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(54) Cross member for fast-fit prefabricated scaffolding, and relative production method

(57) A cross member (1) for "LAYHER" type fast-fit prefabricated scaffolding or similar, having a tubular member (6) of predetermined length and two end attachments (7) located at the two ends of the tubular member (6) and designed to fit onto the anchoring plates (4) of the vertical members (2) of the "LAYHER" type fast-fit prefabricated scaffolding or similar; the two end attachments (7) being formed in one piece with the tubular member (6) by mechanical working, to permanently deform the wall of the tubular member (6), and by subsequent cold cutting.

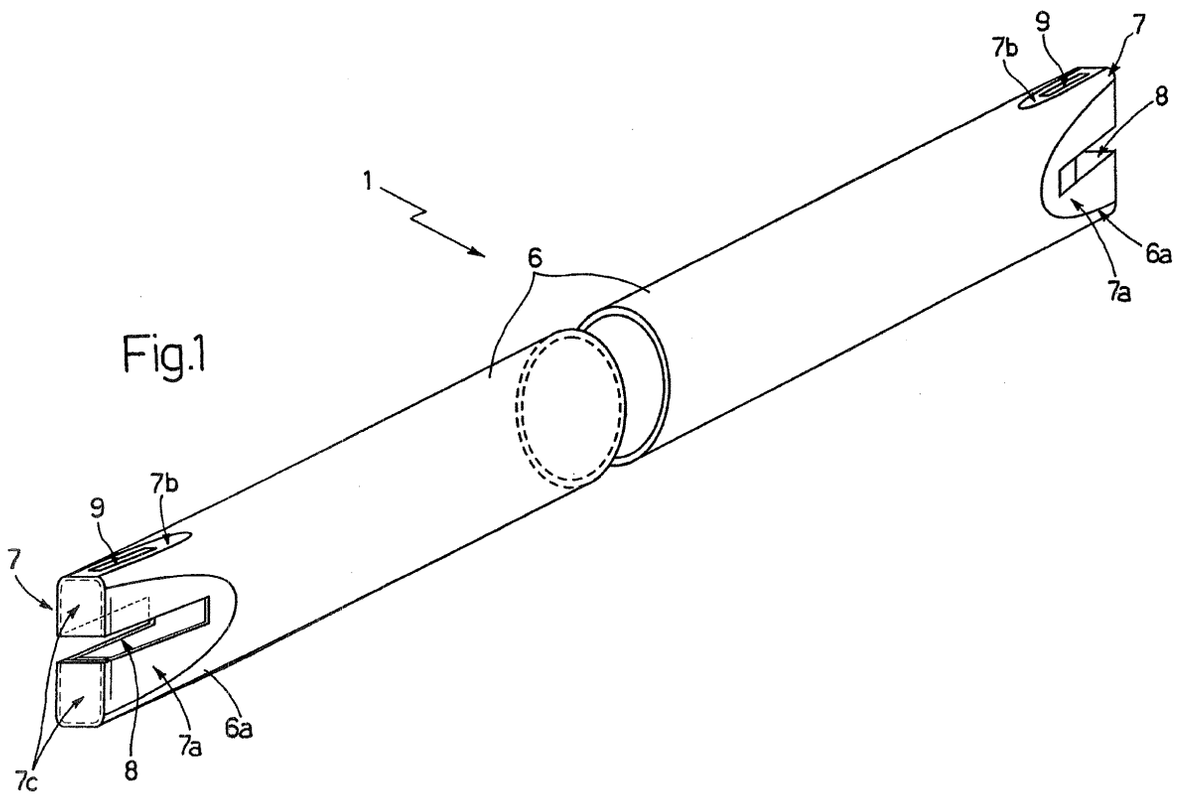

Fig.1

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Description

[0001] The present invention relates to a cross member for fast-fit prefabricated scaffolding.

[0002] More specifically, the present invention relates to a cross member for "LAYHER" type fast-fit prefabricated scaffolding or similar.

[0003] As is known, "LAYHER" type fast-fit prefabricated scaffolding comprises a number of vertical members and horizontal cross members, which can be erected quickly and dismantled easily.

