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(12) # EUROPEAN PATENT SPECIFICATION

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(54) **Coupling system for detachably coupling a substantially rectangular construction member to and between a pair of uprights, in particular a railing to a scaffold.**

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Description

The invention relates to a coupling system for detachably coupling a construction member to and between two uprights, which comprises three or four claw parts which are attached to the construction member in the corners of a rectangle, and projections which are mounted on the uprights at suitable points for interacting with the claw parts, each claw part having a jaw with a passage opening which can allow a projection through and the projections and jaws being so shaped that the upper claw parts of the construction member can be fitted over the upper projections only in an inclined position, in which position the plane of the rectangle through the claw parts makes a minimum angle or more with the plane through the uprights, and the construction member is rotatable about a horizontal axis through the upper claw parts and projections, between the inclined position with the minimum angle and a vertical position in which each of the lower claw parts can receive a lower projection.

A coupling system of this type is known from the published French Patent Application FR—A—2,404,723. The construction member may have various designs and uses, but is intended in particular for use in a scaffold, for example as a support for a planking or as a railing.

In the known system the projections consist of round pins which each have a circumferential flange at the extremities thereof. Each claw part is formed by a tubular member, the centre line of which coincides with the centre line of the corresponding pin when the construction member is coupled to the uprights. The inside diameter of the tubular member is equal to or somewhat greater than the outside diameter of the corresponding pin. At a distance from the extremity of each tubular member a circular recess is formed on the inside edge, the centre line of which coincides with the centre line of the tubular member and the dimensions of which match those of the flange of the corresponding pin. Each tubular member has an open circumferential part so that the cross-section thereof has essentially a U shape and describes a circular arc of approximately 240°. This open part of the tubular member forms the passage opening of the jaw formed by a tubular member. When the construction member is coupled to the uprights, the passage opening of the jaw of each upper claw part lies in a horizontal plane at a small distance below the centre line of the corresponding pin. When the construction member is coupled to the uprights, the passage opening of the jaw of each lower claw part lies in a vertical plane at a short distance from the centre line of the corresponding pin. From this position of the construction member the member can be rotated about an axis through the centre line of the upper projections in one direction so that the lower claw parts are released from the lower pins and the member can be moved obliquely upwards after a minimum angle with respect to the plane through the pins has been exceeded so that the upper claw parts are released from the upper pins. For the purpose of attaching the construction member these steps must be carried out in the reverse order.

French Patent Application FR—A—2,404,723 in addition proposes locking means which counteract rotation of the construction member about an axis through the centre lines of the upper pins when the construction member is coupled to the standards and the lower claw parts engage round the lower pins.

The known system has the drawback that to counteract accidental rotation of the construction member additional means of locking are necessary. Another important drawback is that as a result of the small thickness of the pins with respect to the distance between two pins mounted above each other, the said minimum angle for the inclined movement upwards of the construction member is small. These drawbacks are particularly serious when the construction member is a railing which has to be coupled to the uprights of a scaffold. For detachably coupling a railing to a scaffold it is in particular desired that as few components as possible are necessary for this purpose and that unintentional detachment of the railing from the uprights as a result of unwitting incorrect operations by persons working on the scaffold must be prevented as far as possible even if the separate locking means are not fitted.

In addition, especially if the construction member is a scaffolding railing, the locking means in the known coupling system consist of a U-profiled part which can be fitted over an upright and which has dimensions such that between parts of the flanges thereof movement with as small amount of play is possible over a lower pin with a claw part coupled thereto, and that by means of a cutout formed on the U-profiled part suspension is possible on a pin specially mounted for the purpose on the corresponding upright. By using the known means of locking it is not possible to mount pins at an equal height on either side of a standard for the purpose of coupling the claw parts of two construction members thereto on either side of the said standard.

The object of the invention is to remove the drawbacks of the known coupling system. The intended object is achieved in that each jaw has a stop part in the plane through the claw parts, that the passage opening of each jaw is formed at a distance with respect to the stop part of the jaw, that the jaw, viewed in the vertical position of use of the construction member, has a space above the upper limitation of the passage opening, that the height of an upper projection is larger than the height of the passage opening of the jaw of the corresponding upper claw part, and that the distance between the upper limitations of the jaws of two claw parts mounted above each other is smaller than the distance between the top edges of the corresponding projections.

The said minimum angle can then be chosen simply and relatively large, for example 30°—60°,

by choosing suitable dimensions of the different parts of the system, for example by choosing a certain height for one upper projection. When the construction member is coupled to the uprights, under which circumstances the upper and/or lower claw parts rest on the corresponding projections, the projections are at least partially received in the space obliquely above the passage opening of the respective jaw. As a result of this the construction member cannot be displayed sideways, transversely to the plane through the claw parts. Depending on the height of the said spaces near the passage openings of the jaws, after it has been coupled to the standards, the construction member can be displaced vertically. Only if the vertical displacement is carried out to such an extent that the lower projections are below the upper limitations of the passage openings of the respective jaws, can the construction member be rotated into the position having the said minimum angle or further after which the member can be uncoupled from the upper projections by obliquely displacing upwards. In addition, the coupling system requires no additional means of locking to prevent unintentional rotation of the construction member from the vertical position about an axis through the upper projections. As a result of this a coupling system is obtained which offers a very good safeguard against unintentional uncoupling of a construction part from the uprights. This forms a very important advantage when the construction member is used as a scaffold railing.

An additional safeguard is obtained if on one side or on both sides in relation to a plane of symmetry through the projections, locking parts are formed at the extremities of the projections which can engage behind corresponding parts of the claw parts. This counteracts horizontal displacement of the construction member in the vertical position thereof.

