



(11) **EP 2 532 806 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
12.12.2012 Bulletin 2012/50

(51) Int Cl.:
E04F 21/00 (2006.01)

(21) Application number: **12171318.4**

(22) Date of filing: **08.06.2012**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

(30) Priority: **10.06.2011 ES 201130638 U**

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(54) **Device for levelling rigid cladding plates**

(57) It allows better ergonomics, higher work speed and higher accuracy. It comprises a T-shaped levelling member (3), a wedge (4) and a first actuation member (5); the levelling member comprising a flat base (6) and a second flat member (8) perpendicular to the base (6) and having a first opening (12), for inserting the wedge (4), and end notches (17); the wedge (4) comprising a settling surface (18), a working surface (19), for tracting the second member (8), and blocking saw-teeth grooves

(20); and the first actuation member (5) comprising: a support (22), having a handle (25) and a graduated scale (26); a third support member (23), comprising a guide (30) and first legs (41) having a second opening (33); and a pusher (24), articulated with the support (22) and having a first gripping portion (36) and a second pushing portion (37).

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Description

OBJECT OF THE INVENTION

[0001] The present invention can be included within the technical field of construction; particularly, in the technical field of cladding of floors, walls and ceilings with rigid plates.

[0002] Specifically, the object of the invention relates to a device for levelling rigid cladding plates.

BACKGROUND OF THE INVENTION

[0003] To place flat cladding plates, such as pieces of ceramic, floor tiles and others of appreciably uniform thickness on floors, walls or other surfaces, a layer of adhering product is disposed on said surface (such as mortar or adhesive) whereon said cladding pieces are placed. This operation requires a certain accuracy by the person placing the plates, so that the surface clad later remains smooth, aligned and levelled. This process is slow and complicated. Each plate must be placed, levelled and made flush with the adjacent already placed parts, individually and using completely traditional methods.

[0004] There are considerable difficulties in performing said levelling:

- the surface is not perfectly flat, and there is a lack of horizontality (for ceilings and floors) or verticality (for walls) of the surface to clad;
- at the time of placing, the layer of mortar or adhesive used is soft and, although the surface to clad is completely smooth, the cladding plates may be easily left inclined and uneven, providing a defective finish;
- during the settling, the mortar contracts, meaning that later movements occur in the plates.

[0005] Thus, at present, the levelling of cladding plates is performed using the traditional system, i.e. once the mortar or adhesive has been placed on the base surface where the cladding plates will be placed, the first cladding piece is placed and, using a spirit level, its position is controlled with no further aid or tools. If the part is uneven, its position is corrected by tapping it with a rubber mallet. This work is performed repetitively for all the cladding parts to be placed, being difficult and complicated, since the person performing the task must work in unnatural postures during full working days, especially in the case of floor claddings.

[0006] A solution to the drawbacks mentioned is shown in international application A WO2008/118418, which discloses the joint use of a levelling member and a wedge. The levelling member has an inverted T-shape, with a lower section in the form of cylindrical segment and a flat upper section perpendicularly joined to the central area of the concave part of the lower section. The upper section comprises an opening, as well as incorpo-

rating, close to the joint with the lower section, a notch in the side ends, which weakens the resistance to shearing stresses. The wedge comprises a settling surface and a working surface, inclined with respect to the settling surface, and equipped with teeth and is adapted to be housed, at least partially, in the opening.

[0007] The adhering product is applied on the surface to clad and the levelling pieces are disposed with the convex part resting on the surface. Next, the cladding plates are disposed, taking care that for each joint defined by two adjacent plates one of the plates is disposed on each side of the upper section of at least one levelling member.

[0008] Next, the wedge is introduced in the opening, tapping said wedge so that the working surface produces efforts on the upper part of the opening, tending to separate the levelling member and the surface to clad, which will also cause the separation of the cladding plate, being levelled. When the adhering product is dry, an impact is made on the upper section, which thanks to the notches, is separated from the lower side, the upper section being disposable, as well as the lower section being buried beneath the cladding plates, and concealed, once the grouting has been applied to seal the joints. The wedge can be introduced in the opening by means of a hammer or a metal pushing tool.