[0004] More specifically, the vertical members each comprise a cylindrical tubular member of appropriate length; and a number of anchoring disks or plates appropriately spaced along the whole length of the tubular member. And each anchoring plate has a central through hole, by which it fits rigidly to the body of the cylindrical tubular member; and a number of radial through slits spaced angularly about the whole body of the plate.

[0005] Each horizontal cross member comprises a cylindrical tubular member of appropriate length; and two end attachments fixed rigidly to the two ends of the tubular member.

[0006] Each of the two end attachments comprises a transverse groove or slot extending, perpendicular to the central longitudinal plane of the horizontal cross member, from the end of the end attachment, and which is engaged by a portion of the anchoring plate of the vertical member; and a diametrical through hole extending through the body of the end attachment, parallel to the central longitudinal plane of the horizontal cross member, so as to intersect the transverse slot.

[0007] The diametrical through hole is engaged by a key, shim, or wedge sized to also fit through one of the radial through slits, in the anchoring plate, aligned with the hole, so as to fasten the end attachment rigidly to the anchoring plate.

[0008] At present, the end attachments of the horizontal cross members are simply cast in one piece separately from the tubular member, and are then driven into the two ends of the tubular member to form an interference fit.

[0009] Horizontal cross members produced in this way are obviously much more expensive to manufacture than those of conventional scaffolding, and so account for the big difference in the purchase cost of "LAYHER" type fast-fit prefabricated scaffolding as compared with conventional types.

[0010] It is an object of the present invention to provide a cross member for "LAYHER" type fast-fit prefabricated scaffolding or similar, which is much cheaper to produce than similar currently marketed cross members.

[0011] According to the present invention, there is provided a cross member for "LAYHER" type fast-fit prefabricated scaffolding or similar, comprising a tubular member of predetermined length and two end attachments located at the two ends of the tubular member and designed to fit onto the anchoring plates of the vertical members of said "LAYHER" type fast-fit prefabricated scaffolding or similar; said cross member being characterized in that at least one of said two end attachments is formed in one piece with the tubular member.

[0012] The present invention also relates to a new method of producing cross members for "LAYHER" type fast-fit prefabricated scaffolding or similar.

[0013] According to the present invention, there is provided a method of producing cross members for "LAYHER" type fast-fit prefabricated scaffolding or similar, each comprising a tubular member of predetermined length and two end attachments located at the two ends of said tubular member; at least one of said two end attachments being formed in one piece with said tubular member and the method of producing being characterized by comprising the steps of:

- permanently deforming an end portion of said tubular member, so that the end portion assumes an ogival shape with a substantially wedge-shaped profile; and
- appropriately cutting the wall of the ogival-shaped end portion, so as to form a transverse groove or slot extending inwards of said end portion of the tubular member and perpendicular to a first central longitudinal plane of the tubular member; and two longitudinal through slits formed in the wall of the end portion of the tubular member aligned with each other on opposite sides of said transverse slot.

[0014] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a view in perspective of a scaffolding cross member in accordance with the teachings of the present invention;
Figure 2 shows a plan view of an end portion of the Figure 1 scaffolding cross member;
Figure 3 shows a side view of the Figure 2 end portion of the scaffolding cross member sectioned along line III-III;
Figure 4 shows a schematic plan view of part of a fast-fit prefabricated scaffold comprising the scaffolding cross member in Figures 1, 2 and 3;
Figure 5 shows a side view of the Figure 4 prefabricated scaffold sectioned along line V-V;
Figure 6 shows, schematically, the various steps in a method of producing fast-fit prefabricated scaffolding cross members in accordance with the teachings of the present invention.

[0015] With reference to Figures 1 to 5, number 1 indicates as a whole a cross member, for "LAYHER" type fast-fit prefabricated scaffolding or similar, designed to fit onto vertical members 2, each of which comprises a

cylindrical tubular member 3 of appropriate length, and a number of anchoring disks or plates 4 appropriately spaced along the whole length of tubular member 3.

[0016] More specifically, each anchoring plate 4 comprises a central through hole, by which it fits rigidly onto the outer surface of the body of cylindrical tubular member 3, coaxially with the longitudinal axis A of tubular member 3; and a number of radial through slits 5 angularly spaced on the body of the plate.

[0017] With reference to Figures 1, 2 and 3, scaffolding cross member 1 comprises a tubular member 6 of appropriate length and preferably, though not necessarily, circular or oval cross section; and two end attachments 7 at the two ends of tubular member 6.