By chamfering certain edges of the projections and of the claw parts it is possible to achieve the result that the distance between the standards is not critical and/or the construction member can be coupled to the standards in a clamping manner vibration-free.

It is noted that a coupling system is known from German Published Patent Application DE—A—2,333,957 in which projections tapering downwards designed as hooks are mounted in the corners of a rectangle on the construction member and which can be inserted from above in corresponding tubular members mounted on the standards. The top edge of the lower hook forms a stop which, after the construction member is coupled to the standards, strikes against the bottom edge of the corresponding upper tubular member during a small vertical displacement. As a result the upper hooks of the construction member can only be inserted in the upper tubular members from a certain inclined position with respect to a plane through the standards and can then be rotated. When the construction member is then in a vertical position, it can be lowered down so that all the hooks will be inserted in the respective tubular members. When the upper hooks are inserted in the corresponding tubular members but the lower ones are not, the construction member in this known coupling system can, however, be rotated in both directions from the plane through the standards. Especially if the construction member is a scaffold railing, this forms a serious drawback since during the rotation persons may fall down from the scaffolding below the railing.

The invention will be explained more fully with the aid of the drawings, in which:

Figure 1 is a front view of a scaffold with a detachable railing, to which the coupling system according to the invention is applied;

Figure 2 shows on a larger scale the claw parts of the coupling system with different top and bottom coupling parts provided with projections;

Figure 3 shows on a larger scale a part of the coupling system shown in Figure 1;

Figures 4a, b, c, d show a section along the line IV—IV in Figure 3, with the railing in different positions before it is coupled to or uncoupled from the scaffold.

The scaffold construction shown in front view of Figure 1 consists of a number of uprights 2, to which horizontally extending ledgers are fastened.

In the plane of the ledgers 3 planking, optionally supported on the ledgers 3, can be installed, so that work can be done at a great height above the ground. In order to protect personnel, a railing 4 is therefore disposed at the required points between two uprights 2.

The railing 4 according to the invention, which is shown in Figure 1, consists of a number of horizontal lengths of tubing 5, which are held a specified distance apart by cross members 6 fastened to the lengths of tubing 5. In the embodiment illustrated all four ends of the lengths of tubing 5 are provided with identical claw parts 7, which are shown on a larger scale in Figure 2.

The uprights 2 are provided, opposite the claw parts 7 of the railing 4 which is to be coupled to the uprights 2, with an upper coupling part 8 and a lower coupling part 9, these parts also being shown on a larger scale in Figure 2. In the embodiment illustrated of the coupling system according to the invention, which has four identical claw parts 7, the upper and lower coupling parts 8, 9 have different dimensions.

As illustrated in Figure 2, the claw parts 7 and the coupling parts 8, 9 are of symmetrical construction relative to the plane through the lengths of tubing 5, with the exception of a chamfer on the coupling part 8. A claw part 7 thus has two jaws 10 which are separted by a vertical extending stop part 11, which on each side has a stop surface 12. At the bottom edge of the stop part 11 is formed a bottom part 13 directed perpendicularly to it. At a distance from each stop surface 12 is formed a relatively short downwardly extending flange 14, so that an opening is provided between the bottom edge of the flange 14 and the top edge of the bottom part 13.

The coupling parts 8, 9 are each provided with at

least one projection 15, 16 respectively, directed towards the respective claw part 7. The ends of the projections 15, 16 are provided with blocking parts 17 and 18 respectively, which are directed at right angles to the projections 15, 16. The height of the projection 15 and of the blocking part 17 of the coupling part 8 is greater than the distance between the bottom edge of the flange 14 and the bottom part 13, but smaller than the height of the stop part 11. The height of the projection 16 and of the blocking part 18 of the bottom coupling part 9 is almost equal to but slightly smaller than the distance between the bottom edge of the flange 14 and the bottom part 13. The distance between the top edge of the projection 15 of the upper coupling part 8 and that of the lower coupling part 9 is greater than the distance between the carrier faces of the bottom parts 13 of the upper and lower claw parts 7. In the embodiment illustrated this difference in distance is approximately equal to half the height of the flanges 14.

When the projections 15, 16 are received in the corresponding claw parts 7, the displacement of the lengths of tubing 5 in the plane of the railing 4 in horizontal direction is counteracted because the blocking parts 17, 18 are received inside a passage formed between the stop part 11 and the length of tubing 5 and a passage formed between the flange 14 and the length of tubing 5.

The minimum angle required in order to bring the projection 15 together with the blocking part 17 of an upper coupling part inside the jaw 10 of an upper claw part 7 can be determined by appropriate selection of the dimensions of the coupling part 8 and of the claw part 7, and preferably amounts to at least 30°. This minimum angle is dependent, inter alia, on the width of the bottom part 13 and the width of the blocking part 17.

Because the projections 15, 16, together with the locking parts 17, 18, are formed on a coupling part 8 or 9, they can easily be mounted in accurately determined positions on the uprights 2, for example by welding or by means of rivets.

Figure 3 shows on a larger scale a part of the scaffold shown in Figure 1, and in particular part of the coupling system according to the invention, viewed from the scaffold, the railing being in the position of rest, coupled to the scaffold 1.

Figures 4a, b, c, d show, in section along the line IV—IV in Figure 3, the steps which must be taken in order to couple the railing 4 to the scaffold 1, or, in the reverse order, in order to remove the railing 4 from the scaffold 1.

For the purpose of coupling, the railing 4 must, in a first phase, as shown in Figure 4a, be placed at a minimum angle relative to the plane through the respective set of uprights 2, so that the jaw 10 of the upper claw parts 7 can be hung over the respective projection 15 and the blocking part 17. The railing 4 can then be turned in the direction of the arrow 19 until, as shown in Figure 4b, the respective flange 14 of a lower claw part 7 strikes against the top edge of the projection 16 of the lower coupling part 9.

