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(54) **A device for removing and/or applying fixing hooks**

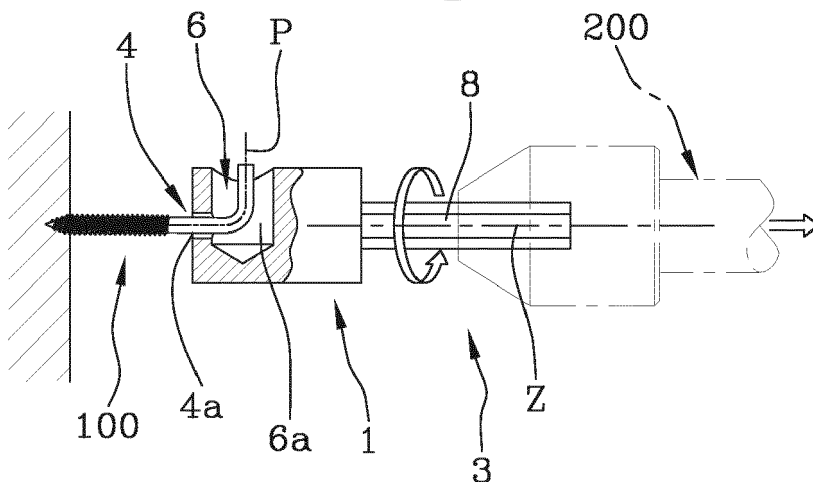
(57) Described is a device (1) for removing and/or applying fixing hooks (100) comprising:

- a main body (2), designed for holding at least one fixing hook (100) during an application or removal of the fixing hook (100);
- gripping means (3) for allowing the movement of the main body (2) according to a movement for removing and/or applying the fixing hook (100).

The device (1) for removing and/or applying fixing

hooks (100) is characterised in that the main body (2) has a front hole (4) positioned on the front surface (5) and a lateral hole (6) positioned on the lateral surface (7); moreover, the above-mentioned holes (4, 6) communicate with each other inside the main body (2) for forming a continuous path ("P") for inserting a portion of the fixing hook (100) through the front hole (4) and the lateral hole (6).

Fig.4B



Description

[0001] This invention relates to a device for removing and/or applying fixing hooks.

[0002] More specifically, this invention relates to a device for removing (both by pulling and by unscrewing) and applying (by screwing) fixing hooks of the L-shaped type, more generally speaking an "open" hook, threaded or threaded, from surfaces or walls on which the hooks are applied. The device according to this invention is therefore preferably reversible.

[0003] More in detail, the above-mentioned hooks are generally used for fixing on different supports, such as: wooden elements, concrete masonry, reinforced concrete prefabricated elements, walls made of plastic resins and the like, with or without suitable supporting plugs.

[0004] The fixing hooks described above are generally used for fastening any type of object which requires a support, such as a cable or an anchoring chain, or for suspending objects, such as a safety connection to prevent the tipping of shelving or, more generally, for hanging pictures, posters, wall cupboards, mirrors, shelves, electrical control panels or display units of various types.

[0005] Traditional pliers (operated by hand) are used in the prior art to remove the above-mentioned hooks from a wall, or sometimes, when the situation allows it, the hooks may be removed directly by gripping them with the fingers and pulling and/or unscrewing them.

[0006] Similarly, in the prior art, these operations are performed in the case of applying the hooks on a wall, after preparing a guide hole in the surface, when required.

[0007] The tools and the techniques described above have obvious drawbacks. One drawback is the time taken to perform the operation for applying and/or removing (for example by screwing or unscrewing) the hooks.

[0008] In effect, the use of the pliers requires, for each half turn, releasing the grip to return to a natural position of the hand so as to perform a successive half turn, and so on, and this procedure implies that upon releasing the pliers the gripping action on the hook is inevitably lost, with obvious complications and inconvenience in use.

[0009] In addition, if the above-mentioned operation must be repeated for a plurality of fixing elements by the user, the negative effect of the procedure is amplified considerably.

[0010] Another drawback in the use of the pliers is linked to the performance screwing of the above-mentioned hooks on a wall or surface. The force needed for the operator to stably grip the hook with the pliers adversely affects the capacity of the operator provide an adequate pushing action and an adequate twisting during the screwing, considering that, in particular in the event of sudden releasing of the clamping force, there is the risk of injury for the operator.

[0011] Any imprecisions in the screwing linked with the above-mentioned difficulty can adversely affect the secure fixing of the hook which is not adequately anchored to the supporting surface, thereby also creating problems

for safety of use.