[0018] More specifically, the two end attachments 7 are designed to fit, by means of keys, to anchoring plates 4 of vertical members 2, and, unlike known scaffolding cross members, are formed in one piece with tubular member 6, and so define the two end portions 6a of tubular member 6.

[0019] More specifically, to form each of the two end attachments 7 of scaffolding cross member 1, a corresponding end portion 6a of tubular member 6 is worked mechanically to permanently deform the wall of tubular member 6, and is subsequently cold cut to obtain a finished form compatible with use with "LAYHER" type fast-fit prefabricated scaffolding or similar.

[0020] With particular reference to Figures 1, 2 and 3, following mechanical working as referred to above, each end attachment 7 is defined by an end portion 6a, of tubular member 6, which has been cold formed to a hollow ogival shape with a substantially wedge-shaped profile extending along a first central longitudinal plane P_1 of tubular member 6.

[0021] More specifically, the ogival end portion 6a of tubular member 6 is symmetrical with respect to central longitudinal plane P_1, and is bounded laterally by two substantially flat major lateral surfaces 7a facing each other on opposite sides of central longitudinal plane P_1 and sloping to form an angle α of less than 90°.

[0022] In the example shown, end portion 6a of tubular member 6 also comprises two substantially flat minor lateral surfaces 7b parallel to and facing each other on opposite sides of a second central longitudinal plane P_2, perpendicular to central longitudinal plane P_1, of tubular member 6.

[0023] In other words, the two major lateral surfaces 7a converge with each other and are perpendicular to central longitudinal plane P_2, and the two minor lateral surfaces 7b are perpendicular to central longitudinal plane P_1 and substantially parallel to central longitudinal plane P_2.

[0024] In the example shown, end attachment 7, i.e. the cold formed end portion 6a of tubular member 6, terminates with a front surface 7c, which is perpendicular to the longitudinal axis of tubular member 6 defined by the intersection of central longitudinal planes P_1 and P_2, and is shaped to rest against the outer surface of tubular member 3 of vertical member 2. In the example shown, front surface 7c is substantially cylindrical with substantially the same radius of curvature as tubular member 3 of vertical members 2.

[0025] It should be pointed out, however, that front surface 7c of end attachment 7 may even be substantially flat.

[0026] Again with reference to Figures 1, 2 and 3, end attachment 7, i.e. the cold formed end portion 6a of tubular member 6, also comprises a transverse groove or slot 8, which extends inwards of the attachment, from the axial end, i.e. front surface 7c, of the attachment, is perpendicular to central longitudinal plane P_1 of tubular member 6, and is coplanar or at any rate parallel to the second central longitudinal plane P_2 of tubular member 6.

[0027] With reference to Figures 4 and 5, transverse slot 8 is sized to be engaged by a portion of anchoring plate 4 of vertical member 2, and end attachment 7 also comprises two longitudinal through slits 9, preferably though not necessarily with a rectangular cross section, which are formed in the wall of end portion 6a of tubular member 6, on opposite sides of central longitudinal plane P_2 of tubular member 6, and therefore on opposite sides of transverse slot 8, and each at a respective minor lateral surface 7b of end attachment 7.

[0028] More specifically, with reference to Figure 5, the two through slits 9 are formed in the lateral wall of tubular member 6 so as to be aligned with each other along central longitudinal plane P_1, and are engaged by a substantially trapezoidal key, shim, or wedge 10 sized to also engage the radial through slit 5, in anchoring plate 4, aligned with the two through slits 9, so as to fasten end attachment 7 rigidly to anchoring plate 4.

[0029] Operation of scaffolding cross member 1 is easily deducible from the foregoing description with no further explanation required.

[0030] As for the method of producing scaffolding cross members 1, this will be described assuming a tubular member 6 of desired length is already available, and for the sake of simplicity, with reference to the formation of one end attachment 7 on tubular member 6 of scaffolding cross member 1.

[0031] With reference to Figure 6, scaffolding cross member 1 is formed from a tubular member 6, by permanently deforming an end portion 6a of tubular member 6, so that the end portion assumes a hollow ogival shape with a substantially wedge-shaped profile, and then appropriately cutting the wall of end portion 6a to form transverse slot 8 and the two longitudinal through slits 9.