When the railing 4 is then raised relative to the projections 15, 16, as shown in Figure 4c, the railing 4 can be turned further in the direction of the arrow 19 to bring the projection 16 of the lower coupling part 9 into the respective jaw of the lower claw part 7. When the railing 4 is then lowered, it will be in the position of use, coupled to the scaffold 1, as shown in Figure 4d.

In the position of use of the railing 4, it can be displaced only a short distance vertically, and only a negligible distance in the direction at right angles to the plane through the railing 4. Even if the railing 4 is successively brought into the positions shown in Figures 4d, 4c, 4b, there will be no danger to personnel working on the scaffold 1, because the railing 4 can be removed only in the inclined position of the upper projections 15 shown in Figure 4a.

Because the coupling system is of symmetrical construction in relation to the plane through the lengths of tubing 5 of the railing 4, that is to say because it has a jaw 10 on each side of a stop part 11, there will be no problems in connection with the positioning of the railing 4 during the installation of the latter.

The flanges 14 taper in the plane of the railing 4 in the downward direction, and the blocking parts 17, 18 have chamfers corresponding thereto. The effect is thereby achieved that the railing 4, on being installed on the scaffold 1, will have more clearance in the horizontal direction in the plane of the railing 4 than in the position of use of the railing 4. The railing 4 can thus be rapidly installed, while in the position of use it is substantially free from vibration.

Since the coupling parts 8, 9 are simpler to manufacture than the claw parts of the kind illustrated, all the claw parts of the coupling system are preferably identical and the coupling parts 8, 9 have the different dimensions mentioned above. Nevertheless, the coupling system according to the invention may even be constructed with different claw parts as well as with different coupling parts.

Claims

1. Coupling system for detachably coupling a construction member (4) to and between two uprights (2), which comprises three or four claw parts (7) which are attached to the construction member (4) in the corners of a rectangle, and projections (15, 16) which are mounted on the uprights (2) at suitable points for interacting with the claw parts (7), each claw part (7) having a jaw (10) with a passage opening which can allow a projection (15 and 16) through and the projections (15, 16) and jaws (10) so shaped that the upper claw parts (7) of the construction member (4) can be fitted over the upper projections (15) only in an inclined position, in which position the plane of the rectangle through the claw parts (7) makes a minimum angle or more with the plane through the uprights (2), and the construction member (4) is rotatable about a horizontal axis through the

upper claw parts (7) and projections, (15, 16) between the inclined position with the minimum angle and a vertical position in which each of the lower claw parts (7) can receive a lower projection (16), characterized in that each jaw (10) has a stop part (11) in the plane through the claw parts (7), that the passage opening of each jaw (10) is formed at a distance with respect to the stop part (11) of the jaw (10), that the jaw (10), viewed in the vertical position of use of the construction member (4), has a space above the upper limitation of the passage opening, that the height of an upper projection (15) is larger than the height of the passage opening of the jaw (10) of the corresponding upper claw part (7) and that the distance between the upper limitations of the jaws (10) of two claw parts (7) mounted above each other is smaller than the distance between the top edges of the corresponding projections (15, 16).

2. Coupling system according to claim 1, characterised in that the height of a lower projection (16) is approximately equal to the height of the passage opening of the jaw (10) of the corresponding lower claw part.

3. Coupling system according to claim 1 or 2, characterised in that at each side of a plane through the claw parts (7) and through the stop parts (11) thereof a jaw (10) is formed with the respective stop parts (11).

4. Coupling system according to claim 1, 2 or 3, characterised in that at the extremity of each projection (15, 16) at the edge of the corresponding claw part (7) a blocking part (17, 18) is formed which runs transvsrsely to the plane through the uprights (2), that a passage opening of a jaw (10) is limited at the upper edge by a flange (14) and that each flange (14) has a cutout such that the cutout can allow the blocking part (17, 18) partially through.

5. Coupling system according to claim 1, 2 or 3, characterised in that at the extremity of each projection (15, 16) at the edge opposite the edge of the corresponding claw part (7) a blocking part (17, 18) is formed which runs transversely to the plane through the uprights (2), that a passage opening of a jaw (10) is limited at the upper edge by a flange (14), that each flange (14) has a cutout for allowing the corresponding blocking part (17, 18) through and that each stop part (11) has a cutout for allowing the blocking part (17, 18) through.

6. Coupling system according to claim 4 or 5, characterised in that the dimension of each flange (14) in a plane parallel to the plane through the claw parts (7) gradually decreases downwards.

7. Coupling system according to claim 4, 5 or 6, characterised in that the blocking part (17) is chamfered with its thickness decreasing upwards on the side of the corresponding flange (14).

8. Coupling system according to one of the preceding claims, characterised in that the projections (15, 16) are formed on corresponding upper (8) and lower (9) coupling parts which are mounted on the uprights (2).