[0009] It is aimed to disclose a device for levelling cladding plates which enables a greater working speed, as well as greater accuracy in adjusting the plates, and which additionally makes it easier for the operator to adopt more ergonomically suitable working postures.

DESCRIPTION OF THE INVENTION

[0010] The present invention resolves the drawbacks mentioned, by means of a device for levelling rigid plates, such as floor tiles or ceramic tiles, of those used for the cladding of surfaces, such as floors, ceilings or walls.

[0011] The device of the invention comprises a levelling member, a wedge, and a first actuation member.

[0012] The levelling member is T-shaped and comprises a preferably flat base, even more preferably rectangular, adapted to be disposed on and adhering product, such as mortar or glue, suitable for fixing the cladding plates to the surface to clad, as well as additionally comprising a second flat member perpendicularly joined to the base defining collinear edges for joining between the base and the second member. A flat base is preferable because it provides a greater contact surface between the base and the cladding plate and, therefore fewer and more uniform stresses on the base due to contact with the cladding plate.

[0013] The base may additionally incorporate cylindrical stiffeners, preferably in the form of a cylinder sector, such as a semi-cylinder, as well as brackets connecting the cylinders to improve the base's resistance. On the other hand, the ends of the base furthest from the second member may have a more reduced thickness, to facilitate

the insertion of said base under the cladding plates, and in the corners of said ends furthest from the second member, there may preferably be bevels to lighten material, considering that the part transmitting greatest efforts is the part closest to the second member.

[0014] The second member is adapted to transmit towards the base a component of the efforts exerted on said second member; said component is in a direction perpendicular to the surface to clad and towards the outside of said surface to clad. Therefore, the second member is equipped in its lower part with a first opening, wherein the wedge can be inserted. The first opening is also limited in its upper part by a flange designed to make contact with the wedge. The height dimension of the first opening is related to the maximum height allowed for a cladding plate.

[0015] On the sides of the first opening, the second member may comprise protuberances to provide the original thickness of said second member with an additional thickness, suitable for joining cladding plates according to joints of greater width than the original thickness of the second member. The protuberances may be disposed on the front part and/or the rear part, and they may have varied thicknesses, enabling the production of levelling parts which allow making joints of various thicknesses between cladding plates.

[0016] Additionally, the second member may incorporate ribs disposed from side to side to provide greater resistance.

[0017] The second member incorporates at its ends, close to the joining edges, notches designed to produce a weakening against shearing stresses. The dimensions of said notches shall not be so large as to produce an appreciable weakening against tractive efforts. Preferably, the levelling member is manufactured in injected plastic, due to the simplicity of preparation that said technology provides, as well as due to its convenience in terms of cost.

[0018] The cladding plates are disposed on the surface to clad, so that each of the sides of two adjacent plates which define a joint is disposed on at least one base, with each of the two plates disposed on one side of said base with respect to the second member, where the edges for joining are disposed in substantially the same direction as the joint.

[0019] The wedge comprises a flat settling surface designed to be inserted in the first opening and resting on the cladding plate, as well as comprising a working surface, which is inclined with respect to the settling surface; said working surface is preferably equipped with a series of grooves which define saw teeth, to block the backward movement of the wedge, where the working surface is adapted to transmit the component of the efforts exerted by the user on the levelling member through the base's flange, causing efforts tending to separate the base and, therefore, the cladding plates, from the cladding surface, for levelling the cladding plates. Preferably, the wedge is a body in the form of straight triangular prism, where

the settling surface is one of the side faces of the prism and the working surface is another of the side faces of said prism. The number of teeth is defined by a compromise bearing in mind that a high number means greater accuracy in the levelling, but less resistance of the teeth.

[0020] The first actuation member is a manual tool comprising a support, a third support member and a pusher.