[0032] More specifically, scaffolding cross member 1 is formed from a tubular member 6 of predetermined length, by bending two lateral portions 6b of end portion 6a of tubular member 6, located on opposite sides of central longitudinal plane P_1, towards each other and towards central longitudinal plane P_1.

[0033] Once the two lateral portions 6b are bent, the

method of producing scaffolding cross members 1 comprises pinching end portion 6a of tubular member 6 on opposite sides of central longitudinal plane P_1 to superimpose the two lateral portions 6b and form two arc-shaped cusps 6c on opposite sides of second central longitudinal plane P_2.

[0034] Once the two arc-shaped cusps 6c are formed, the method of producing scaffolding cross members 1 comprises bending the two arc-shaped cusps 6c towards each other and onto the two lateral portions 6b, and then pinching the deformed end portion 6a of tubular member 6 on opposite sides of central longitudinal plane P_2, so that end portion 6a assumes an ogival shape with a substantially wedge-shaped profile extending along first central longitudinal plane P_1 of tubular member 6, and with four substantially flat lateral surfaces facing one another in pairs.

[0035] More specifically, the method of producing scaffolding cross members 1 comprises pinching end portion 6a of tubular member 6 on opposite sides of central longitudinal plane P_2, so that end portion 6a assumes a substantially wedge shape comprising two substantially flat major lateral surfaces perpendicular to central longitudinal plane P_2 and on opposite sides of central longitudinal plane P_1, and two substantially flat minor lateral surfaces perpendicular to central longitudinal plane P_1 and on opposite sides of central longitudinal plane P_2.

[0036] The major lateral surfaces define the two major lateral surfaces 7a of end attachment 7, and the two minor lateral surfaces define the two minor lateral surfaces 7b of end attachment 7.

[0037] Once permanent deformation of end portion 6a of tubular member 6 is completed, the method of producing scaffolding cross members 1 comprises cutting the wall of end portion 6a of tubular member 6 on opposite sides of central longitudinal plane P_2 and at the two minor lateral surfaces of end portion 6a, i.e. at the two minor lateral surfaces 7b of end attachment 7, to form two preferably though not necessarily rectangular longitudinal through slits 9 engageable by key, shim, or wedge 10.

[0038] Depending on construction requirements, the flap or scrap produced by cutting the wall of tubular member 6 to form through slits 9 may either be removed completely or folded inside tubular member 6 and pinched against the two lateral portions 6b of the wall of tubular member 6 (see Figure 5).

[0039] Simultaneously with the formation of through slits 9, the method of producing scaffolding cross members 1 also comprises pinching the two lateral portions 6b, the two arc-shaped cusps 6c, and possibly also the two flaps or scraps produced by forming through slits 9, so as to compact the whole and smooth the front surface of end portion 6a defining front surface 7c of end attachment 7.

[0040] Once through slits 9 are completed, the method of producing scaffolding cross members 1 comprises forming transverse groove or slot 8 parallel to central longitudinal plane P_2 of tubular member 6. This can be done by cold blanking or more simply using a rotary disk cutter capable of cutting the deformed wall of tubular member 6, while remaining coplanar with or at any rate parallel to central longitudinal plane P_2 of tubular member 6.

[0041] Scaffolding cross member 1 as described and illustrated herein has numerous, obvious advantages. Firstly, the cross member so formed is much cheaper to produce than known types, thus making "LAYHER" type fast-fit prefabricated scaffolding economically competitive with conventional scaffolding.

[0042] Secondly, the method of producing scaffolding cross members 1 can be implemented easily using multipurpose dies designed to perform the various permanent deformation and cutting operations of the two ends of tubular member 6 fully automatically.

[0043] Clearly, changes may be made to scaffolding cross member 1 and to the method of producing it, without, however, departing from the scope of the present invention.

[0044] For example, tubular member 6 for producing scaffolding cross member 1 may have a rectangular, square, trapezoidal, or generally polygonal cross section.

