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(54) **Device for lifting prefabricated components, particularly made of concrete or the like**

Vorrichtung zum Heben von vorgefertigten Gegenständen, insbesondere aus Beton oder dergleichen

Dispositif pour lever des objets préfabriqués, en particulier faits de béton ou analogue

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Description

[0001] The present invention relates to a device for lifting prefabricated components, particularly made of concrete or the like.

[0002] As is known, various kinds of devices are used for lifting concrete components; such devices can be grouped into three main categories, according to the element to be embedded in the concrete in order to form an engagement point for the element which performs the lifting action.

[0003] Devices are in fact known which are based on the use of shaped tubular bodies (FR-A-2 580 442, WO-A-8 700 823), to be embedded in the concrete, and of a pin to be inserted in the shaped cavity defined by the tubular body in order to couple the component to a lifting machine.

[0004] Hand-made and industrially-manufactured devices are also known (US-A-4 930 269) which use a rod or nail, to be embedded in the component, and a hook or clamp, which is connected to the lifting machine and can engage the rod or nail protruding from the component or accommodated in an appropriate recess.

[0005] Lifting devices belonging to these two first categories very often have the drawback that the element embedded in the concrete protrudes from said concrete and thus must be removed by cutting after use. In the other cases, the recess in which the end of the element anchored in the concrete is accommodated is large, with problems as regards the aesthetics of the component, due to the shape of the element which performs the lifting action and has to be inserted in said recess.

[0006] Furthermore, with devices of this type there are very often difficulties in positioning the element to be anchored in the concrete during production, as well as a certain difficulty in performing the correct engagement of said element on the part of the element which must perform the lifting action.

[0007] Lifting devices are also known (US-A-4 627 196) which have a plate to be anchored in the component except for one end, which is in any case kept within the volume occupied by the component by providing a recess in the body of the component at said end. This end of the plate is crossed by a hole in which it is possible to insert a curved latch accommodated in a toroidal seat formed in a handle partially insertable in said recess. The toroidal seat is interrupted by a radial notch in which the end of the plate is insertable in order to engage it by means of the latch.

[0008] These kinds of device are certainly more practical than the types previously described, but they have the drawback of transmitting the lifting force to a small portion of the plate, often deforming it, or compulsorily requiring the use of very thick plates. Deformations or breakages of the component may furthermore occur proximate to the most intensely stressed region of the plate.

[0009] Known lifting devices furthermore have no safety systems for preventing the lifting of the component if engagement of the element anchored in the concrete is defective.

[0010] The aim of the present invention is to solve the above described problems by providing a lifting device which is simple and practical to use, achieves a better distribution of the forces exchanged between the lifting element and the element anchored in the component, so as to safeguard the integrity of said component even if it has low strength.

[0011] Within the scope of this aim, an object of the present invention is to provide a lifting device which makes component engagement operations extremely simple and rapid.

[0012] Another object of the present invention is to provide a lifting device which offers adequate assurances of safety against accidental disengagement of the component during lifting.

[0013] A further object of the present invention is to provide a lifting device which can be manufactured at competitive costs with respect to known lifting devices.

[0014] This aim, these objects and others which will become apparent hereinafter are achieved by a device as claimed in claim 1.

[0015] Further characteristics and advantages of the present invention will become apparent from the description of a preferred but not exclusive embodiment of the lifting device according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is an exploded perspective view of the device according to the present invention, with the handle;

figure 2 is a sectional view of the portion of the component which is affected by the device, taken at right angles to the plane of arrangement of the plate;

figure 3 is a sectional view of the coupling between the handle and the plate, taken on a plane at right angles to the plane of arrangement of the plate and with the component omitted for the sake of greater clarity;

figure 4 is a lateral elevation view of the handle engaged with the plate;

figures 5 to 7 are views of the steps of the lifting of a component with the device according to the present invention;

figure 8 is a sectional view of a detail of figure 3, taken along the axis VIII-VIII;

figures 9 and 10 are respectively a front elevation view and a lateral elevation view of a different embodiment of the plate;

figures 11 and 12 are respectively a front elevation view and a lateral elevation view of another embodiment of the plate.

[0016] With reference to the above figures, the device according to the present invention, generally designated by the reference numeral 1, comprises a plate 2, to be embedded in a component 3 except for an end 4 which can be accommodated in a recess 5 appropriately formed in the component 3 and accessible from outside, and a lifting handle 6, insertable in the recess 5 and provided with engagement means coupleable to the end 4 of the plate 2.

[0017] The plate 2 is meant to be embedded in the component 3 during the manufacture of said component, and is placed so that it is arranged on a plane which is parallel to the lifting direction. For example, if the component is constituted by a panel, the plate 2 is placed at right angles to the two larger faces of the panel, proximate to one side of the panel in which the recess 5 is formed.

[0018] The plate 2 has an elongated shape and is preferably obtained by blanking from a steel sheet in a per se known manner.

[0019] The end 4 of the plate is wider than the remaining part of the plate body and blends with the remaining part by means of two inclined portions 7a and 7b. The remaining part of the plate body has an intermediate neck 8 along its width and a series of slots 9 which are elongated in the direction of the longitudinal extension of the plate and anchor the plate within the component 3. In the case of reinforced concrete components, the slots 9 are filled by the concrete during the casting of the component and may also be crossed by reinforcement rods of the component.

[0020] The handle 6 is substantially constituted by a metal block in which the side meant to be inserted in the recess 5 is rounded so as to facilitate its insertion. A notch 10, suitable to receive the end 4 of the plate 2, is formed in the portion of the handle 6 to be inserted in the recess 5.

[0021] A substantially cylindrical seat 11 is formed in the body of the handle 6, crosses the notch 10 at right angles and axially slideably accommodates a latch 12 which is also substantially cylindrical.

[0022] The latch 12 is movable longitudinally along the seat 11 to pass from a disengagement position, in which it is arranged outside the notch 10, to an engagement position, in which it crosses said notch 10 so as to engage a through hole 13 formed in the portion of the end 4 of the plate 2 to be inserted in the notch 10. The through hole 13 has an axis substantially perpendicular to the plane of arrangement of the plate 2 and can be aligned with the seat 11 by inserting the end 4 of the plate 2 in the notch 10.

[0023] Furthermore, the side of the plate to be directed toward the bottom 14 of the notch 10 is provided with two end protrusions, respectively 15 and 16, and with at least one intermediate protrusion 17, all of which form a supporting surface for the bottom 14 of the notch 10 and are mutually separated by depressions 18 engageable by raised portions 19 protruding from the bottom 14 of the notch 10. In practice, the particular shape of the end 4 of the plate 2 and of the bottom 14 of the notch 10 produces a coupling between the plate 2 and the handle 6 which limits relative movements between these two elements during lifting, so that the surface over which forces are exchanged between the handle and the plate, particularly during the first lifting step, is considerably larger than that of known lifting devices using a plate anchored in the component. In this manner, the extent of the local stresses to which the end 4 of the plate is subjected is modest, thus avoiding deformations of the plate which might cause cracks or breakages of the component and without requiring any oversizing of the thickness of the plate.

