, can be retrofitted in an articulated manner on each ladder, irrespective of the ladder width and rung geometries, and swung in parallel to the ladder-stringer outer side but is fully telescopic in both longitudinal directions of the supports (6) figure 1, figure 7, and is designed such that it can be pivoted from the lean-to side/rear side of the ladder to the front side or climbing side, with the result that the slipping-prevention means can also be used as a wall support and, with load-distributing bars (11) figure 9, can be used as a roof bearing or roof support on, for example, saddleback roofs figure 7, characterized in that the curved or rectilinear supports (6) figure 1, figure 6 and figure 7, which can be fully extended and secured in both longitudinal directions, are each provided, at the top region, with a branching-off protrusion (7) figure 1 which is fastened in an articulated manner on the threaded ends projecting out of the end-side rung openings, it being the case that a threaded end on one side belongs to a threaded rod which is introduced into the rung cavity and is screwed to a threaded bushing which is arranged on the opposite side and is located within the ladder rung, and the threaded bushing is connected firmly to a centering cone (2) figure 2, on the outer side of which a threaded bolt is located, and positioned on the threaded rod arranged opposite is a second centering cone (1) figure 2, which can be displaced separately and secured by a nut, so that it is possible to brace firmly the resulting fastening spindle for supports (6) within ladder rungs, irrespective of the ladder width and rung shape, of all makes of ladder, and,

in addition, the supports (6) figure 8 and figure 7, which are fully extensible in both directions, are curved and, for this purpose, provided on the curved supports (6), figure 1, figure 6, figure 7, is a correspondingly curved sleeve (5) which can be displaced and secured and on which a pull and/or push rod (3) figure 1, figure 6 and figure 7 is fitted in an articulated and rotatable manner by way of one end, and the opposite end of the pull/push rod (3) is fastened in an articulated manner at the projecting threaded ends of the length-adjustable spindles which are introduced in a second ladder rung, and braced with the aid of threaded rods, threaded bushings and centering cones (1) and (2) figure 2 and figure 1, and the slipping-prevention means may have, on each curved extensible support (6) figure 7, a load-distributing bar (11) figure 9, which is fastened in an articulated manner at the bottom end of the curved extension and retraction element, is angled at the ends, is curved over its length, is provided with supporting rollers (12) figure 9 on the outer corners of the angles (12) figure 9 and at the ends, and is retained, by spring force (10) figure 9 and figure 8, in the swung-in position parallel to the ladder-stringer outer side.

2. The slipping-prevention means for ladders as claimed in claim 1, characterized in that the supports (6) figure 6 and figure 7 may also be of rectilinear design (6) figure 3.

3. The slipping-prevention means for ladders as claimed in claim 1, characterized in that it is alternatively possible for the slipping-prevention means to be fastened merely on the ladder rungs using clamping or hook-in devices.

4. The slipping-prevention means for ladders as claimed in claim 1, characterized in that it is also possible for the load-distributing bar (11) figure 9 to be of rectilinear

configuration and be equipped with rubber or plastic buffers on the underside.

5. The slipping-prevention means for ladders as claimed in claim 1, characterized in that a length-adjustable auxiliary rod (4) figure 1 may be located between the supports (6) figure 1.

6. The slipping-prevention means for ladders as claimed in claim 1, characterized in that the pull rod (3) figure 1, figure 6, figure 7 may also be of length-adjustable design.