Patentansprüche

1. Kupplungssystem zur lösbaren Kupplung eines Baugliedes (4) an und zwischen zwei Stützen (2), bestehend aus drei oder vier Klauenteilen (7), die an dem Bauglied (4) in den Ecken eines rechten Winkels angebracht sind, und Auslegern (15, 16), die an den Stützen (2) an geeigneten Stellen angebracht sind, um mit den Klauenteilen (7) zusammenzuwirken, wobei jedes Klauenteil (7) einen Backen (10) mit einer Durchgangsöffnung besitzt, die den Durchgang eines Auslegers (15 und 16) erlaubt, und wobei die Ausleger (15, 16) und Backen (10) so geformt sind und über die oberen Ausleger (15) nur in einer geneigten Stellung aufgepaßt werden können, in der die Ebene des Rechtecks durch die Klauenteile (7) des Baugliedes (4) einen minimalen oder größeren Winkel mit der Ebene durch die Stützen (2) bildet, das Bauglied (4) um eine horizontale Achse durch die oberen Klauenteile (7) und Ausleger (15, 16) zwischen der schrägen Lage mit dem minimalen Winkel und einer vertikalen Lage, in der jeder der unteren Klauenteile (7) eine unteren Ausleger (16) aufnehmen kann, drehbar ist, dadurch gekennzeichnet, daß jeder Backen (10) einen Anschlag, (11) in der Ebene durch die Klauenteile (7) besitzt, daß die Durchgangsöffnung eines jeden Backens (10) in einem Abstand, bezogen auf den Anschlag (11) des Backens (10), ausgebildet ist, daß der Backen (10), gesehen in der vertikalen Einsatzstellung des Baugliedes (4), einen Raum über der oberen Begrenzung der Durchgangsöffnung besitzt, daß die Höhe eines oberen Auslegers (15) größer ist als die Höhe der Durchgangsöffnung des Backens (10) des korrespondierenden oberen Klauenteils (7), und daß der Abstand zwischen den oberen Begrenzungen der Backen (10) der zwei Klauenteile (7), die übereinander angebracht sind, geringer ist als der Abstand zwischen den Oberkanten der korrespondierenden Ausleger (15, 16).

2. Kupplungssystem nach Anspruch 1, dadurch gekennzeichnet, daß die Höhe eines unteren Auslegers (16) annähernd gleich der Höhe der Durchgangsöffnung des Backens (10) des korrespondierenden unteren Klauenteils ist.

3. Kupplungssystem nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß auf jeder Seite einer Ebene durch die Klauenteile (7) und ihre Anschläge (11) ein Backen (10) mit den jeweiligen Anschlägen (11) ausgebildet ist.

4. Kupplungssystem nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß an dem äußeren Ende eines jeden Auslegers (15, 16) an der Kante des korrespondierenden Klauenteils (7) ein Verriegelungsteil (17, 18) ausgebildet ist, das quer zur Ebene durch die Stützen (2) verläuft, daß eine Durchgangsöffnung eines Backens (10) an der Oberkante durch einen Flansch (14) begrenzt ist, und daß jeder Flansch (14) einen Ausschnitt besitzt, der es dem Verriegelungsteil (17, 18) erlaubt, teilweise hindurchzugehen.

5. Kupplungssystem nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß an dem äußeren

Ende eines jeden Auslegers (15, 16) an den Kanten gegenüber den Kanten des korrespondierenden Klauenteils (7) ein Verriegelungsteil (17, 18) ausgebildet ist, das quer zur Ebene durch die Stützen (2) verläuft, daß eine Durchgangsöffnung eines Backens (10) an der Oberkante durch einen Flansch (14) begrenzt ist, daß jeder Flansch (14) einen Ausschnitt besitzt, der es dem korrespondierenden Verriegelungsteil (17, 18) erlaubt, hindurchzugehen, und daß jeder Anschlag (11) einen Ausschnitt besitzt, der es dem Verriegelungsteil (17, 18) erlaubt, hindurchzugehen.

6. Kupplungssystem nach Anspruch 4 oder 5, dadurch gekennzeichnet, daß sich die Abmessung eines jeden Flansches (14) in einer Ebene parallel zu der Ebene durch die Klauenteile (7) allmählich nach unten hin verringert.

7. Kupplungssystem nach Anspruch 4, 5 oder 6, dadurch gekennzeichnet, daß das Verriegelungsteil (17) angefast ist, wobei seine Dicke auf der Seite des korrespondierenden Flansches (14) nach oben hin abnimmt.

8. Kupplungssystem nach einem der vorherghenden Ansprüche, dadurch gekennzeichnet, daß die Ausleger (15, 16) an korrespondierenden oberen (8) und unteren (9) Kupplungsteilen angebracht sind, die an den Stützen (2) befestigt sind.

Revendications

1. Système d'attache pour la fixation séparable d'un élément de construction (4) à et entre deux montants (2), qui comprend trois ou quatre parties d'accrochage (7) qui sont attachées sur l'élément de construction (4) dans les coins d'un rectangle, et des saillies (15, 16) qui sont prévues sur les montants (2) en des points appropriés pour coopérer avec les parties d'accrochage (7), chaque partie d'accrochage (7) comportant une mâchoire (10) pourvue d'une ouverture de passage qui peut permettre le passage d'une saillie (15 et 16), et les saillies (15, 16) et les mâchoires (10) étant profilées de telle sorte que les parties d'accrochage supérieures (7) de l'élément de construction (4) puissent être montées sur les saillies supérieures (15) seulement dans une position inclinée, position dans laquelle le plan du rectangle correspondant aux parties d'accrochage (7) fait un angle minimal ou plus avec le plan passant par les montants (2), et l'élément de construction (4) peut tourner autour d'un axe horizontal traversant les parties supérieures d'accrochage (7) et les saillies (15, 16), entre la position inclinée correspondant à l'angle minimal et une position verticale dans laquelle chacune des parties inférieures d'accrochage (7) peut recevoir une saillie inférieure (16), caractérisé en ce que chaque mâchoire (10) comporte une partie de butée (11) située dans le plan passant pas les parties d'accrochage (7), en ce que l'ouverture de passage de chaque mâchoire (10) est formée à une certaine distance par rapport à la partie de butée (11) de la mâchoire (10), en ce que la mâchoire (10), observée dans la position verticale d'utilisation de l'élément de construction (4), comporte un espace situé au-dessus de la limite supérieure de l'ouverture de passage, en ce que le hauteur d'une saillie supérieure (15) est plus grande que la hauteur de l'ouverture de passage de la mâchoire (10) de la partie supérieure d'accrochage (7) correspondante et en ce que la distance entre les limites supérieures des mâchoires (10) de deux parties d'accrochage (7) montées l'une au-dessus de l'autre est plus petite que la distance entre les bords supérieurs des saillies correspondantes (15, 16).