[0024] Conveniently, the ends of the protrusions 15, 16 and 17 are all arranged in a same plane which is substantially at right angles to the longitudinal extension of the plate, and the depressions 18 have a rounded bottom; the end of the raised portions 19 protruding from the bottom of the notch 10 of the handle 6 is also correspondingly rounded.

[0025] Figures 9 and 10 illustrate a different embodiment of the plate, now designated by the reference numeral 40, which, instead of providing for a fully planar extension of said plate, has, at the end of said plate which is opposite to the one which can engage the handle 6, a portion 41 which is folded so as to form a plane which is inclined with respect to the plane of arrangement of the remaining part of the plate 40. Preferably, the inclination angle of the portion 41 with respect to the remaining part of the plate is substantially 45^{o}. The same reference numerals have been maintained for the other elements of the plate 40 which correspond to the elements of the plate shown in the preceding figures.

[0026] Figures 11 and 12 illustrate another embodiment of the plate, now designated by the reference numeral 42, which has, starting from the end opposite to the end which can engage the handle 6, two portions 43 and 44 which are curved so as to form arcs with mutually opposite concavities. In this case, too, the other elements of the plate which correspond to the elements already described and illustrated with reference to the plate shown in figures 1 to 8 have been designated by the same reference numerals.

[0027] Again with reference to the plate 42 shown in figures 11 and 12, the intermediate protrusion 17 protrudes with respect to the plane of arrangement of the two end protrusions 15 and 16. In this case, the bottom 14 of the notch 10 of the handle is shaped correspondingly.

[0028] The portion of the handle 6 which remains outside the recess 5 is associated with a lifting ring 20 which, during the initial step of the lifting operation, is rotatable with respect to the handle 6 about an axis which is substantially parallel to the axis of the seat 11.

[0029] The latch 12 has, proximate to the end opposite to the end for insertion in the seat 11, an arm 21 which extends transversely to the axis of the seat 11

and is partially accommodated in a groove 22 formed in the body of the handle and connected to the seat 11.

[0030] More particularly, the groove 22 has a first portion 23 extending on a plane passing through the axis of the seat 11, and a second portion 24, containing the arm 21 when the latch 12 is in an engagement position and extending on a plane which is substantially perpendicular to the axis of the seat 11, so as to allow a rotation of the arm 21, and thus of the latch 12, in said plate at right angles to the axis of the seat 11 so as to trace an arc which is delimited by the extension of the second portion 24 of the groove 22. The rotation of the arm 21 in the portion 24 of the groove 22 causes the transfer of the latch 12 from a free position, in which the arm 21 is aligned with the first portion 23 of the groove 22 and thus allows axial sliding of the latch 12 along the seat 11, to an axial locking position, in which the arm 21 is angularly offset with respect to the first portion 23 within the second portion 24, so as to prevent axial sliding of the latch 12.

[0031] Advantageously, the lifting device according to the present invention is provided with first safety means which oppose the lifting of the handle if the latch 12 is shifted along the seat 11 with respect to the correct engagement position.

[0032] Said first safety means comprise an end portion 21a of the arm 21 which extends substantially parallel to the axis of the seat 11 beyond the region where the handle 6 is connected to the ring 20, so that the ring 20, during the initial lifting step, strikes the portion 21a if the latch 12 is not in the above described axial locking position. More particularly, when the latch 12 is in the axial locking position, or when the arm 21 is in the second portion 24 of the groove 22 and is angularly offset with respect to the first portion 23, the end portion 21a of the arm 21 is spaced from the ring 20 in the lifting direction, so that the ring 20 is rotatable with respect to the handle 6 without interfering with the end portion 21a. Vice versa, when the latch 12 is not in the axial locking position but is in any case in the second portion 24 of the groove 22, the ring 20, during the initial lifting step, strikes the end portion 21a, causing the partial rotation of the latch 12 so as to move said latch into the axial locking position. Finally, if the latch 12 is shifted longitudinally along the seat 11 with respect to the position for correct engagement with the plate 2, the ring 20 strikes the end portion 21a without causing the rotation of the latch 12, which is prevented by the fact that the arm 21 is not at the second portion 24 of the groove 22. In this case, contact of the ring 20 against the portion 21a of the arm 21 is detected by the operators, who interrupt the lifting operations.

[0033] Conveniently, in order to avoid the total extraction of the latch 12 from the seat 11 there are retention means constituted by a plate 25 fixed to the handle 6 and closing the end of the groove 22 which is directed outwards.

[0034] Conveniently, means are provided for retaining the latch 12 in the axial locking position. Said retention means comprise a ball 26 or another presser element which protrudes with an end portion from a passage 27 formed in one of the sides of the second portion 24 of the groove 22 in the position of the arm 21 corresponding to the axial locking position of the latch 12. The ball 26 is pressed by a spring 28 accommodated in the passage 27 against a seat 29 which is shaped correspondingly and is formed on the side of the arm 21 directed toward the passage 27.

[0035] The engagement of the ball 26 in the seat 29 indicates, by means of a clicking noise which can be perceived by whoever actuates the latch 12, that said latch has reached the correct axial locking position.

[0036] In addition to the above described safety means, the lifting device according to the present invention is provided with additional safety means acting on the latch 12 to move it or keep it in the axial locking position. Said additional safety means are constituted by a flattened region 30 which affects an axial portion of the lateral surface of the latch 12, which is arranged at the notch 10 and is directed toward the bottom 14 of said notch 10 when the latch 12 is in the correct engagement and axial locking position. The flattened region 30 is coupleable to a flat portion 13a of the profile of the through hole 13 which affects the portion of said hole directed toward the bottom 14 of the handle 6 which is coupled to the plate 2. The coupling of the flattened region 30 with the flat portion 13a of the through hole 13 prevents the occurrence, during lifting, of rotations or translatory movements of the latch 12. Furthermore, if the latch 12 is slightly rotated with respect to the correct axial locking position when lifting begins, the coupling of the flattened region 30 with the flat portion 13a automatically causes a partial rotation of the latch 12 about the axis of the seat 11, moving it into the correct axial locking position.

[0037] The lifting device according to the present invention furthermore comprises a disposable box-like body 31 which can be fitted around the end 4 of the plate 2 prior to the manufacture of the component 3 so as to form the recess 5. Said box-like body 31, having a bottom in which a passage 32 for the plate 2 is formed, is provided, on its side directed towards the outside of the component 3, with a lid 33 which is removed after manufacturing the component and can be reused. The box-like body 31 is fitted onto the plate 2 starting from the end which is opposite to the end 3 until its bottom engages the inclined portions 7a and 7b which blend the end 4 with the remaining part of the plate.

[0038] The operation of the device according to the present invention is as follows.

[0039] In order to lift a component 3 inside which the plate 2 has been arranged beforehand, as described, the handle 6 is inserted in the recess 5, after checking that the latch 12 is in a disengagement position, so that the end 4 of the plate 2 correctly enters the notch 10, moving the through hole 13 into alignment

with the seat 11. At this point the latch 12 is pushed manually, by acting on the arm 21 which protrudes from the recess 5, along the seat 11 so as to move it into the position for engagement with the through hole 13 and is then rotated about its own axis, moving the arm 21 inside the second portion 24 of the groove 22, so as to cause its axial locking.

[0040] In this manner the plate 2 is engaged with the handle 6 and the component 3 can be lifted.