[0021] The support is a longitudinal part comprising at a first end a handle adapted to be gripped by a user, as well as comprising at a second end, opposite the first end, a scale graduated in correspondence with the height of the cladding plate, where the scale has a first frame corresponding to the smallest plate height allowed, a second frame corresponding to the greatest plate height allowed and third frames corresponding to intermediate plate heights. The scale makes it possible to apply a suitable pressure for the thickness of the cladding plate. Without the regulation with respect to plate height, the device would apply insufficient pressure for the case of reduced height, whilst it would apply an excessive pressure to plates of large height, causing them to break.

[0022] The third support member comprises a guide adapted to allow the displacement of the third member along the support, between the positions corresponding to the first frame and the second frame. The third member can further preferably comprise fixing means for fixing said third member in a desired position in the support. Preferably, the fixing means comprise a screw that can be screwed in a threaded bore that connects with the guide, so that the screw, when screwed / unscrewed, can press / stop pressing the support against the guide, avoiding / allowing the relative movement between the third member and the support.

[0023] Likewise, the third member comprises first legs disposed in the lower part, separated by a second opening which allows the passage of the wedge, and adapted to provide a distancing between the support and the cladding plate. The first legs further comprise feet to rest on the cladding plate, the dimensions whereof are preferably sufficiently large to avoid said feet from being introduced in the joints between cladding plates.

[0024] The pusher is articulated with the support according to an articulation and comprises a first gripping portion to, in cooperation with the handle of the support, actuate the pusher between a first position and a second position, and a second pushing portion adapted to remain out of contact with the wedge in the first position and push the wedge against the flange of the levelling member, transmitting towards the levelling member the efforts that tend to separate the plate and the surface.

[0025] The first opening can be closed or, also, open in its lower part, defining two side legs in the second member.

[0026] Once the cladding plates and the levelling parts are disposed on the surface to clad, as explained above, said plates can be set on the adhering product using slight taps with a mallet and the wedge is inserted in the first

opening until the working surface makes contact with the flange, lightly pressing with the hand or, if desired, with a tapping instrument, such as a hammer or mallet. Next, the first member is used for levelling the cladding plates, as stated below:

[0027] Firstly, the third member is disposed in the scale frame of the support corresponding with the height of the cladding plate. Next, the first member is placed so that the feet rest on the cladding plate, with the wedge inserted between the first legs and with the third member and the second pushing portion disposed on opposite sides with respect to the second flat member of the base. Finally, simultaneously gripping with the same hand the handle and the first gripping portion, pivot the first portion with respect to the support, so that the second portion pushes the wedge against the flange, producing efforts tending to separate the second member and the surface to clad, which also causes the separation of the flat base and the cladding plate, which remains in levelled position.

[0028] Once the adhering product is dry, the second member is tapped (for example with the foot) which, thanks to the notches, separates from the base, it being possible to discard the second member and the base being lost under the cladding plate, concealed once grout is applied to cover the joints. Shearing stress in the direction of the joint.

[0029] It is not essential for it to work correctly, but it is recommended to immerse the levelling parts in water before their use, to increase their flexibility and, therefore, increase contact with the cladding plates and improve the behaviour with respect to transmission of efforts.

[0030] The parts of the device of the invention which, in service conditions, are designed to make contact with the cladding plates, are preferably manufactured in plastic materials, with less density and hardness than metal materials, so as not to damage the plates.

[0031] The device of the invention has a simple, light construction. It additionally allows, thanks to the combination of the pusher and the scale, an application of efforts which is repetitive, as well as adapted to the height of each cladding plate and does not depend on the uncontrollable application of force with the hand or a hammer. On the other hand, the presence of the third support member provides greater stability of the device, making it suitable to work in claddings of any orientation, whether horizontal (floors, ceilings), vertical (walls), or oblique, where applicable, with greater speed than the means known to date.

DESCRIPTION OF THE DRAWINGS

[0032] To complement the description being made and in order to aid towards a better understanding of the characteristics of the invention, in accordance with a preferred example of practical embodiment thereof, a set of drawings is attached wherein, with illustrative and non-limiting character, the following has been represented:

Figure 1.- Shows a side view of the device of the invention.