[0012] In this context, the technical purpose of this invention is to provide a device for removing and/or applying fixing hooks which is free of the above-mentioned drawbacks.

[0013] More specifically, the aim of this invention is to provide a device for removing and/or applying fixing hooks which allows fixing hooks to be removed from walls or surfaces in a shorter time and in a simple and safe manner for the operator.

[0014] In addition, the aim of this invention is to provide a device for removing and/or applying fixing hooks which guarantees an adequate work safety for the operator during application of the hooks to a wall or surface.

[0015] These and other aims are substantially achieved by a device for removing and/or applying fixing hooks as described in one or more of the appended claims.

[0016] Further features and advantages are more apparent in the detailed description which follows of a preferred non-limiting embodiment of a device for removing and/or applying fixing hooks according to this invention.

[0017] The description is provided below with reference to the accompanying drawings, which are also non-limiting and provided by way of example only, in which:

- Figure 1 is a perspective view of a device for removing and/or applying fixing hooks according to this invention in a first embodiment of it;
- Figure 2 is a perspective view of a device for removing and/or applying fixing hooks according to this invention in a second embodiment of it;
- Figure 3 is a perspective view of a device for removing and/or applying fixing hooks according to this invention in a third embodiment of it;
- Figures 4A-4D illustrate a sequence of operating steps performed during use of a device according to an embodiment of this invention during the removal of a fixing hook;
- Figure 5A is a side view partly in cross section of the device of Figure 1;
- Figure 5B is a side view partly in cross section of a device for removing and/or applying fixing hooks according to a different embodiment relative to the preceding figure;
- Figure 5C is a side view partly in cross section to better illustrate the details of a device for removing and/or applying fixing hooks according to another and different embodiment relative to the preceding figures;
- Figure 6 is a perspective view of a step of a condition of use of a device for removing and/or applying fixing hooks according to this invention;

[0018] With reference to the accompanying drawings, the numeral 1 denotes in its entirety a device for removing and/or applying fixing hooks 100 according to this invention.

[0019] Preferably, the term "fixing hooks" 100 comprises all those hardware articles or articles used in the mechanical field which have a partly threaded rod and a shaped end along a path positioned in a non-symmetrical manner relative to the axis of the rod. Alternatively, instead of the thread, the rod may have other means for connecting to a surface.

[0020] In other words, the fixing hooks 100 are generally a straight rod threaded at least partly and another stretch which in one case can have a straight shape perpendicular to the rod, or can be a stretch consisting of a succession of segments set at an angle to one another until the last of these is perpendicular to the rod, or it can comprise a curved portion which connects between the portion of threaded rod and the straight retaining stretch.

[0021] It is evident that the above-mentioned category of fixing hooks does not comprise all those fixing elements which have a symmetrical shape along the axis of the threaded rod which is also the axis along which the elements are screwed and/or unscrewed. For example, screws with hexagonal heads, screws with straight or cross-head heads, screws with hexagonal slots, ring hooks or closed rings such as eye bolts, and so on. The device 1 allows the removal of fixing hooks 100 and also the application of fixing hooks from/on a surface; in other words, the device 1 lends itself to a reversible use.

[0022] According to a preferred embodiment of the invention, the device 1 for removing and/or applying the fixing hooks 100 comprises:

- a main body 2 designed for holding at least one fixing hook 100 during a step of applying or removing the fixing hook;
- gripping means 3 for allowing the movement of the above-mentioned main body 2 according to a movement for removing and/or applying the fixing hook 100.

[0023] The main body 2 is cylindrical in shape with a circular cross section. The cross section of the main body 2 may, however, comprise other shapes for further and different embodiments of the device 1, not illustrated below (for example, prismatic, spherical or others).

[0024] The main body 2 has a front hole 4 positioned on a front surface 5 of the main body 2, and a lateral hole 6 positioned on a lateral surface 7 of the main body 2. Preferably, as it is possible to infer from Figure 1, the corners present between the front surface 5 and the lateral surface 7 are rounded in such a way as to form a narrowing section of the main body 2 from the lateral surface 7 towards the front surface 5. In that way, it is easier to insert the fixing hook 100 through the front hole 4 especially when the fixing hook 100 is already partly screwed on a wall. Alternatively, the front surface 5 might be curved towards the lateral surface 7 of the main body 2 in such a way as to form a sort of dome.

[0025] The front hole 4 extends about a first axis "X" in such a way as to have a substantially cylindrical lateral

wall 4a. Preferably, the first axis "X" is perpendicular to the front surface 4.

[0026] Similarly, the lateral hole 6 extends about a second axis "Y" in such a way as to have a respective lateral wall 6a.