2. Système d'attache selon la revendication 1, caractérisé en ce que la hauteur d'une saillie inférieure (16) est approximativement égale à la hauteur de l'ouverture de passage de la mâchoire (10) de la partie inférieure d'accrochage correspondante.

3. Système d'attache selon une des revendications 1 ou 2, caractérisé en ce que, de chaque côté d'un plan passant par les parties d'accrochage (7) et passant par les parties de butée (11), une mâchoire (10) est pourvue des parties de butée (11) respectives.

4. Système d'attache selon la revendication 1, 2 ou 3, caractérisé en ce que, à l'extrémité de chaque saillie (15, 16) et sur le bord de la partie d'accrochage correspondante (7), une partie de blocage (17, 18) est formée de manière à s'étendre transversalement au plan passant par les montants (2), en ce qu'une ouverture de passage d'une mâchoire (10) est limitée sur le bord supérieur par un rebord (14) et en ce que chaque rebord (14) comporte un évidement tel que cet évidement puisse permettre un passage partiel de la partie de blocage (17, 18).

5. Système d'attache selon la revendication 1, 2 ou 3, caractérisé en ce que, à l'extrémité de chaque saillie (15, 16) et sur le bord opposé au bord de la partie d'accrochage correspondante (7), une partie de blocage (17, 18) est formée de manière à s'étendre transversalement au plan passant par les montants (2), en ce qu'une ouverture de passage d'une mâchoire (10) est limitée sur le bord supérieur par un rebord (14), en ce que chaque rebord (14) comporte un évidement permettant le passage de la partie de blocage correspondante (17, 18) et en ce que chaque partie de butée (11) comporte un évidement permettant le passage de la partie de blocage (17, 18).

6. Système d'attache selon la revendication 4 ou 5, caractérisé en ce que la dimensions de chaque rebord (14) dans un plan parallèle au plan passant par les parties d'accrochage (7) diminue graduellement vers le bas.

7. Système d'attache selon la revendication 4, 5 ou 6, caractérisé en ce que la partie de blocage (17) est chanfreinée, son épaisseur diminuant vers le haut sur le côté du rebord correspondant (14).

8. Système d'attache selon une des revendications précédentes, caractérisé en ce que les saillies (15, 16) sont formées sur des parties d'attache supérieure (8) et inférieure (9) correspondantes qui sont installées sur les montants (2).