Claims

1. A cross member (1) for "LAYHER" type fast-fit prefabricated scaffolding or similar, comprising a tubular member (6) of predetermined length and two end attachments (7) located at the two ends of the tubular member (6) and designed to fit onto the anchoring plates (4) of the vertical members (2) of said "LAYHER" type fast-fit prefabricated scaffolding or similar; said cross member (1) being **characterized in that** at least one of said two end attachments (7) is formed in one piece with the tubular member (6).

2. A scaffolding cross member as claimed in Claim 1, **characterized in that**, to form said end attachment (7), a corresponding end portion (6a) of the tubular member (6) is worked mechanically to permanently deform the wall of the tubular member (7), and is subsequently cold cut.

3. A scaffolding cross member as claimed in Claim 2, **characterized in that** said end attachment (7) is defined by an end portion (6a) of the tubular member (6) deformed to assume a hollow ogival shape, with a substantially wedge-shaped profile extending along a first central longitudinal plane (P_1) of the tubular member (6).

4. A scaffolding cross member as claimed in Claim 3, **characterized in that** said end attachment (7) is

bounded laterally by two major lateral surfaces (7a) facing each other on opposite sides of the first central longitudinal plane (P_1) and sloping to form a given angle (α).

5. A scaffolding cross member as claimed in Claim 4, **characterized in that** said end attachment (7) is bounded laterally by two minor lateral surfaces (7b) parallel to and facing each other on opposite sides of a second central longitudinal plane (P_2), perpendicular to said first central longitudinal plane (P_1), of the tubular member (6).

6. A scaffolding cross member as claimed in any one of Claims 3 to 5, **characterized in that** said end attachment (7) comprises a transverse groove or slot (8) extending inwards of the end attachment, from the axial end (7c) of the end attachment, and perpendicular to said first central longitudinal plane (P_1) of the tubular member (6).

7. A scaffolding cross member as claimed in Claim 6, **characterized in that** said end attachment (7) comprises two longitudinal through slits (9) aligned with each other and formed in the wall of the end portion (6a) of the tubular member (6), on opposite sides of said transverse slot (8); said longitudinal through slits (9) being engaged by a key, shim, or wedge (10).

8. A method of producing cross members (1) for "LAYHER" type fast-fit prefabricated scaffolding or similar, each comprising a tubular member (6) of predetermined length; and two end attachments (7) located at the two ends of said tubular member (6); at least one of said two end attachments (7) being formed in one piece with said tubular member (6) and the method of producing being **characterized by** comprising the steps of:

- permanently deforming the end portion (6a) of said tubular member (6) in which said end attachment (7) is to be formed, so that the end portion assumes an ogival shape; and
- appropriately cutting the wall of the ogival-shaped said end portion (6a), so as to form a transverse groove or slot (8) extending inwards of, and from the axial end of, said end portion (6a), and perpendicular to a first central longitudinal plane (P_1) of the tubular member (6); and two longitudinal through slits (9) formed in the wall of the end portion (6a) of the tubular member (6) aligned with each other on opposite sides of said transverse slot (8).

9. A method of producing scaffolding cross members as claimed in Claim 8, **characterized in that** said step of permanently deforming the end portion (6a) of said tubular member (6) comprises the steps of:

- bending two lateral portions (6b) of the end portion (6a) of said tubular member (6), located on opposite sides of the first central longitudinal plane (P_1), towards each other and towards said first central longitudinal plane (P_1);
- pinching the end portion (6a) of the tubular member (6) on opposite sides of said first central longitudinal plane (P_1), so as to superimpose the two lateral portions (6b) and form two arc-shaped cusps (6c) on opposite sides of a second central longitudinal plane (P_2) perpendicular to said first central longitudinal plane (P_1) ;
- bending the two arc-shaped cusps (6c) towards each other and onto said two lateral portions (6b); and
- pinching the end portion (6a) of the tubular member (6) on opposite sides of said second central longitudinal plane (P_2), so that the end portion (6a) assumes an ogival shape with a substantially wedge-shaped profile extending along said first central longitudinal plane (P_1) of the tubular member (6).

10. A method of producing scaffolding cross members as claimed in Claim 8 or 9, **characterized in that** said step of cutting the wall of said end portion (6a) of the tubular member (6) comprises the steps of:

- cutting the wall of the tubular member (6) on opposite sides of said second central longitudinal plane (P_2) to form two aligned longitudinal through slits (9); and
- cutting the wall of the tubular member (6) at the axial end of said end portion (6a) to form a transverse groove or slot (8) extending inwards and perpendicular to said first central longitudinal plane (P_1) of the tubular member (6).