Figures 2a, 2b and 2c.- respectively show different plant, elevation and profile views of the levelling member.

Figure 3.- Shows a perspective view of the first member.

PREFERRED EMBODIMENT OF THE INVENTION

[0033] The device (1) of the invention is adapted for levelling rigid cladding plates (2) disposed on a surface (38) to clad and which one wants to fix to said surface (38) by means of an adhering product (39), such as mortar or glue. The device (1) comprises a levelling member (3), a wedge (4), and a first actuation member (5).

[0034] The levelling member (3) is T-shaped and comprises a rectangular flat base (6), as well as additionally comprising a second flat member (8) perpendicularly joined to the base (6) defining collinear joining edges (7) between the base (6) and the second member (8). The base (6) further incorporates cylindrical stiffeners (9), as well as brackets (10) to improve their resistance. On the other hand, the ends of the base (6) furthest from the second member (8) have a more reduced thickness, to facilitate the insertion of said base (6) under the cladding plates (2), and in the edges of said ends furthest from the second member (8), there may preferably be bevels (11) to lighten material.

[0035] The cladding plates (2) will be disposed on the surface (38), so that each of the sides (40) of two adjacent plates (2) which define a joint (15) is disposed on at least one base (6), with each of the two plates (2) disposed on one side of said base (6) with respect to the second member (8), where the joining edges (7) are disposed in substantially the same direction as the joint (15).

[0036] The second member (8) is equipped in its lower part with a first opening (12), wherein the wedge (4) can be inserted. The first opening (12) is also limited in its upper part by a flange (13) designed to make contact with the wedge (4).

[0037] At the ends of the first opening (12), there may be protuberances (14), both in the front part and in the rear part with respect to the original thickness, which provide the original thickness of the second member (8) with an additional thickness, to obtain levelling parts (3) adapted to different joint (15) thicknesses, for example from between one and ten millimetres. Additionally, the second member (8) incorporates ribs (16) disposed from side to side to provide greater resistance, and the second member (8) incorporates at its ends, close to the joining edges (7), notches (17) designed to produce a weakening against shearing stresses.

[0038] The wedge (4) has the form of a straight triangular prism, where one of the side faces constitutes a flat settling surface (18) designed to be inserted in the first opening (12) and resting on the cladding plate (2), and another of the side faces constitutes a working surface

(19), which is inclined with respect to the settling surface (18); said working surface (19) is equipped with a series of grooves (20) which define saw teeth (21).

[0039] The first actuation member (5) is a manual tool with a support (22), a third support member (23) and a pusher (24).

[0040] The support (22) is a longitudinal part comprising at a first end a handle (25), produced in polymeric material, and at a second end a graduated scale (26) in correspondence with the height of the cladding plate (2), where the scale (26) has a first frame (27) corresponding to the smallest plate (2) height allowed, a second frame (28) corresponding to the greatest plate (2) height allowed and third frames (29) corresponding to intermediate plate (2) heights.

[0041] The third support member (23) comprises a guide (30) to make it possible to move the third member (23) along the support (22), between the first frame (27) and the second frame (28). The third member (23) additionally preferably comprising fixing means (31, 32) for fixing said third member (23) in a desired position in the support (22). The fixing means (31, 32) comprise a screw (31) that can be screwed in a threaded bore (32) that connects with the guide (30), so that the screw (31) presses the support (22) against the guide (30).

[0042] Likewise, the third member (23) comprises first legs (41) disposed in the lower part, separated by a second opening (33) which allows the passage of the wedge (4), and adapted to provide a distancing between the support (22) and the cladding plate (2). The first legs (41) further comprise feet (34) to rest on the cladding plate (2), the dimensions whereof are sufficiently large to avoid said feet (34) from being introduced in the joints (15) between two plates (2).

[0043] The pusher (24) is articulated with the support (22) according to an articulation (35) and comprises a first gripping portion (36) to actuate the pusher (24), and a second pushing portion (37) to push the wedge (4) against the flange (13), transmitting towards the levelling member (3) the efforts that tend to separate the cladding plate (2) and the surface (38).