[0041] If the latch 12 should accidentally rotate about its own axis prior to the beginning of the lifting operation, despite the retaining action performed by the ball 26 which engages the seat 29, the coupling of the flattened region 30 of the latch 12 with the flat portion 13a of the through hole 13, as well as the action of the ring 20 on the end portion 21a of the arm 21, returns the latch to the correct axial locking position.

[0042] In practice it has been observed that the lifting device according to the present invention fully achieves the intended aim and objects since, by obtaining a better distribution of the forces exchanged between the lifting handle and the plate anchored in the component, it allows to use thinner plates while nonetheless avoiding excessive deformations of said plates as well as cracks or damage to the component.

[0043] A further advantage of the device according to the present invention is that it offers adequate safety against lifting in the absence of correct engagement between the plate and the handle.

[0044] The device thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept; all the details may furthermore be replaced with other technically equivalent elements.

[0045] In practice, the materials employed, as well as the dimensions, may be any according to the requirements and the state of the art.

[0046] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Device for lifting prefabricated components, particularly made of concrete or the like, comprising a plate (2), arranged in a plane which is substantially parallel to the lifting direction, for embedding in a component except for an end (4) which can be accommodated in a recess (5) formed in said component and accessible from outside, and a lifting handle (6) which can be inserted in said recess (5) and is provided with engagement means which can be coupled to said end of the plate, wherein said handle (6) has, on its portion which can be inserted in said recess, a notch (10) for receiving said end of the plate, a seat (11) being formed in the body of said handle, said seat (11) intersecting said notch (10) substantially at right angles, a through hole (13) being formed in said end of the plate, having an axis which is substantially perpendicular to the plane of arrangement of the plate and being arrangeable in alignment with said seat by inserting said end of the plate in said notch, said end of the plate having, on a side thereof to be directed toward the bottom of said notch, two end protrusions (15, 16) and at least one intermediate protrusion (17) forming a support for the bottom of said notch and alternated with depressions (18) engageable by raised portions protruding from the bottom of said notch, wherein said seat slideably accommodates a latch (12), longitudinally movable along said seat from a disengagement position, in which it does not affect said notch, to an engagement position, in which it crosses said notch, characterized in that said depressions (18) have a rounded bottom and said raised portions (19) are shaped correspondingly, said protrusions (15, 16 17) each forming a supporting surface for the bottom of said notch of the handle during a lifting step wherein a torque in the plate occurs.

2. Device according to claim 1, characterized in that it comprises first safety means (21a) which oppose the lifting of said handle when said latch is shifted along said seat with respect to said engagement position.

3. Device according to claims 1 and 2, characterized in that a lifting ring (20) is associated with the portion of said handle (6) which is meant to remain outside said recess, said ring being rotatable with respect to said handle about an axis which is substantially parallel to the longitudinal axis of said seat.

4. Device according to one or more of the preceding claims, characterized in that said latch (12) has, proximate to the end opposite to the end for insertion in said seat (11), an arm (21) extending transversely with respect to the extension of said seat and partially accommodated in a groove (22) connected to said seat (11) and having a first portion (23), extending on a plane which passes through the axis of said seat, and a second portion (24), containing said arm when said latch is in said engagement position and extending on a plane which is substantially perpendicular to the axis of said seat for a rotation of said arm and of said latch about an arc which is delimited by the extension of said second portion of the groove for transferring said latch from a free position, in which said arm is aligned with said first portion of the groove, to an

axial locking position, in which said arm is in said second portion of the groove which is angularly offset with respect to said first portion, or vice versa.

5. Device according to one or more of the preceding claims, characterized in that said first safety means (21a) comprise an end portion of said arm of the latch which extends substantially parallel to the axis of said seat beyond the region for connecting said ring to said handle for an interference of said ring (20) with said arm which is directed so as to cause the transfer of said latch from said free position to said axial locking position when lifting begins.

6. Device according to one or more of the preceding claims, characterized in that said handle is provided with means (25,26,27,28) for retaining said latch in said axial locking position.

7. Device according to one or more of the preceding claims, characterized in that it comprises second safety means (30) acting on said latch for its transfer to, or retention in, said axial locking position.

8. Device according to one or more of the preceding claims, characterized in that said second safety means (30) comprise a flattened region which affects an axial portion of the lateral surface of said latch and is directed toward the bottom of said notch with said latch in said axial locking position, said flattened region being associable with a flat portion of the profile of said through hole which affects a portion of said through hole directed toward the bottom of said handle and coupled to said plate.

9. Device according to one or more of the preceding claims, characterized in that said handle (6) is provided with retention means which oppose the axial extraction of said latch from said seat.

10. Device according to one or more of the preceding claims, characterized in that the ends of said protrusions which are directed toward said handle are substantially coplanar and form a supporting surface, substantially perpendicular to the longitudinal extension of said plate, for the bottom of said notch of the handle.

11. Device according to one or more of the preceding claims, characterized in that said end of the plate is wider than the remaining part of the plate and is blended therewith by means of two inclined portions.

12. Device according to one or more of the preceding claims, characterized in that said plate has, in an intermediate region of its longitudinal extension, a neck (8) which narrows along its width.

13. Device according to one or more of the preceding claims, characterized in that said plate has through anchoring slots (9) on its part to be embedded in the concrete.

14. Device according to one or more of the preceding claims, characterized in that it comprises a disposable box-like body which can be fitted around said end of the plate prior to the manufacture of the component in order to form said recess.

15. Device according to one or more of the preceding claims, characterized in that said box-like body has, on its side directed toward the outside of the component, a lid which can be removed after manufacture of the component.

16. Device according to one or more of the preceding claims, characterized in that said plate has, at its end opposite to the end which can engage said handle, a portion which is folded so as to form a plane (41) which is inclined with respect to the plane of arrangement of the remaining part of said plate.

17. Device according to one or more of the preceding claims, characterized in that said plate has, starting from its end opposite to the end which can engage said handle, two portions (43,44) which are folded so as to form arcs with mutually opposite concavities.

18. Device according to one or more of the preceding claims, characterized in that the intermediate protrusion of said protrusions of the end of the plate meant to engage said handle protrudes with respect to the plane of arrangement of said two end protrusions.