[0027] Preferably, the above-mentioned first axis "X" and second axis "Y" are incident with each other, preferably they are perpendicular.

[0028] Preferably, the lateral walls 4a, 6a of the front hole 4 and of the lateral hole 6, respectively, have respective cross sections transversal to the axes "X" and "Y" delimited by closed lines.

[0029] Preferably, the above-mentioned closed lines are circular in shape (as illustrated in the attached Figure 1). There are, however, other possible embodiments, such as to give rise to further and different embodiments of the device 1 according to the invention. In the embodiment of Figure 2, for example, the lateral hole 6 has a cross section with an elongate shape along the first axis "X"; in other words, the hole 6 is of the slot type. Preferably, the front hole 4 and the lateral hole 6 have a different diameter; preferably, the diameter of the lateral hole 6 is greater than the diameter of the front hole 4, as shown in detail in the attached Figure 5A.

[0030] Preferably, the diameter of the lateral hole 6 is between 5 and 15 mm and the diameter of the front hole 4 is between 3 and 20 mm.

[0031] In a different embodiment of the device 1, illustrated in the attached Figure 5B, the lateral hole 6 of the main body 2 extends around the second axis "Y" with walls which define a frustoconical geometrical shape, with the apex of the cone facing towards the first axis "X". In other words, the lateral hole 6 is flared in such a way as to increase the relative diameter starting from the first axis "X" towards the outside of the main body 2.

[0032] In another embodiment of the device 1, illustrated in the attached Figure 5C, the lateral hole 6 passes through the main body 2 in such a way as to join the opposite ends of the lateral surface 7.

[0033] In the embodiment with lateral hole 6 passing through, the hole may have a constant circular cross section (Figure 5C) or, according to an embodiment not illustrated, defined by two truncated cone portions of the type shown in Figure 5B.

[0034] Advantageously, the front hole 4 and the lateral hole 6 are in communication with each other inside the main body 2 of the device 1.

[0035] In other words, the lateral hole 6 is elongate in the direction of the front hole 4 in order to make a passage with the above-mentioned front hole 4 for housing a fixing hook 100.

[0036] Advantageously, the above-mentioned passage, from the front hole 4 to the lateral hole 6 and/or vice versa, defines a continuous path "P" for inserting the hook 100 in the device 1, which coincides for a portion with the above-mentioned axes "X" and "Y".

[0037] Advantageously, the continuous insertion path "P" allows the user using the device 1 to perform a fast

and intuitive housing or extraction of the hook 100.

[0038] Advantageously, the lateral hole 6 elongate towards the front hole 4 allows the introduction of the implicit feature of locking the rotation of the fixing hook 100 by means of the lateral wall 6a (with a closed shape) of the lateral hole 6.

[0039] The axes "X" and "Y" of the front hole 4 and of the lateral hole 6 are incident with each other: this geometrical condition prevents the rotation along a hole and the transversal movement of a rigid element such as the hook 100 which is inserted simultaneously in both the holes 4, 6 of the device 1.

[0040] The device 1 also has gripping means 3, such as to allow the main body 2 to be adequately moved during use.

[0041] In an embodiment, illustrated in figure 1, the gripping means 3 comprise a rod 8 with the shape of a hexagonal prism (also called "male" rod) extending from the main body 2 along the first axis "X" in a direction opposite to that on which the front surface 5 lies.

[0042] Advantageously, the hexagonal shape of the rod 8 allows its insertion and clamping in an electric screwdriver 200 or an electric drill, or the coupling with a manual screwdriver having a receiving recess with a hexagonal shape. Alternatively, the rod 8 is at least partly threaded in such a way as to be able to couple, by screwing, with a reverse-threaded body forming part of an electric screwdriver 200 or screwdriver or other device suitable for the rotation. Once the body is screwed on the rod, 8, it is possible to lock the rotation between the two using locking means (bushing, welding, etc.).

[0043] In a different embodiment, not illustrated, the gripping means 3 comprise a grip for manual gripping, applied to the main body 2 on the opposite side to the front surface 5.

[0044] In a further and different embodiment, illustrated in the attached Figure 3, the gripping means 3 are formed inside the main body 2 and comprise a coupling seat 9 (also called "female" recess) with a hexagonal cross section extending along the operating axis "Z", preferably coaxial with the first axis "X". In this embodiment, the coupling with an electric screwdriver 200 or an electric drill or a manual screwdriver, comprises a step of possibly inserting a hexagonal prismatic adapter in the main body 2, which is compatible in shape and size with the above-mentioned coupling seat 9. In other different embodiments, not illustrated, the gripping means 3 may comprise a rod as mentioned above but cylindrical in shape, or a recess as mentioned above but circular in shape, or a slot in the rear surface 10, opposite the front surface 4, which allows the insertion directly of the straight or cross-head end of a screwdriver or of an electric screwing/unscrewing device equipped with a suitable tool.