[0044] The first opening (12) is open in its lower part, defining two second side legs (42) in the second member (8).

Claims

1. Device (1) for levelling rigid cladding plates (2) disposed on a surface (38) to clad, **characterized in that** it comprises a levelling member (3), a wedge (4) and a first actuation member (5), where the levelling member (3) is T-shaped and comprises a flat base (6) adapted to lean on the surface (38) to clad, and a second flat member (8) perpendicularly joined to the base (6) and which is provided in its lower part with a first opening (12), where in the wedge (4) can be inserted, and with end notch-

es (17) to weaken the second member (8) against shearing stresses,

where the wedge (4) comprises a settling surface (18), and a working surface (19), inclined with respect to the settling surface (18) and adapted to transmit towards the second member (8) tractive efforts which tend to separate the levelling member (3) from the surface (38), and the working surface (19) incorporates grooves (20) which define saw teeth (21), to block the backward movement of the wedge (4) with respect to the second member (8), where the first member (5) is a manual tool comprising:

- a support (22), equipped, at a first end, with a handle (25) produced in polymeric material and, at a second end, with a graduated scale (26), to apply the suitable effort in accordance with the height of the cladding plates (2),

- a third support member (23), produced in polymeric material, comprising a guide (30) adapted to allow the displacement of the third member (23) along the support (22); and first legs (41) disposed in the lower part, separated by a second opening (33) which allows the passage of the wedge (4), and adapted to provide a distancing between the support (22) and the cladding plate (2), where the first legs (41) further comprise feet (34) to rest on the cladding plate (2), and

- a pusher (24), produced in polymeric material, joined by an articulation (35) with the support (22) and equipped with a first gripping portion (36) and a second pushing portion (37) to push the wedge (4) by pivoting of the support (22) by the articulation (35), causing the efforts to separate the levelling member (3) and the surface (38).

2. Device (1) for levelling rigid cladding plates (2), according to claim 1, **characterized in that** the second member (8) comprises in the sides of the first opening (12) protuberances (14) to provide the original thickness of said second member (8) with an additional thickness, suitable for joining cladding plates (2) according to joints (15) of greater width than the original thickness of the second member (8).

3. Device (1) for levelling rigid cladding plates (2), according to claim 1, **characterized in that** the notches (17) are disposed on both sides of the second member (8), with respect to the thickness.

4. Device (1) for levelling rigid cladding plates (2), according to any of claims 1 to 3, **characterized in that** the first opening (12) is open in its lower part, defining second legs (42) on its sides.

5. Device (1) for levelling rigid cladding plates (2), according to claim 1, **characterized in that** the ends of the base (6) furthest from the second member (8) have a reduction in the thickness, to facilitate the insertion of said base (6) under the cladding plates (2). 5
6. Device (1) for levelling rigid cladding plates (2), according to claim 1, **characterized in that** the corners of the ends of the base (6) far from the second member (8) comprise bevels (11) to reduce material. 10
7. Device (1) for levelling rigid cladding plates (2), according to claim 1, **characterized in that** the levelling member (3) additionally comprises cylindrical stiffeners (9), disposed in the base (6) to provide greater resistance and rigidity. 15
8. Device (1) for levelling rigid cladding plates (2), according to any of claims 1 or 7, **characterized in that** the levelling member (3) additionally comprises brackets (10) disposed in the base (6), connecting the stiffeners (9). 20
9. Device (1) for levelling rigid cladding plates (2), according to any of claims 1, 7 or 8, **characterized in that** the levelling member (3) additionally comprises ribs (16) disposed from side to side of the second member (8). 25
30
10. Device (1) for levelling rigid cladding plates (2), according to claim 1, **characterized in that** the wedge (4) is a straight triangular prism, where one of the side faces constitutes the settling surface (18) and another of the side faces constitutes the working surface (19). 35
11. Device (1) for levelling rigid cladding plates (2), according to claim 1, **characterized in that** the third support member (23) additionally comprises fixing means (31, 32) for fixing said third member (23) in a desired position in the support (22). 40
12. Device (1) for levelling rigid cladding plates (2), according to claim 11, **characterized in that** the fixing means (31, 32) comprise a screw (31) that can be screwed in a threaded bore (32) that connects with the guide (30), so that the screw (31) can press the support (22) against the guide (30). 45
50
13. Device (1) for levelling rigid cladding plates (2), according to claim 1, **characterized in that** the first legs (41) further comprise feet (34) to stably rest on the cladding plate (2). 55
14. Device (1) for levelling rigid cladding plates (2), according to claim 13, **characterized in that**, the feet (34) have dimensions that exceed half of the thickness of the joint (15) between cladding plates (2), to avoid them from being introduced inside said joint (15).