Patentansprüche

1. Vorrichtung zum Heben von vorgefertigten Gegenständen, insbesondere aus Beton oder dergl., mit einer Platte (2), die in einer Ebene angeordnet ist, die im wesentlichen parallel zur Heberichtung ist, und zum Einbetten in einen Gegenstand mit Ausnahme eines Endes (4) ausgebildet ist, welches in einer Ausnehmung (5) aufgenommen ist, welche in dem Gegenstand ausgebildet und von der Außenseite zugänglich ist, und mit einem Hebegriff (6), der in die Ausnehmung (5) eingeführt werden kann und mit Eingriffsmitteln versehen ist, welche mit dem Ende der Platte gekuppelt werden können, wobei der Griff (6) auf seinem in die Ausnehmung einführbaren Bereich eine Nut (10) zur Aufnahme des Endes der Platte aufweist, wobei ein Sitz (11)

im Körper des Griffes ausgebildet ist, wobei der Sitz (11) die Nut (10) im wesentlichen unter rechten Winkeln durchkreuzt, wobei eine Durchbohrung (13) in dem Ende der Platte ausgebildet ist, die eine Achse aufweist, die im wesentlichen rechtwinklig zur Ebene der Anordnung der Platte ist und in Ausrichtung mit dem Sitz durch Einführung des Endes der Platte in die Nut anordbar ist, wobei das Ende der Platte auf einer Seite derselben, die gegen den Boden der Nut gerichtet ist, zwei Endvorsprünge (15,16) und wenigstens einen mittleren Vorsprung (17) aufweist, welche eine Stütze für den Boden der Nut bilden und abwechselnd mit Einsenkungen (18) versehen ist, die von erhabenen von dem Boden der Nut vorstehenden Bereiche in Eingriff bringbar sind, wobei der Sitz verschiebbar eine Rastnase (12) aufnimmt, die in Längsrichtung entlang des Sitzes bewegbar ist von einer Außereingriffsposition, in welcher sie die Nut nicht beeinflußt, in eine Ineingriffsposition, in welcher sie die Nut kreuzt,
dadurch gekennzeichnet,
dass die Einwölbungen (18) einen runden Boden aufweisen und daß die herausragenden Bereiche (19) entsprechend geformt sind, wobei die Vorsprünge (15,16,17) je eine Tragfläche ausbilden für den Boden der genannten Nut des Griffes während eines Hubschrittes, wobei eine Zunge in der Platte vorkommt.

2. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet
daß sie erste Sicherheitsmittel (21a) aufweist, welche dem Anheben des Griffes entgegenwirken, wenn die Rastnase entlang des Sitzes in bezug auf die Eingriffsposition verschoben wird.

3. Vorrichtung nach Anspruch 1 oder 2,
dadurch gekennzeichnet,
daß ein Hebering (20) mit dem Bereich des Griffes (6) verbunden ist, der bestimmt ist, um außerhalb der Ausnehmung zu verbleiben, wobei der Ring in bezug auf den Griff um eine Achse drehbar ist, die im wesentlichen parallel zur Längsachse des Sitzes ist.

4. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß die Rastnase (12) benachbart zu dem Ende gegenüberliegend zu dem Ende für die Einführung in dem Sitz (11) einen Arm (21) aufweist, der sich transversal in bezug auf die Ausdehnung des Sitzes erstreckt und bereichsweise in einer Ausnehmung (22) aufgenommen ist, welche mit dem Sitz (11) verbunden ist, und einen ersten Bereich (23), der sich auf einer Ebene erstreckt, die durch die Achse des Sitzes hindurchtritt, und einen zweiten Bereich (24) aufweist, der den Arm enthält, wenn sich die Rastnase in der Eingriffsposition erstreckt, und sich auf einer Ebene erstreckt, die im wesentlichen rechtwinklig zur Achse des Sitzes für eine Drehung des Armes und der Rastnase um einen Bogen ist, welcher durch die Erstreckung des zweiten Bereiches der Ausnehmung zur Übertragung der Rastnase von einer freien Position, in welcher der Arm in Ausrichtung mit dem ersten Bereich der Ausnehmung ist, zu einer axialen Verschlußposition begrenzt ist, in welcher der Arm sich im zweiten Bereich der Ausnehmung befindet, welcher winkelförmig gekrümmt in bezug auf den ersten Bereich oder umgekehrt ist.

5. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß die ersten Sicherheitsmittel (21a) einen Endbereich des Armes der Rastnase aufweisen, welcher sich im wesentlichen parallel zur Achse des Sitzes außerhalb des Bereiches zur Verbindung des Ringes mit dem Griff für eine Interferenz des Ringes (20) mit dem Arm erstreckt, welcher so gerichtet ist, um die Übertragung der Rastnase von der freien Position zu der axialen Verschlußposition zu verursachen, wenn das Anheben beginnt.

6. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß der Griff mit Mitteln (25,26,27,28) zum Halten der Rastnase in der axialen Verschlußposition versehen ist.

7. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß sie zweite Sicherheitsmittel (30) aufweist, die auf die Rastnase für deren Übertragung oder Festhaltung in ihrer axialen Verschlußposition wirken.

8. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß die zweiten Sicherheitsmittel (30) einen abgeflachten Bereich aufweisen, welcher auf einen axialen Bereich der seitlichen Oberfläche der Rastnase einwirkt und gegen den Boden der Nut gerichtet ist, wenn sich die Rastnase in der axialen Verschlußposition befindet, wobei der abgeflachte Bereich mit einem flachen Bereich des Profiles der Durchbohrung verbindbar ist, welcher einen Bereich der Durchbohrung beaufschlagt, der gegen den Boden des Griffes gerichtet ist und mit der Platte gekuppelt ist.

9. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,

dadurch gekennzeichnet,
daß der Griff (6) mit Rückhaltemitteln versehen ist, welche einem axialen Herausziehen der Rastnase aus dem Sitz entgegenwirken.

10. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß die Enden der Vorsprünge, die gegen den Griff gerichtet sind, im wesentlichen koplanar sind und eine im wesentlichen rechtwinklig zur Erstreckung der Platte befindliche Stützoberfläche für den Boden der Nut des Griffes bilden.

11. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß das Ende der Platte breiter ist als der verbleibende Teil der Platte und mit dieser durch zwei geneigte Bereiche verbunden ist.

12. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß die Platte in einem Zwischenbereich ihrer Längserstreckung einen Hals (8) aufweist, welcher sich entlang seiner Breite verjüngt.

13. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß die Platte durchgehende Ankerschlitze (9) auf ihrem in den Beton einzubettenden Teil aufweist.

14. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß sie einen entfernbaren kastenartigen Körper aufweist, welcher um das Ende der Platte vor der Herstellung des Gegenstandes eingepaßt werden kann, um die Ausnehmung zu bilden.

15. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß der kastenartige Körper auf seiner gegen die Außenseite des Gegenstandes gerichteten Seite einen Deckel aufweist, der nach der Herstellung des Gegenstandes entfernt werden kann.

16. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß die Platte auf ihrem Ende gegenüberliegend zu dem in den Griff einführbaren Ende einen Bereich aufweist, der gefaltet ist, um eine Ebene (41) zu bilden, welche in bezug auf die Ebene zur Anordnung des verbleibenden Teiles der Platte geneigt ist.

17. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß die Platte ausgehend von ihrem Ende gegenüberliegend zu dem in den Griff einführbaren Ende zwei Bereiche (43,44) aufweist, welche gefaltet sind, um Bögen mit gegenseitig entgegengesetzten Konkavitäten zu bilden.

18. Vorrichtung nach einem oder mehreren der vorangehenden Ansprüche,
dadurch gekennzeichnet,
daß der mittlere Vorsprung der Vorsprünge des Endes der Platte, welches zum Eingreifen in den Griff bestimmt ist, in bezug auf die Ebene der Anordnung der beiden Endvorsprünge hervorsteht.