[0045] More generally, the gripping means define a grooved coupling (that is to say, not rotation, defined by a coupling profile with a non-circular transversal cross section).

[0046] Obviously, the specific embodiment of the grip-

ping means 3 is independent of the embodiment of the main body 2. For this reason, the combinations shown in Figures 1 to 3 are not be considered as being exhaustive but, in the context of this invention, any technically achievable combination is fully covered in the inventive concept.

[0047] In the preferred condition of use of the device 1 it is possible to associate in a single geometrical entity the above-mentioned first axis "X" of the front hole 4 to the so-called operating axis "Z", which is preferably the axis of rotation of the rod of the hook 100 and simultaneously of the device 1 during use (whether it is unscrewing and screwing of the hook 100).

[0048] In other words, preferably, during use, the first axis "X" coincides with the operating axis "Z".

[0049] This invention also relates to a method for removing and/or applying fixing hooks 100. The method is derived directly from what is described above, which is hereby incorporated in its entirety. More specifically, the method comprises a first step of preparing a device 1 of the type described above.

[0050] Moreover, the method comprise inserting a portion of the fixing hook 100 through the front hole 4 and passing it through the lateral hole 6 along the continuous path "P" in such a way as to constrain the rotational movement of the hook 100 around the axis "Z". Lastly, the method comprises rotating the main body 2 about the axis "Z" in such a way as to remove and/or apply the fixing hook 100 on a surface. This operation of rotating the main body 2 is preferably performed by applying a rotational force at the gripping means 3.

[0051] The sequence of the accompanying Figures 4A-4D illustrates by way of example a sequence of steps for removing a hook 100 from a masonry wall.

[0052] More specifically, once the device 1 has been fitted on the hook 100 (Figure 4B), using a procedure shown in Figure 4A, the hook 100 has an end portion of the rod (opposite the threaded portion of the rod inserted in the hole of the wall surface), inserted in the front hole 4 and the L-shaped portion, perpendicular to the rod, inserted in the lateral hole 6. By applying a twisting force to the device suitable for the unscrewing, that is, by turning it in the unscrewing direction, the hook 100 is removed from the surface by unscrewing. It is evident that the position of the hook 100 in the device 1 means that the hook 100 is housed reversibly by the wall 6a of the lateral hole 6, until the hook 100, once it has been removed, is extracted by hand from the continuous path "P" by the user. Thanks to the device 1, the operation thus described is very fast and effective.

[0053] Therefore, until the hook 100 remains housed along the continuous path "P" its free rotation along its rod is impossible and depends on the rotation of the wall 6a of the lateral hole, that is, of the main body 2, that is to say, of the entire device 1. In effect, the above-mentioned portion "L" of the hook 100 is trapped inside the lateral hole 6, without the possibility of rotating or, if necessary, with minimum freedom of rotation defined by the

normal clearances necessary for inserting the hook 100 in the device 1. Advantageously, the above-mentioned condition of reversible locking of the rotation of the fixing hook 100 (defined by the closed cross-section profile of the lateral hole 6) is effective for both directions of rotation of the above-mentioned operating axis "Z", that is to say, for both the possible conditions of use of the device 1: the rotation for removal and rotation for application of the hook 100.

[0054] Advantageously, in the case of a use of the device 1 for removal, the housing of the hook 100 in the continuous path "P" lends itself to the extraction of the hook 100 also by applying a tensile force (by pulling), preferably directed along the operating axis "Z" or at least along the axis of the rod of the hook 100. The operation for removing the hook 100 performed in this way is even easier and faster than the removal by unscrewing with the use of the device 1.

[0055] In effect, the shape of the walls 4a and 6a of the holes 4, 6 along the continuous path "P" is such that removal of the hook 100 from the guide hole is performed with a pull along the operating axis "Z". This occurs, advantageously, thanks to the contrast which the wall 6a of the lateral hole 6 offers, in a given point, on the portion of the hook 100 perpendicular to the rod, even for forces applied in the direction of the axis of the rod of the hook 100.

[0056] As already mentioned, the locking of the fixing hook 100 is reversible and is therefore advantageous even during the step for screwing (insertion) of the hook 100 in a surface. This sequence is not illustrated in the accompanying drawings, but the main steps are described below.