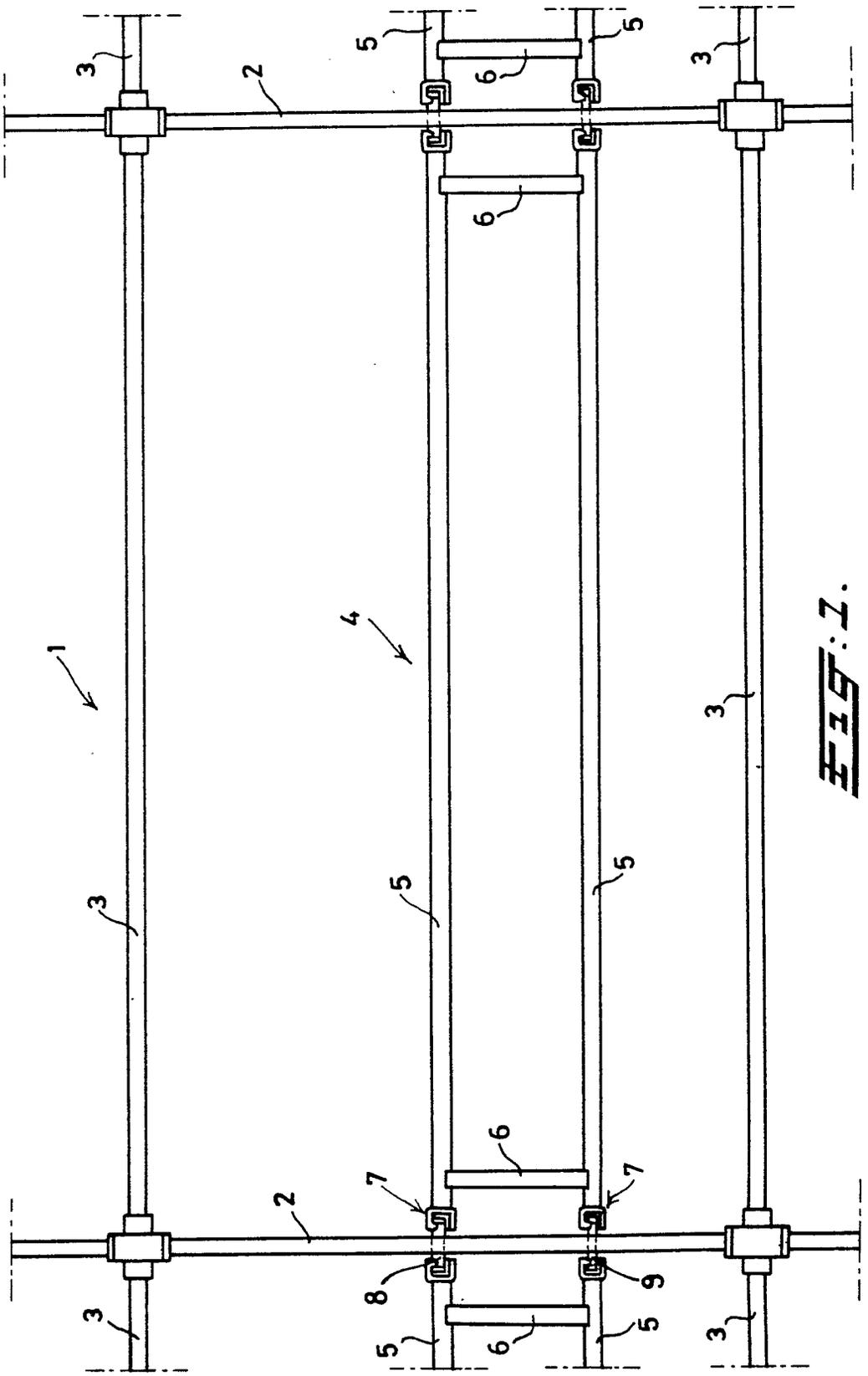

Fig. 1.

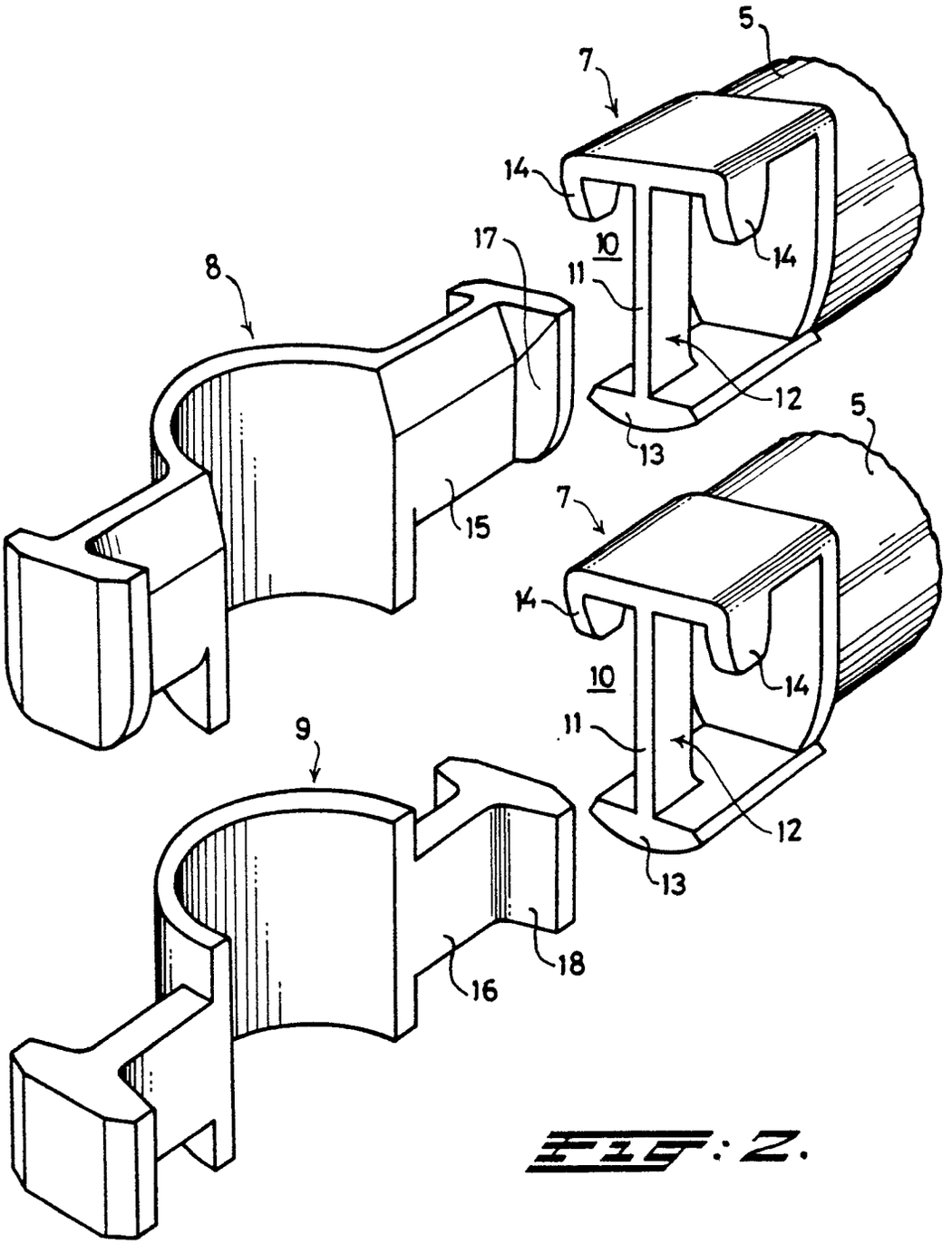

Fig. 2.