Revendications

1. Dispositif pour soulever des éléments préfabriqués, réalisés en particulier en béton ou analogue, comprenant une plaque (2), agencée dans un plan qui est sensiblement parallèle à la direction de levage, pour être noyée dans un élément à l'exception d'une extrémité (4) qui peut être logée dans un évidement (5) formé dans ledit élément et accessible de l'extérieur, et une poignée de levage (6) qui peut être insérée dans ledit évidement (5) et est munie de moyens d'engagement qui peuvent être couplés à ladite extrémité de la plaque, dans lequel ladite poignée (6) présente, sur sa partie qui peut être insérée dans ledit évidement, une encoche (10) pour recevoir ladite extrémité de la plaque, un siège (11) étant formé dans le corps de ladite poignée, ledit siège (11) coupant ladite encoche (10) sensiblement à angle droit, un trou traversant (13) étant formé dans ladite extrémité de la plaque, ayant un axe sensiblement perpendiculaire au plan d'agencement de la plaque et pouvant être agencé en alignement avec ledit siège en insérant ladite extrémité de la plaque dans ladite encoche, ladite extrémité de la plaque ayant sur un côté de celle-ci devant être dirigé vers le fond de ladite encoche deux saillies d'extrémité (15,16) et au moins une saillie intermédiaire (17) formant un support pour le fond de ladite encoche et étant alternées avec des dépressions (18) pouvant être engagées par des parties surélevées faisant saillie du fond de ladite encoche, dans lequel ledit siège reçoit de façon coulissante un verrou (12) longitudinalement déplaçable le long dudit siège à partir d'une position de désengagement, dans laquelle il n'affecte pas ladite encoche, vers une position d'engagement dans laquelle il croise ladite encoche, caractérisé en ce que lesdites dépressions (18) présentent un fond arrondi et lesdites parties surélevées (19) sont conformées de façon correspondante, lesdites saillies (15, 16, 17) formant chacune une surface

de support pour le fond de ladite encoche de la poignée (6) pendant une étape de levage pendant laquelle un couple se produit dans la plaque.

2. Dispositif selon la revendication 1, caractérisé en ce qu'il comprend des premiers moyens de sécurité (21a) qui s'opposent au levage de ladite poignée quand ledit verrou est déplacé le long dudit siège par rapport à ladite position d'engagement.

3. Dispositif selon les revendications 1 et 2, caractérisé en ce qu'un anneau de levage (20) est associé à la partie de ladite poignée (6) qui est destinée à demeurer à l'extérieur dudit évidement, ledit anneau pouvant tourner par rapport à ladite poignée autour d'un axe qui est sensiblement parallèle à l'axe longitudinal dudit siège.

4. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que ledit verrou (12) présente, à proximité de l'extrémité opposée à l'extrémité pour l'insertion dans ledit siège (11), un bras (21) s'étendant transversalement par rapport à l'extension dudit siège et logé partiellement dans une rainure (22) reliée audit siège (11) et ayant une première partie (23), s'étendant dans un plan qui passe par l'axe dudit siège, et une seconde partie (24), contenant ledit bras quand ledit verrou est dans ladite position d'engagement et s'étendant dans un plan qui est sensiblement perpendiculaire à l'axe dudit siège pour une rotation dudit bras et dudit verrou autour d'un arc qui est délimité par l'extension de ladite seconde partie de la rainure pour transférer ledit verrou d'une position libre, dans laquelle ledit bras est aligné avec ladite première partie de la rainure, dans une position de verrouillage axiale dans laquelle ledit bras est dans ladite seconde partie de la rainure qui est angulairement décalée par rapport à ladite première partie, ou inversement.

5. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que lesdits premiers moyens de sécurité (21a) comprennent une partie d'extrémité dudit bras du verrou qui s'étend sensiblement parallèlement à l'axe dudit siège au-delà de la région pour relier ledit anneau à ladite poignée pour une interférence dudit anneau (20) avec ledit bras qui est dirigé de façon à provoquer le transfert dudit verrou de ladite position libre vers ladite position de verrouillage axiale quand le levage commence.

6. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que ladite poignée est munie de moyens (25, 26, 27, 28) pour retenir ledit verrou dans ladite position de verrouillage axiale.

7. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce qu'il comprend des seconds moyens de sécurité (30) agissant sur ledit verrou pour son transfert dans ladite position de verrouillage axiale ou sa retenue dans celle-ci.

8. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que lesdits seconds moyens de sécurité (30) comprennent une région aplatie qui affecte une partie axiale de la surface latérale dudit verrou et est dirigée vers le fond de ladite encoche quand ledit verrou est dans ladite position de verrouillage axiale, ladite région aplatie pouvant être associée à une partie plate du profil dudit trou traversant qui affecte une partie dudit trou traversant dirigée vers le fond de ladite poignée et couplée à ladite plaque.

9. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que ladite poignée (6) est munie de moyens de maintien qui s'opposent à l'extraction axiale dudit verrou dudit siège.

10. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que les extrémités desdites saillies qui sont dirigées vers ladite poignée sont sensiblement coplanaires et forment une surface de support, sensiblement perpendiculaire à l'extension longitudinale de ladite plaque, pour le fond de ladite encoche de la poignée.

11. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que ladite extrémité de la plaque est plus large que la partie restante de la plaque et est reliée à celle-ci au moyen de deux portions inclinées.

12. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que ladite plaque présente, dans une région intermédiaire de son extension longitudinale, un col (8) qui diminue sa largeur.

13. Dispositif selon une ou plusieurs des revendications précédentes, caractérisé en ce que ladite plaque présente des fentes d'ancrage traversantes (9) sur la partie devant être noyée dans le béton.

14. Dispositif selon une ou plusieurs des revendications précédentes,

caractérisé en ce qu'il comprend un corps du type boîtier jetable qui peut être adapté autour de ladite extrémité de la plaque avant la fabrication de l'élément de façon à former ledit évidement.

15. Dispositif selon une ou plusieurs des revendications précédentes,
caractérisé en ce que ledit corps du type boîtier présente, sur son côté dirigé vers l'extérieur de l'élément, un couvercle qui peut être retiré après fabrication de l'élément.

16. Dispositif selon une ou plusieurs des revendications précédentes,
caractérisé en ce que ladite plaque présente, à son extrémité opposée à l'extrémité qui peut engager ladite poignée, une partie qui est pliée de façon à former un plan (41) qui est incliné par rapport au plan d'agencement de la partie restante de ladite plaque.

17. Dispositif selon une ou plusieurs des revendications précédentes,
caractérisé en ce que ladite plaque présente, en partant de son extrémité opposée à l'extrémité qui peut engager ladite poignée, deux parties (43, 44) qui sont pliées de façon à former des arcs ayant des concavités mutuellement opposées.

18. Dispositif selon une ou plusieurs des revendications précédentes,
caractérisé en ce que la saillie intermédiaire desdites saillies de l'extrémité de la plaque destinée à engager ladite poignée fait saillie par rapport au plan d'agencement desdites deux saillies d'extrémité.