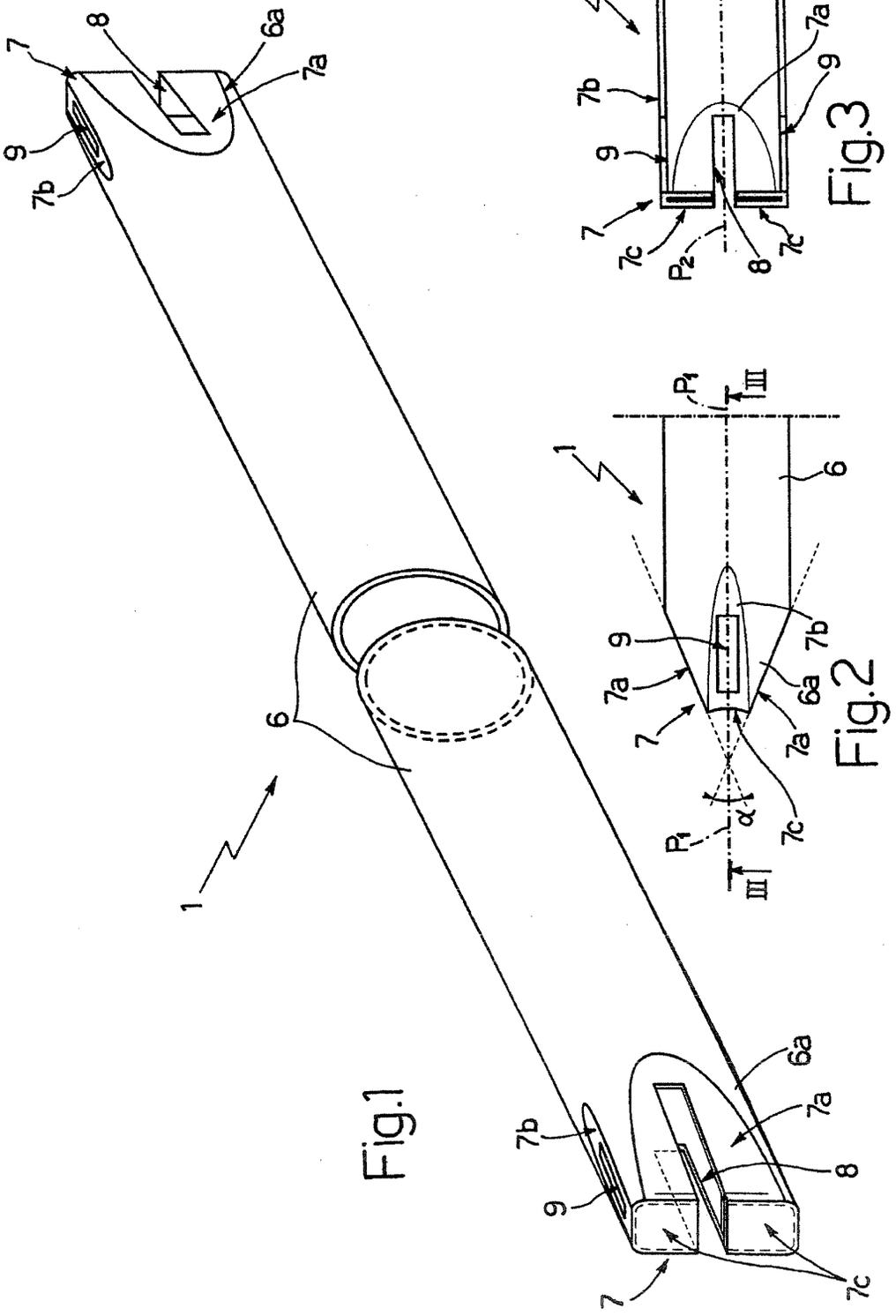

Fig.1

Fig.3

Fig.2

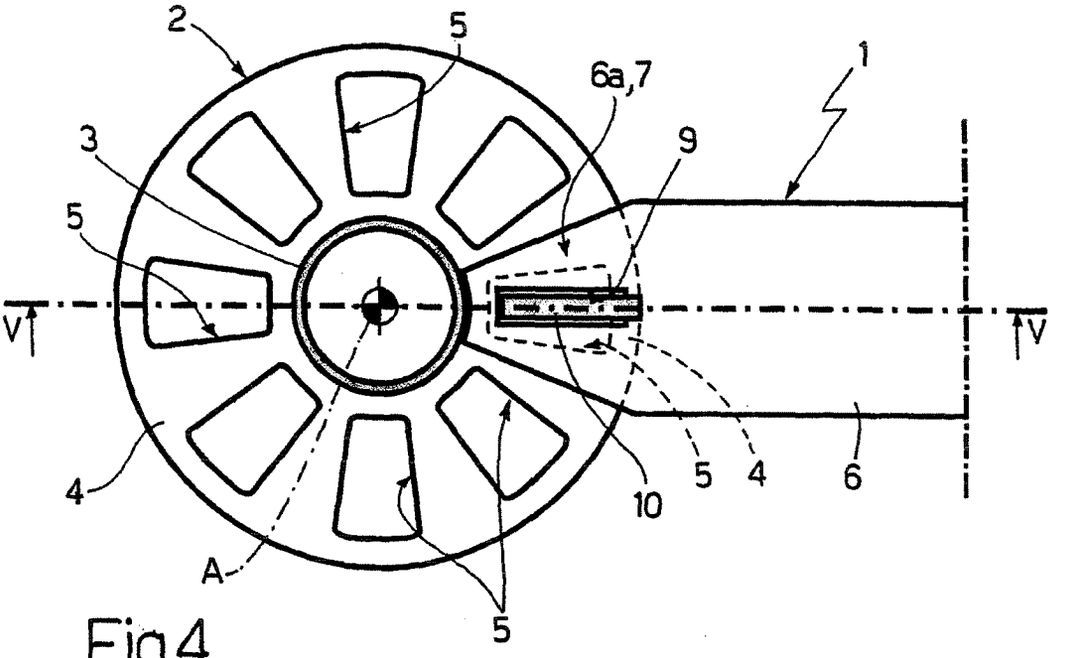

Fig.4

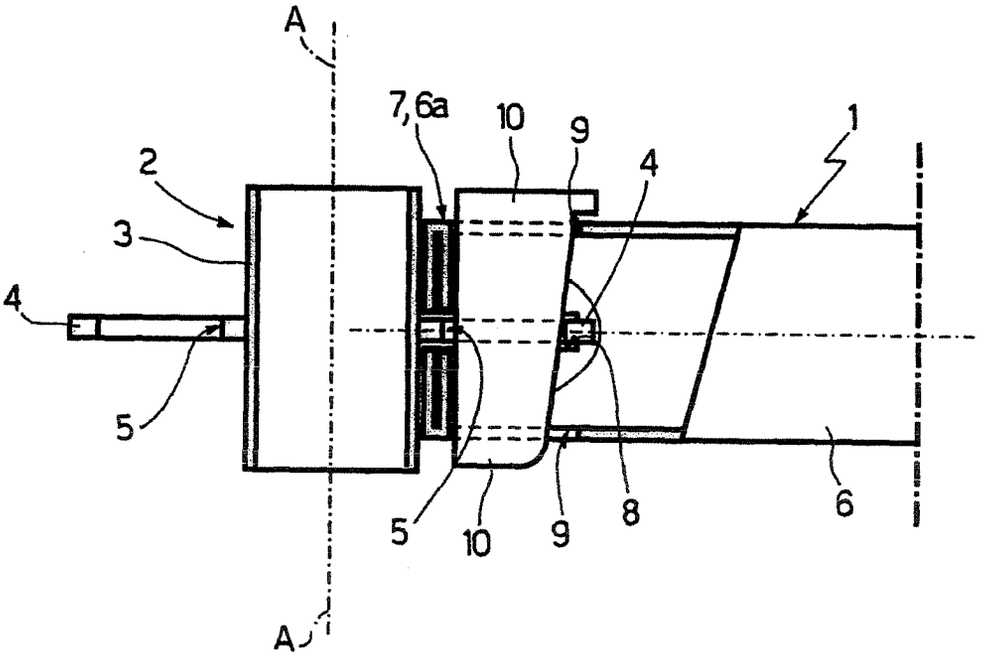

Fig.5

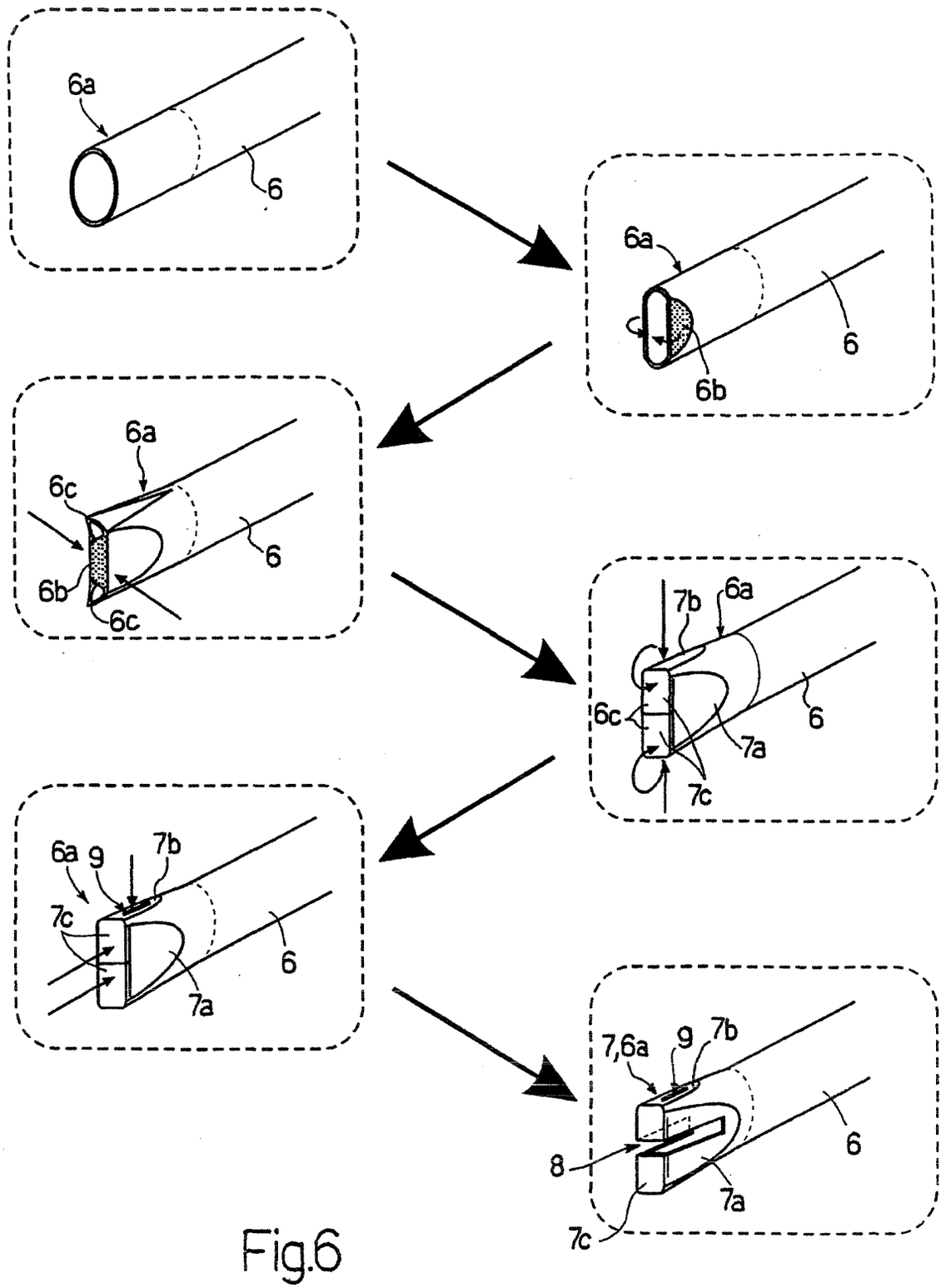
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Fig.6

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EUROPEAN SEARCH REPORT

Application Number
EP 04 10 6483

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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 March 2005	Saretta, G

CATEGORY OF CITED DOCUMENTS

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