[0057] In the case of screwing, as soon as the user has prepared a hook 100 along the continuous path "P" of the device 1, the screwing of the hook 100 in the prepared guide hole occurs by the simultaneous rotation, relative to the operating axis "Z", of the device 1 and of the hook 100 as if it were a single body. This occurs, in a similar manner to that described above, advantageously thanks to the contrast which the wall 6a of the lateral hole 6 offers, at a point different to the preceding one, preferably on the side opposite that affected during the unscrewing, on the portion of the hook 100 perpendicular to the rod.

[0058] Advantageously, with regard to the installation or removal of a fixing hook depending on the above description, the device according to this invention makes it possible to use less time compared with that of the prior art. In other words, the user applying or removing hooks who uses the above-mentioned device can benefit from a considerable saving in time in performing the work: the screwing is safe and fast, the removal is equally fast and effective.

[0059] Advantageously, the device according to this invention allows the use of traditional grippers to be avoided.

[0060] In this way, the movements for screwing or un-

screwing a hook do not require any steps of interrupting and restarting the work: in particular, during manual removal (that is to say, without an electric screwdriver or drill which rotate the device) the posture of the hand is more natural and the actions performed by the user are smoother and less tiring for the user. The effectiveness of the device according to this invention is even greater in the case of a plurality of fixing elements to be removed and/or applied by the user.

[0061] Advantageously, during the screwing of the fixing hook, the device according to this invention makes it possible to maintain a constant force in the direction of the rod of the hook and to perform in a natural fashion a rotation along the axis of the rod in the direction of screwing. Advantageously, the effective screwing of the hook by the above-mentioned device can be performed both in a completely manual manner (with a handle as a means for gripping and manual rotation) or with the aid of an electrical drill or screwdriver (as a means for gripping and rotation in support of the manual action).

[0062] In effect, the front hole of the device is preferably aligned with the axis of the rod or of the gripping hole of the rod, thereby allowing a faster and much safer screwing and above all with intuitive movements, as in the use of a normal manual and/or electrical screwdriver.

[0063] Advantageously, the use of the above-mentioned device eliminates any screwing inaccuracies linked to the difficulties known in the prior art: during screwing of the fixing hooks the user has complete control of the position of the rod of the hook relative to the guide hole (normally perpendicular to the surface to be equipped) because the axis of a spindle of a drill or the rod of the gripping portion represent the normal extension.

[0064] A precise insertion of the hook also guarantees a secure hold of the hook in the surface of application and a safe use free of problems.

Claims

1. A device (1) for removing and/or applying fixing hooks (100) comprising:

- a main body (2), designed for holding at least one fixing hook (100) during an application or removal of the fixing hook (100); and
- gripping means (3) for allowing the movement of the main body (2) according to a movement for removing and/or applying the fixing hook (100);
- the main body (2) has a front hole (4) positioned on a front surface (5) of the main body (2), and a lateral hole (6) positioned on a lateral surface (7) of the main body (2),

characterised in that the holes (4, 6) communicate internally with each other for forming a continuous