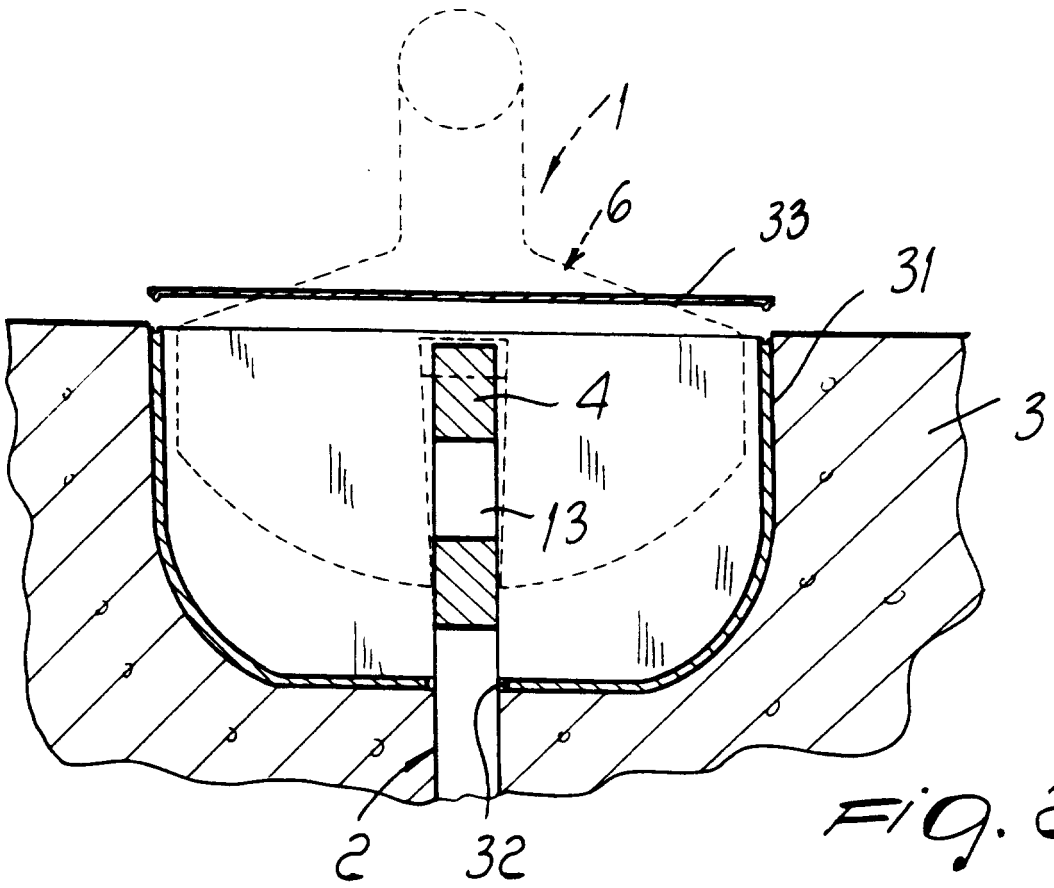
1
6
33
31
4
3
13
2
32

Fig. 2

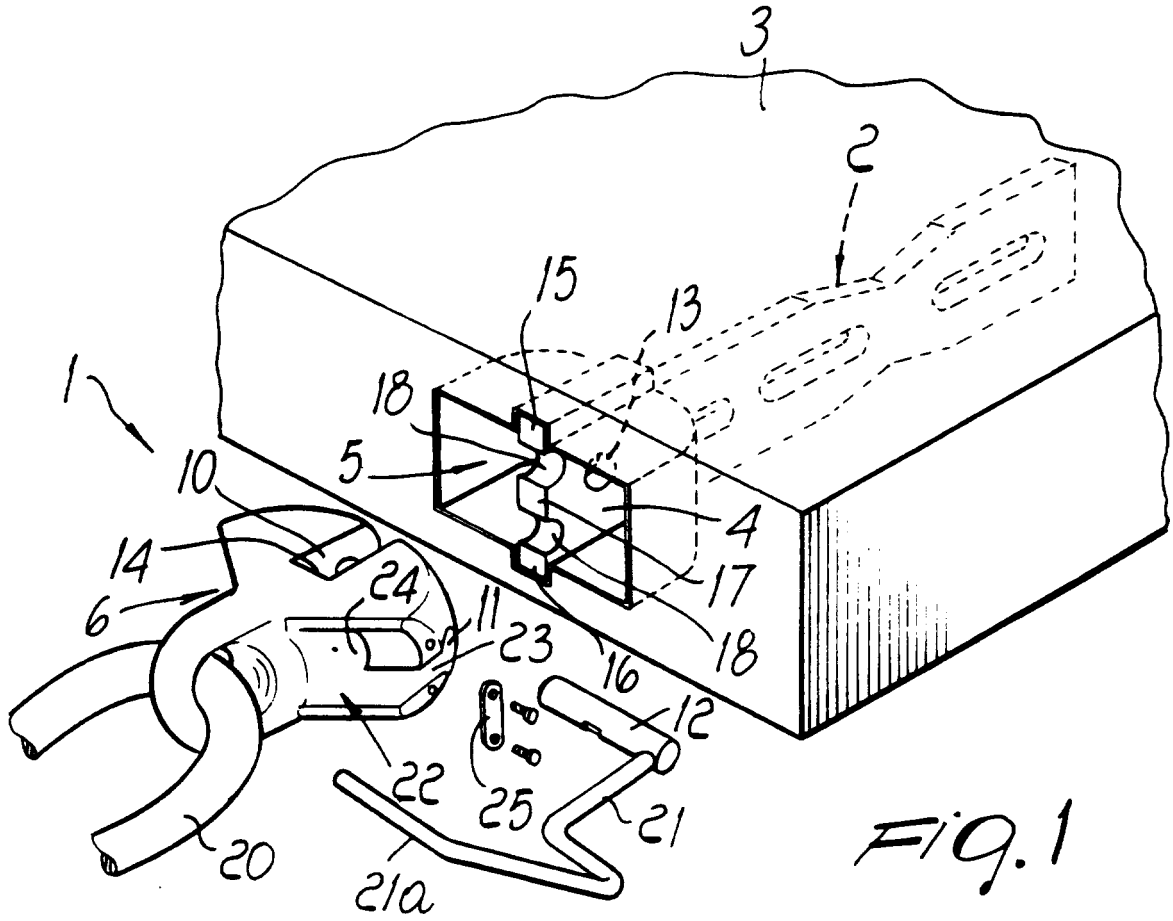
3
2
15
13
1
18
10
5
4
14
17
6
24
11
23
18
16
12
22
25
21
20
21a