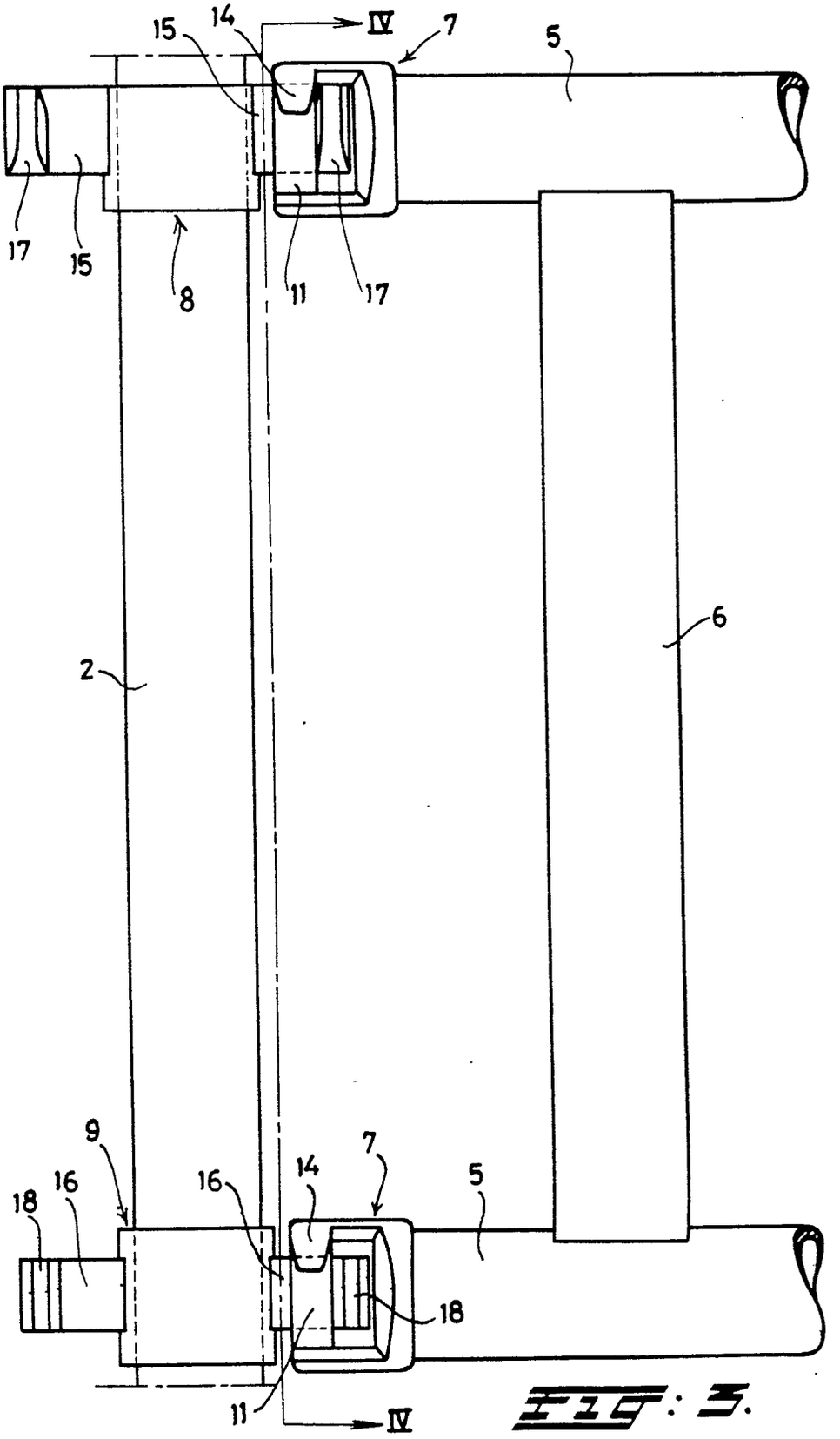

Fig: 3.