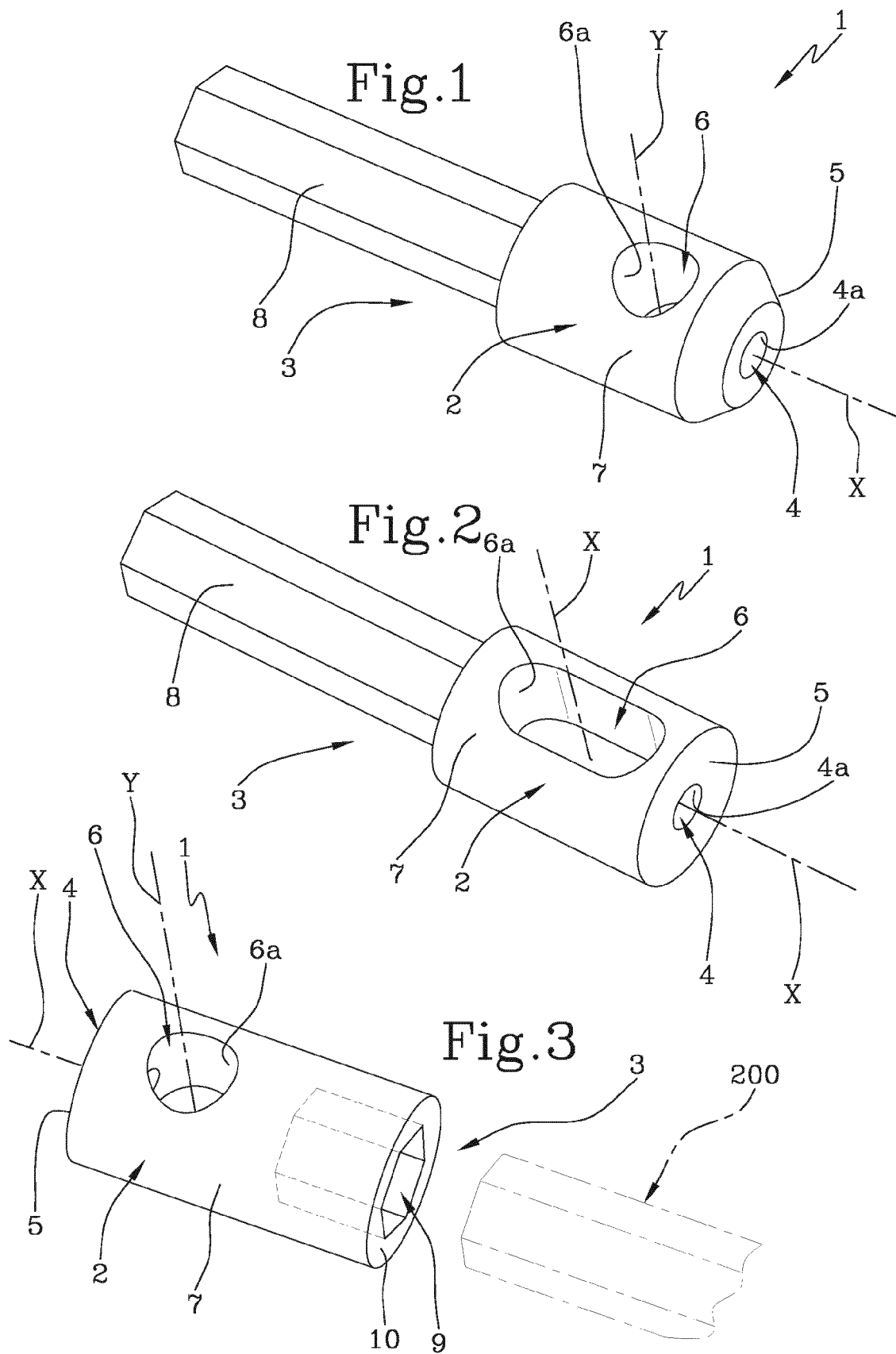
path ("P") for inserting a portion of the fixing hook (100) between the front hole (4) and the lateral hole (6); the front hole (4) extending along a first axis ("X") of extension and having a respective lateral wall (4a) having the cross section transversal to the first axis ("X") delimited by closed lines; the lateral hole (6) extending along a second axis ("Y") of extension and having a respective lateral wall (6a) having the cross section transversal to the second axis ("Y") delimited by closed lines; the lateral hole (6) being elongate at least until the front hole (4) to define a closing of the latter, along the first axis ("X") through the lateral wall (6a).

2. The device (1) according to claim 1, **characterised in that** a part of the lateral wall (6a) passes through a continuation of the front hole (4) along the first axis ("X") to define the closing of the front hole (4). 15
3. The device (1) according to claim 2, **characterised in that** the front hole (4) is blind along the first axis ("X") at a part of the lateral wall (6a) of the lateral hole (6). 20
4. The device (1) according to any one of the preceding claims, **characterised in that** the lateral wall (4a) of the front hole (4) joins with the lateral wall (6a) of the lateral hole (6) in such a way as to define a fixed curve of the continuous path ("P") from the front hole (4) to the lateral hole (6). 25
30
5. The device (1) according to any one of the preceding claims, **characterised in that** the front hole (4) extends along the first axis ("X") towards a closing wall positioned at the lateral hole (6). 35
6. The device (1) according to claim 5, **characterised in that** the closing wall is defined by a part of the lateral wall (6a) of the lateral hole (6). 40
7. The device (1) according to any one of the preceding claims, wherein the front hole (4) and the lateral hole (6) have different dimensions, preferably the front hole (4) having a smaller dimension. 45
8. The device (1) according to any one of the preceding claims, wherein the front hole (4) and the lateral hole (6) both have a circular cross section.
9. The device (1) according to any one of the preceding claims, wherein the first axis ("X") and second axis ("Y") of extension are incident on each other and preferably perpendicular. 50
10. The device (1) according to any one of the preceding claims, wherein the lateral hole (6) is frustoconical in shape, preferably having apex facing towards the first axis ("X"). 55

11. The device (1) according to any one of the preceding claims, wherein the lateral hole (6) passes through and is such as to connect opposite portions of the lateral surface (7).