Fig. 1

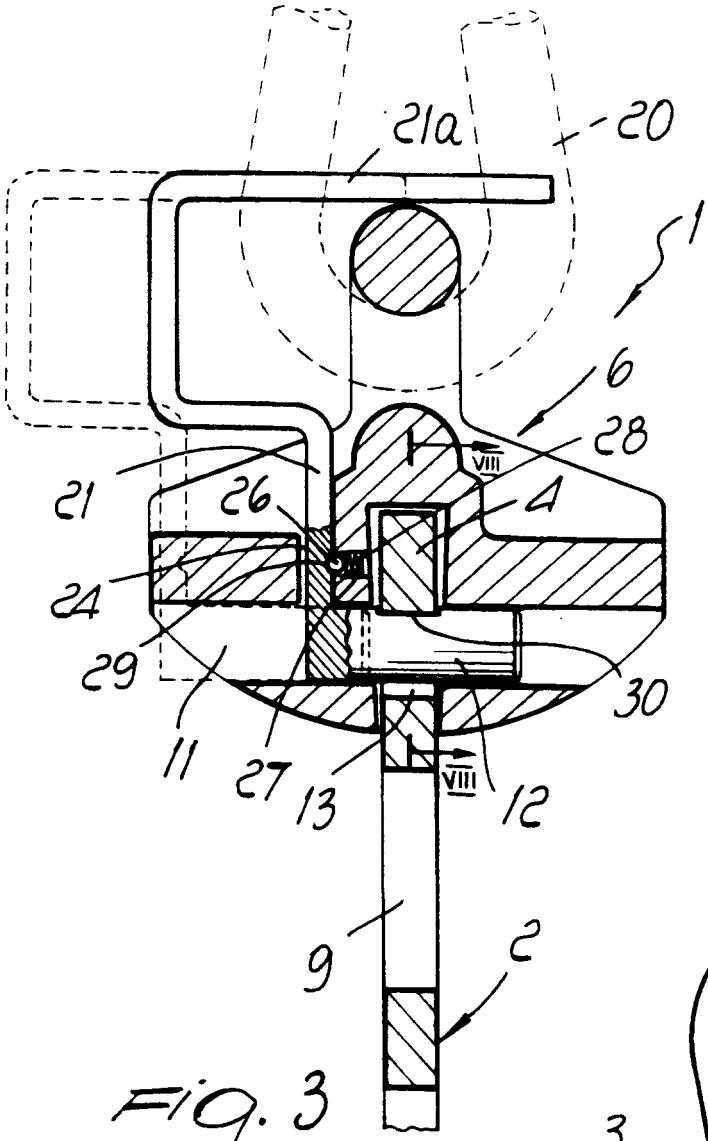

Fig. 3

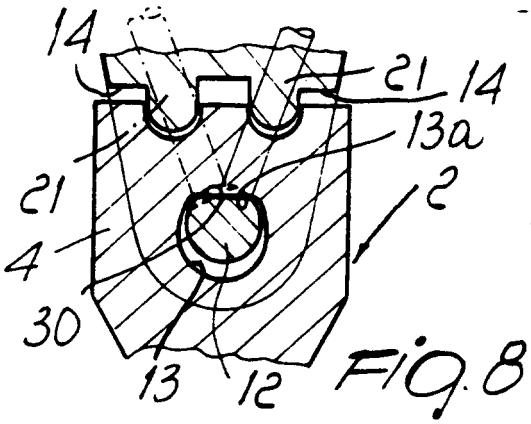

Fig. 8

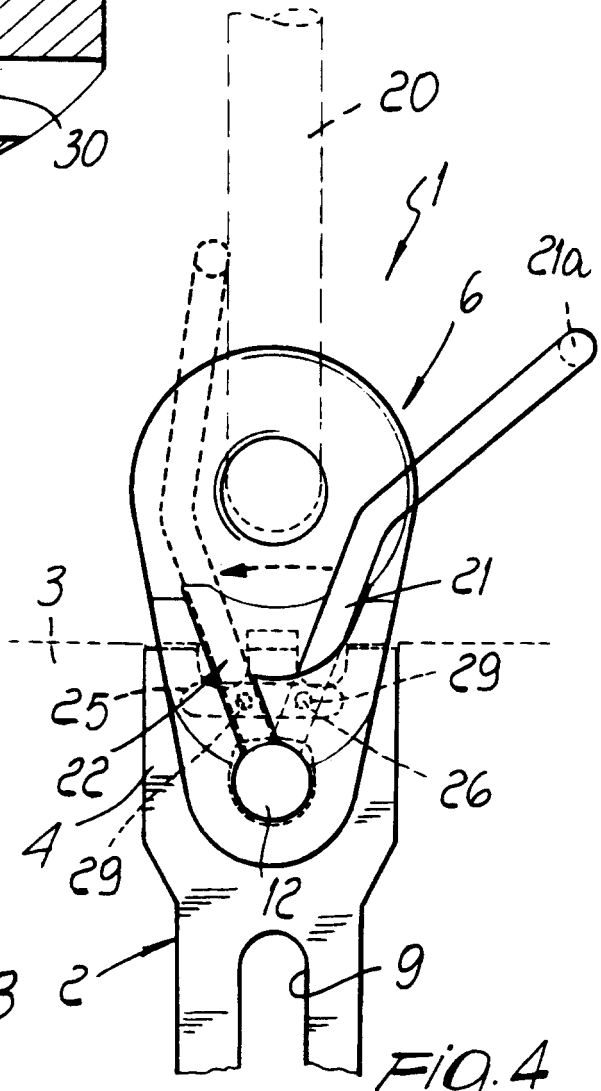

Fig. 4

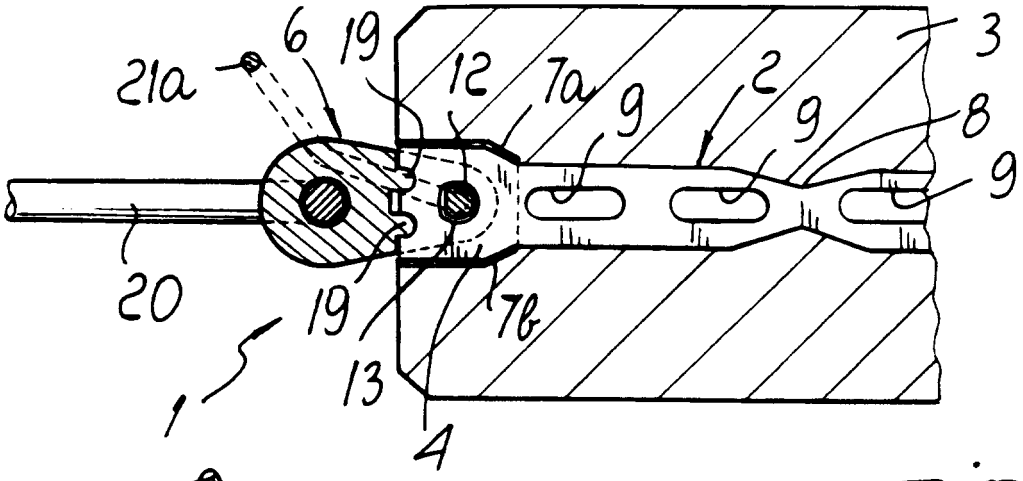

FIG. 5

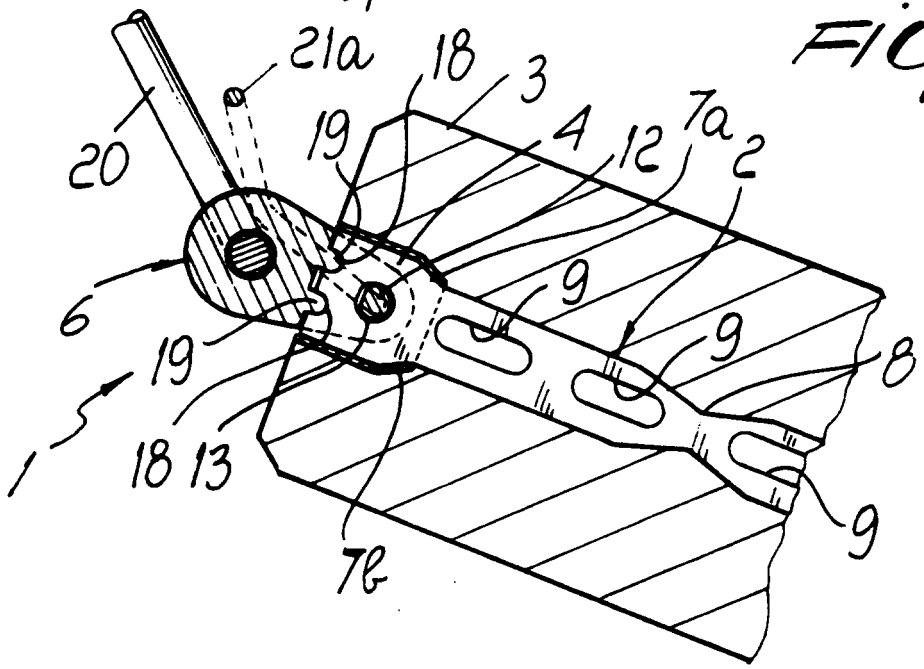