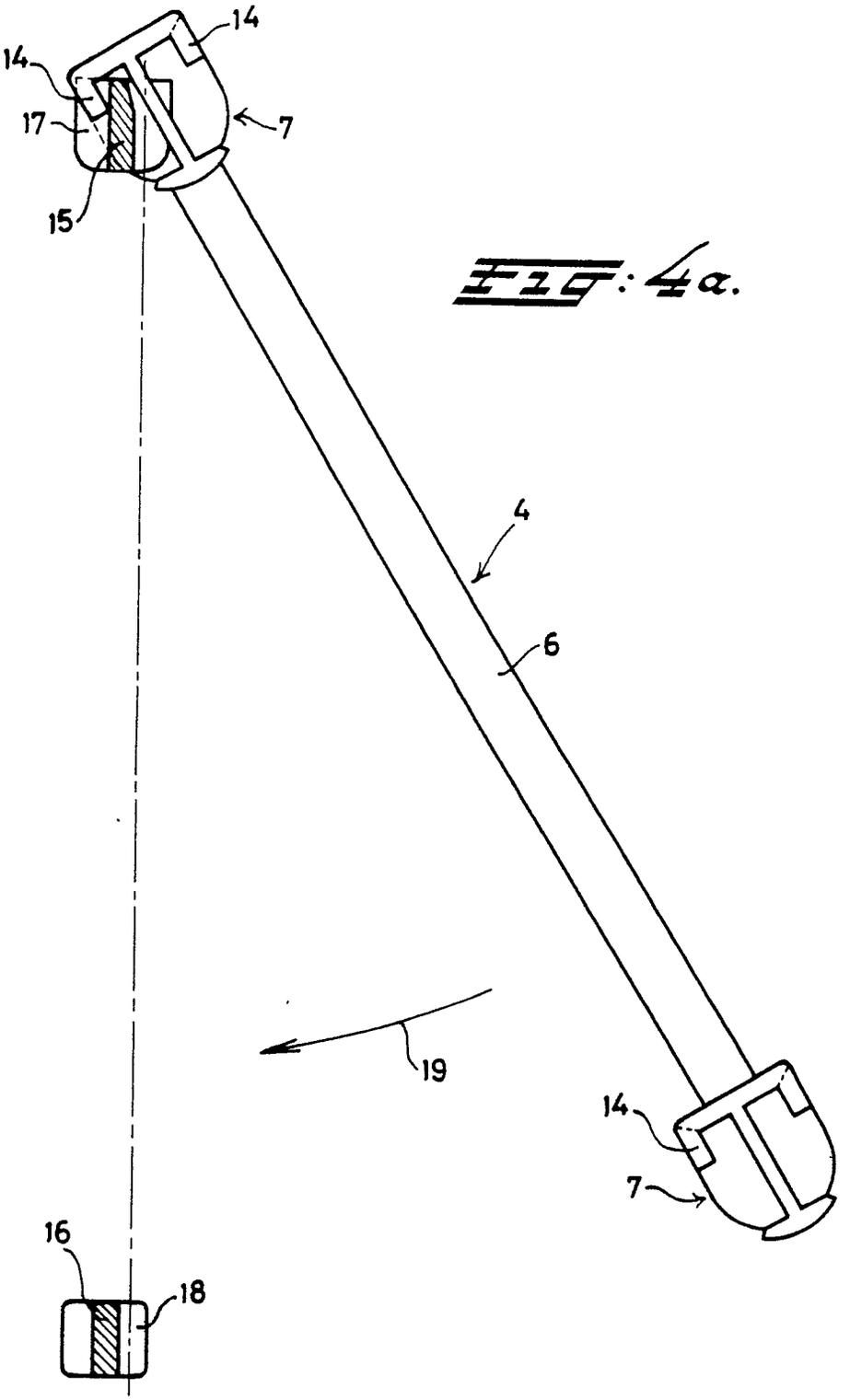

Fig. 4a.

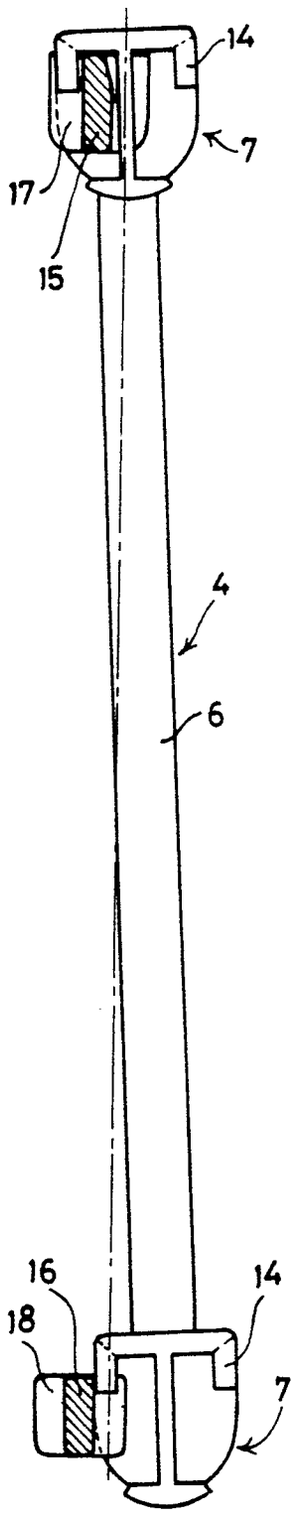

Fig. 4b.

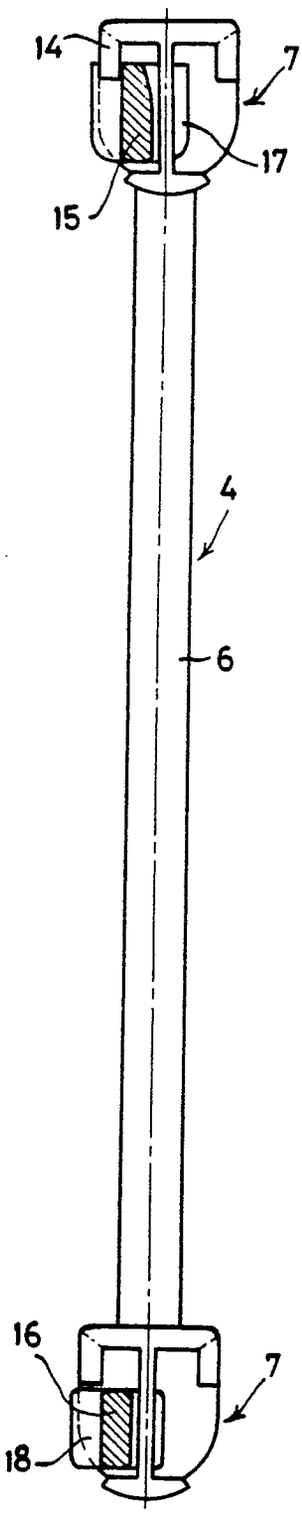

Fig. 4c.

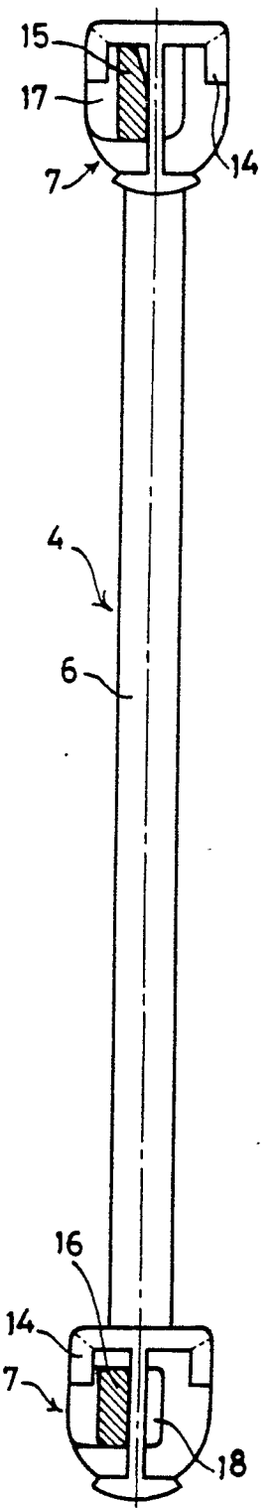

Fig. 4d.