12. The device according to any one of the preceding claims, wherein the gripping means (3) comprise a shank (8) with a grooved shape designed for being coupled with a motor-driven screwing device (200) for making the movement for removing and/or applying the fixing hook (100).

13. The device (1) according to any one of the preceding claims, wherein the gripping means (3) comprise a coupling seat (9) with a grooved shape for making a connection with a motor-driven screwing device (200) or with a shank of a tool which can be held by hand, preferably the coupling seat (9) having a hexagonal cross section.



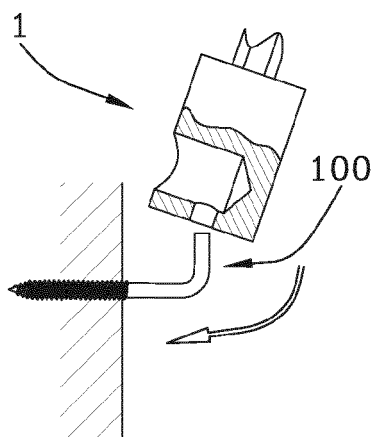


Fig. 4A

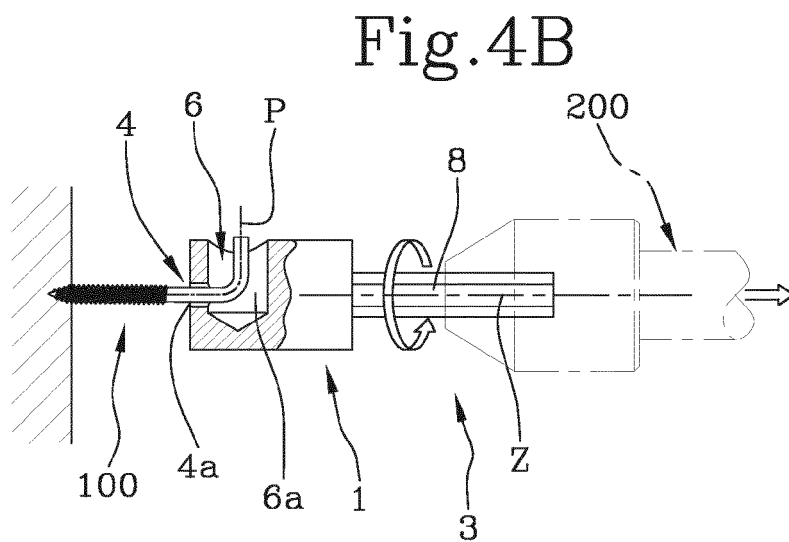


Fig. 4B

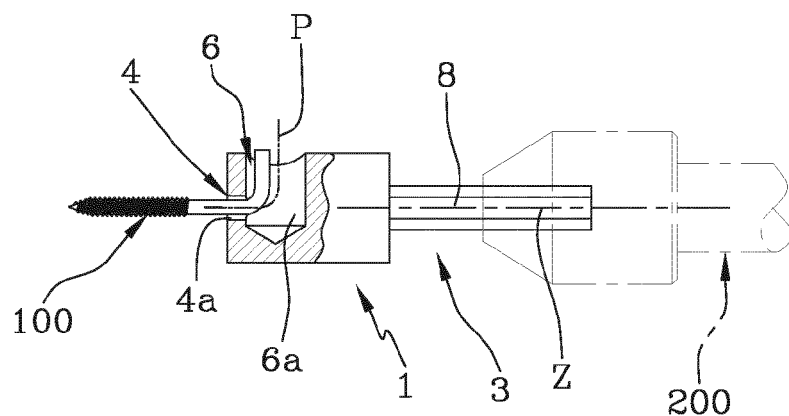


Fig. 4C

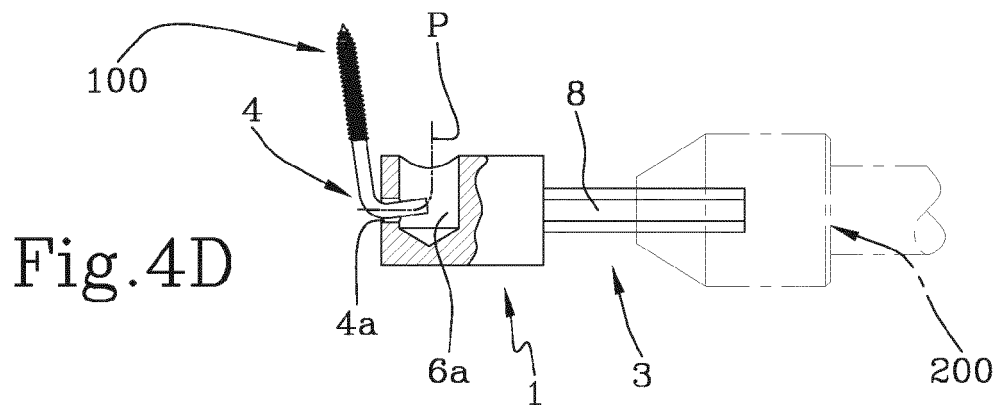


Fig. 4D

Fig.5A

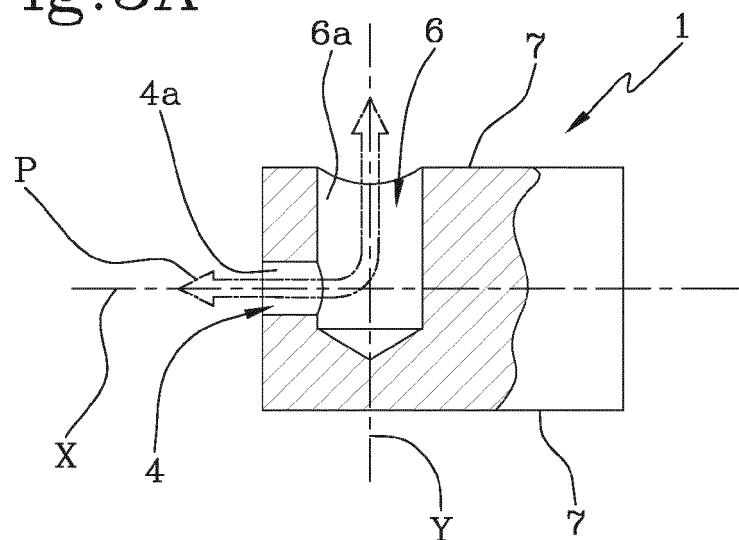


Fig.5B

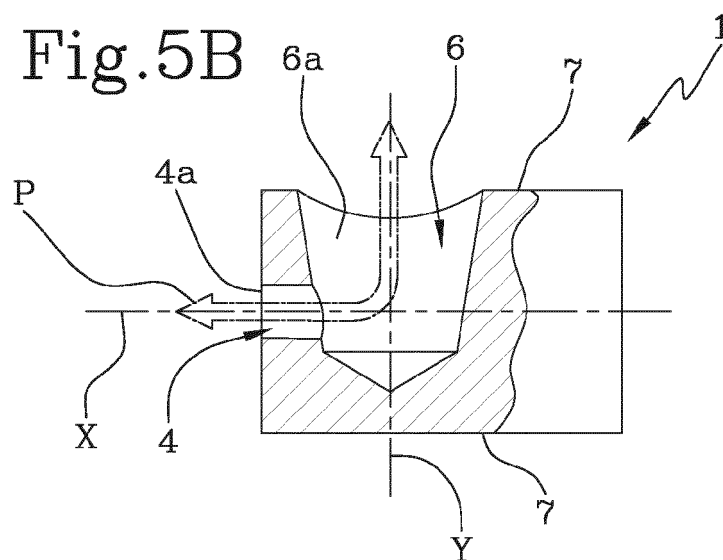


Fig.5C

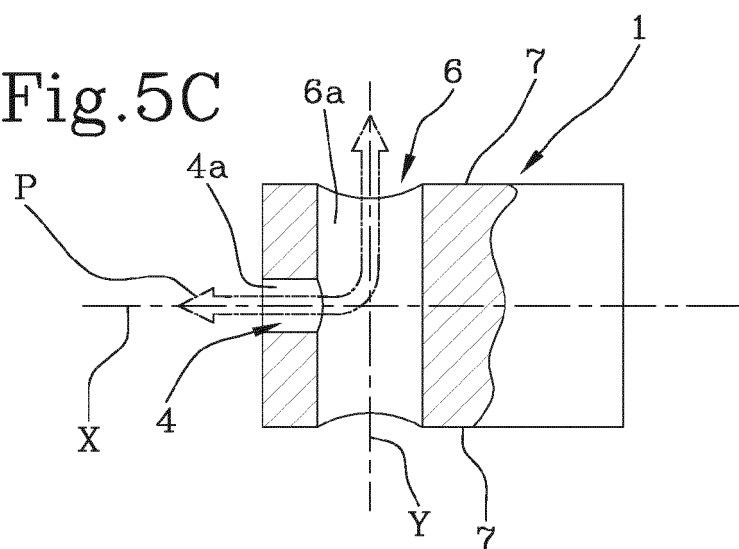


Fig.6