FIG. 6

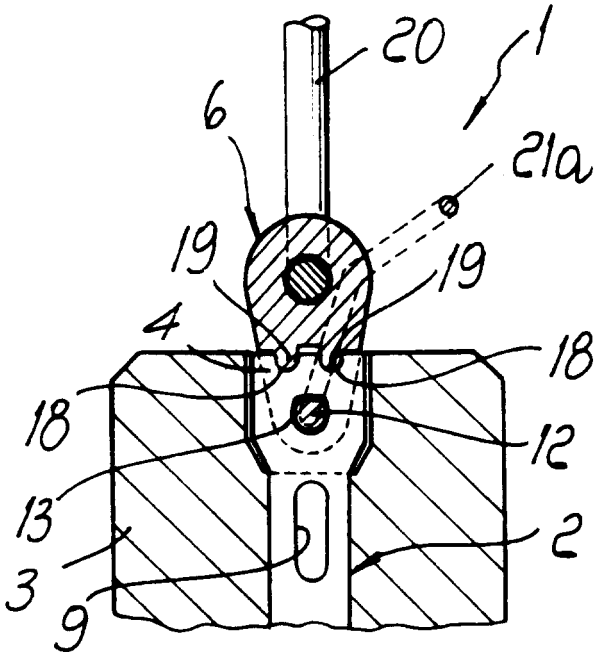

FIG. 7

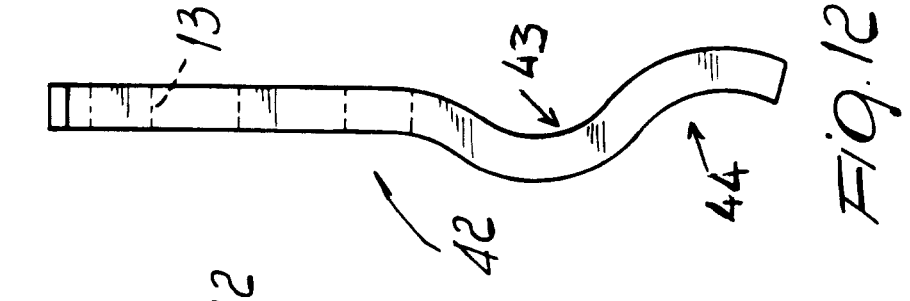

Fig.12

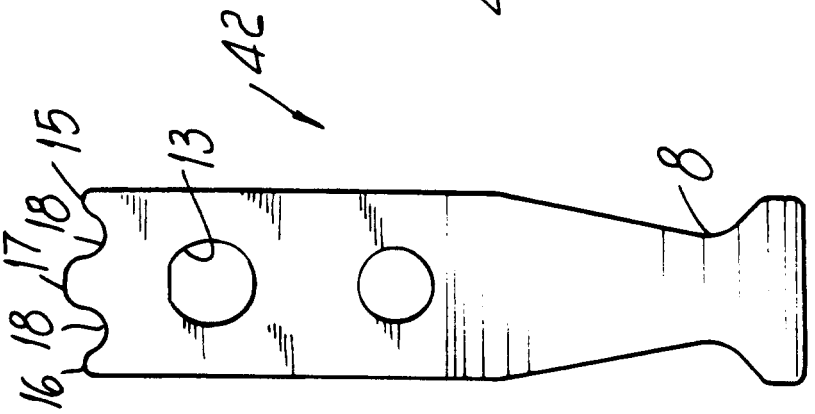

Fig.11

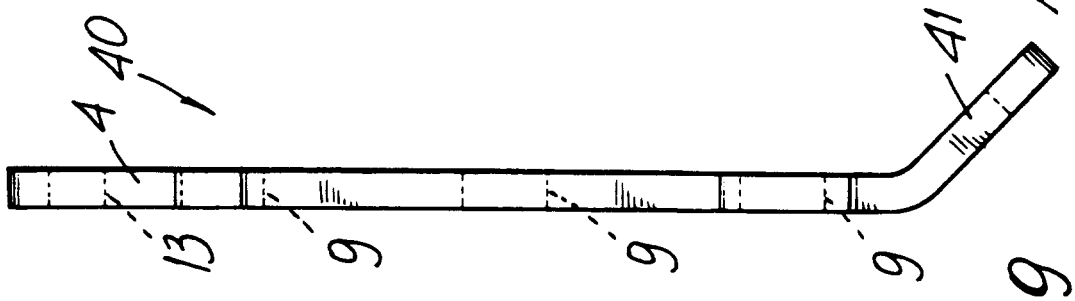

Fig.10

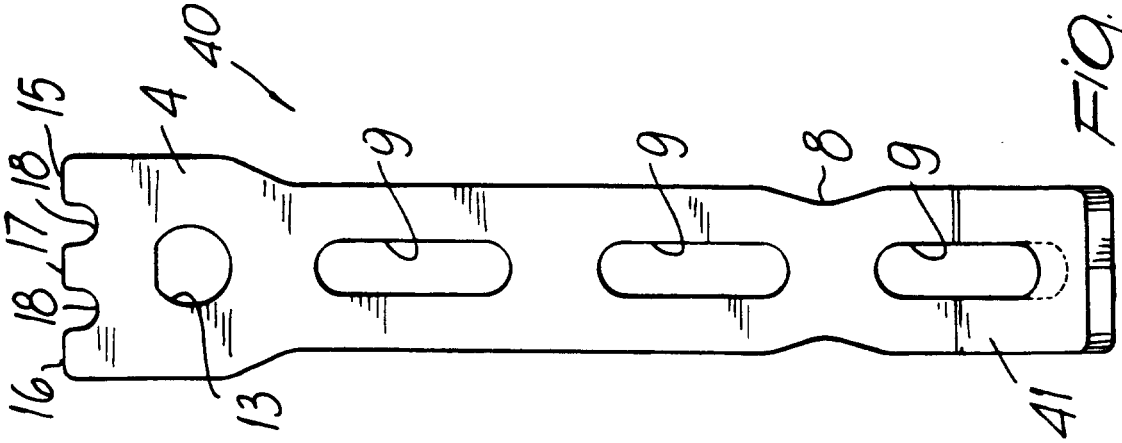

Fig.9