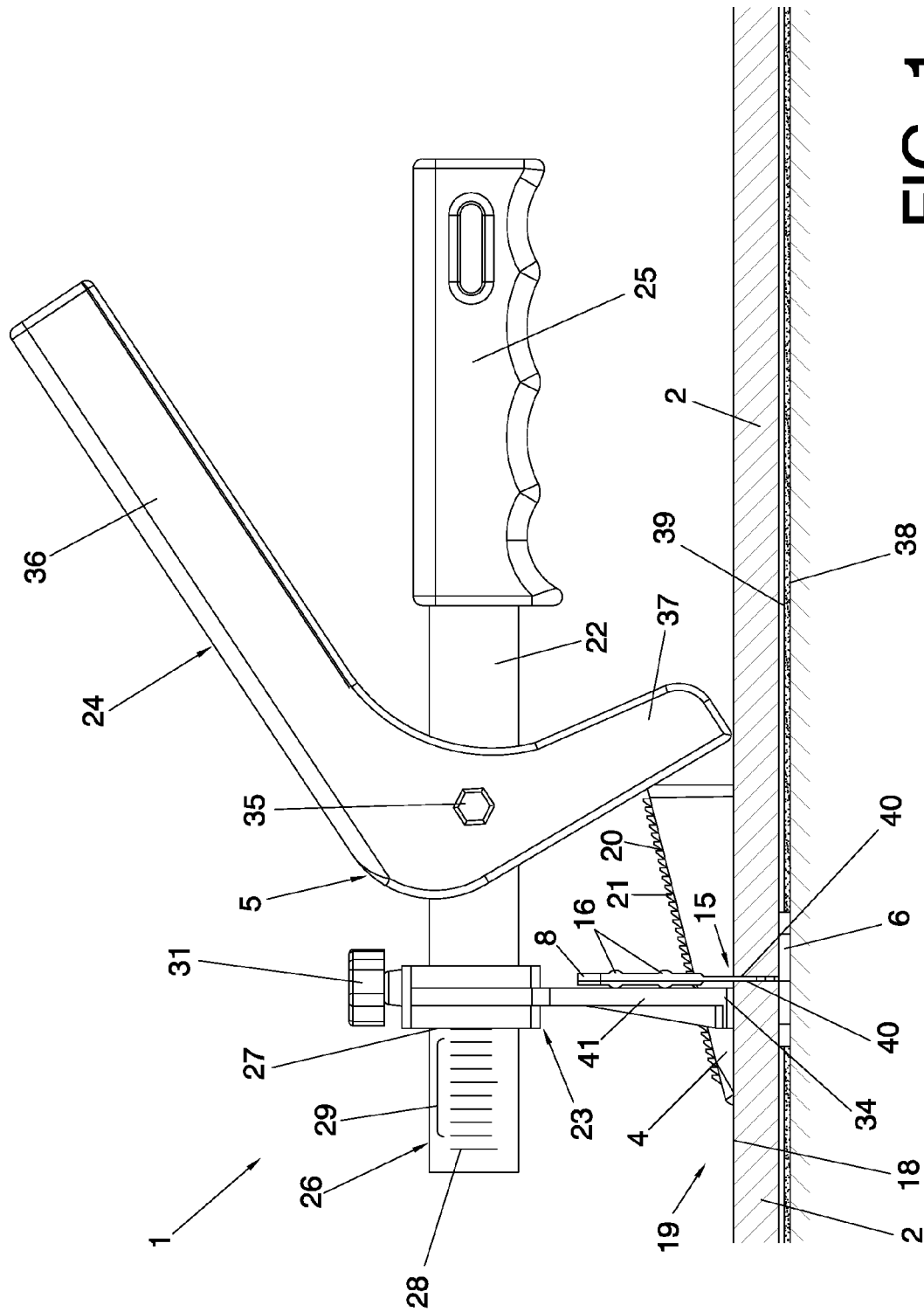


FIG. 1

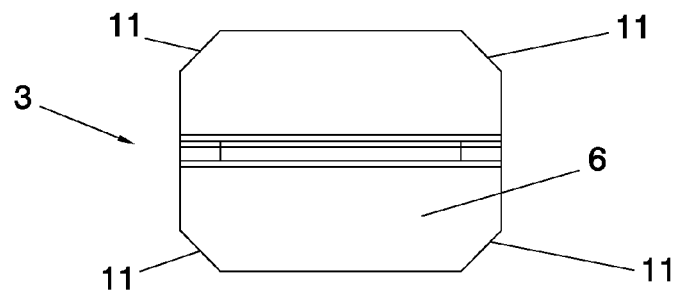


FIG. 2a

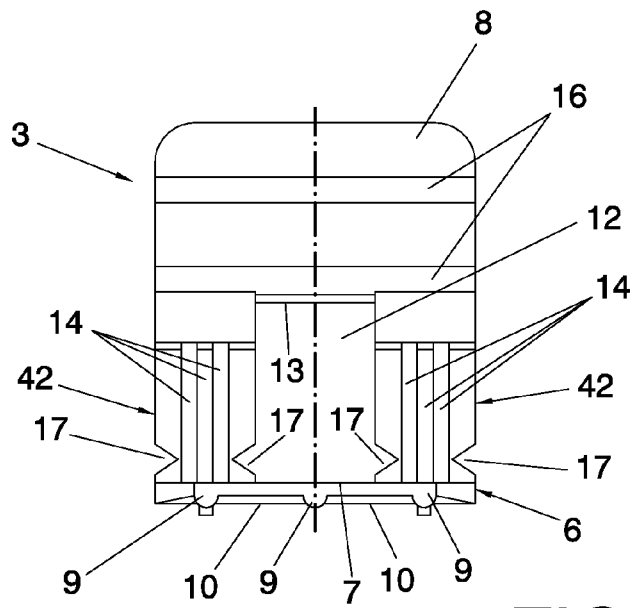


FIG. 2b

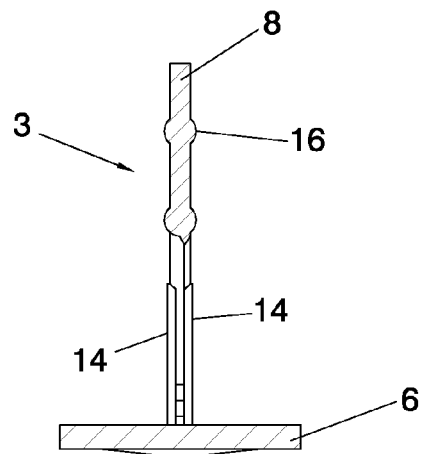


FIG. 2c

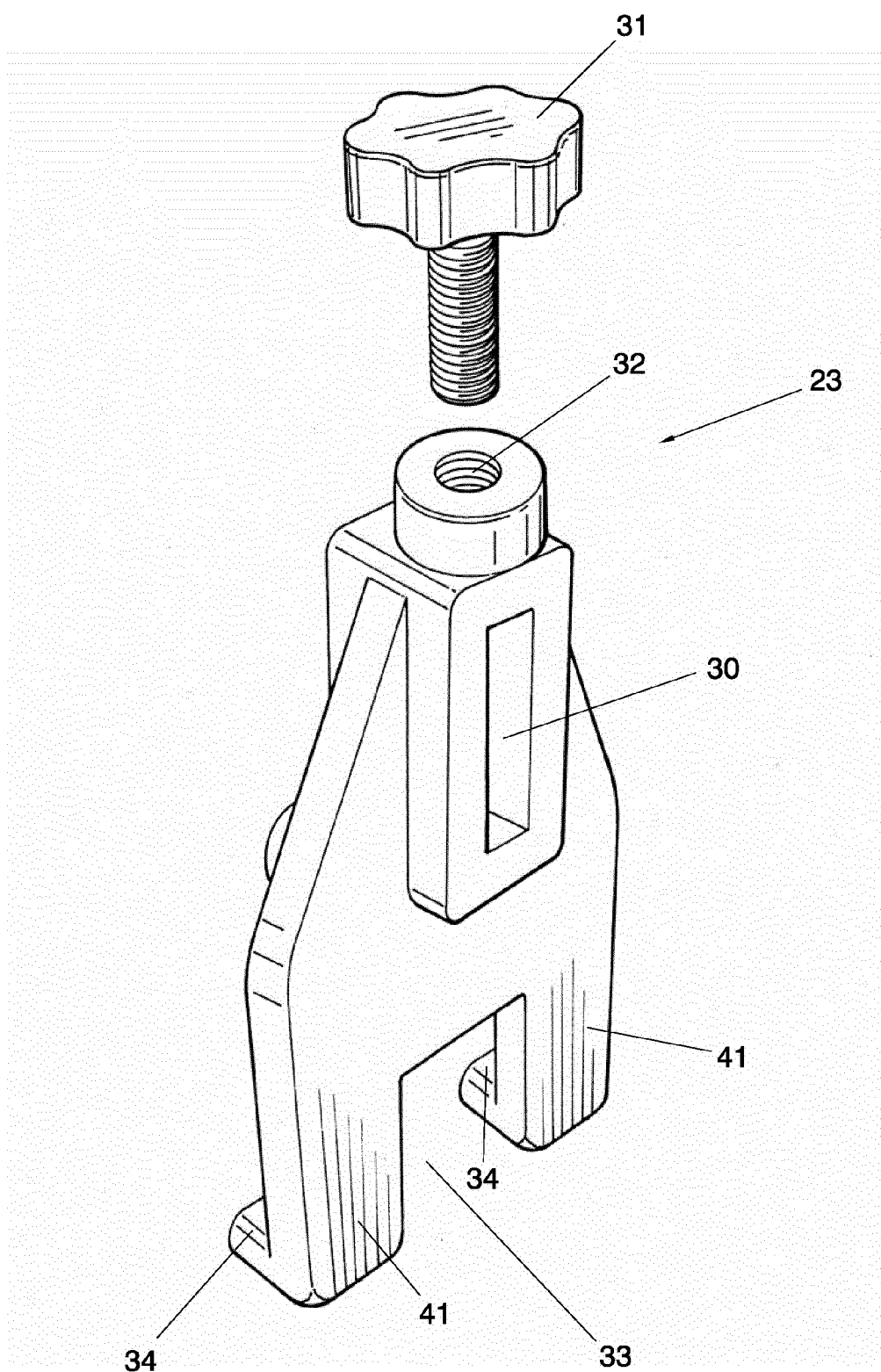


FIG. 3



EUROPEAN SEARCH REPORT

Application Number
EP 12 17 1318

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	WO 2008/118418 A1 (Q E P CO INC [US]; DODA JR ROBERT C [US]) 2 October 2008 (2008-10-02) * the whole document *	1	INV. E04F21/00
A	WO 2011/012994 A2 (MOLLIFICIO APUANO S R L [IT]; BONDIELLI MAURO [IT]) 3 February 2011 (2011-02-03) * figures 1-7 *	1	
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 21 August 2012	Examiner Fournier, Thomas
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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21-08-2012

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