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(54) A device for locking a battery clamp

(57) A device (1) for locking a battery clamp (2), which is substantially in the form of an open ring, by moving the free ends (5, 6) of the clamp (2) together, comprises a pressing element (7) and an abutment surface (20) which is abutted by a first free end (5) of the clamp (2), which end is pushed, in a first direction (X-X), by the other free end under the action of the pressing element (7). Advantageously, the pressing element (7) acts as a wedge which can be operated from above in a second direction (Y-Y), substantially at right-angles to the direction (X-X), in order to cause the two free ends (5, 6) of the clamp (2) to move together and therefore to bring about the locking of the clamp.

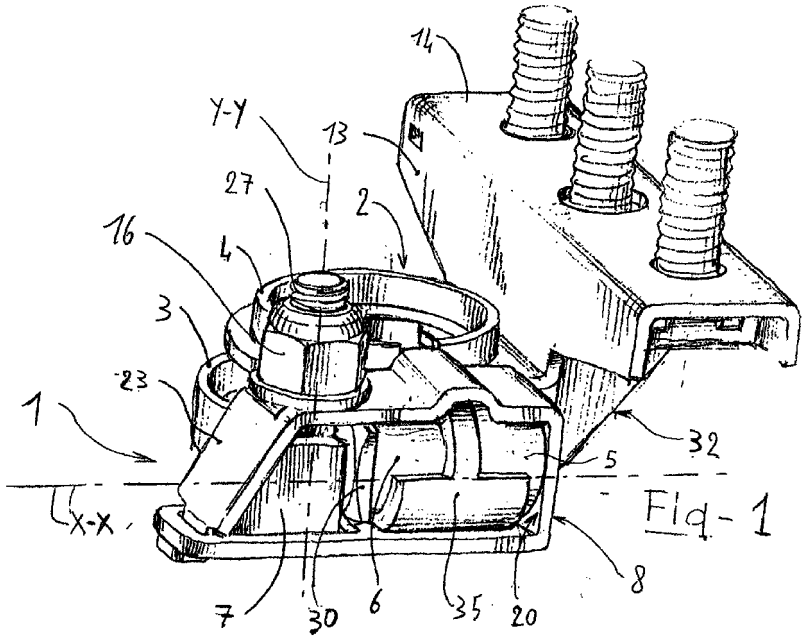

Fig. 1

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Description

[0001] The present invention relates to a device for locking a battery clamp, which is substantially in the form of an open ring, by moving the free ends of the clamp together, wherein the locking device comprises a pressing element and an abutment surface which is abutted by a first free end of the clamp, which end is pushed by the other free end under the action of the pressing element.

[0002] Car accumulators are provided with electrical poles which are generally in cylindrical or frustoconical form and which are arranged at the top and projecting upwards.

[0003] The conductors are connected to the electrical poles by using battery clamps which are in the form of an open ring or are U-shaped and the free ends of which are connected by a locking bolt. The locking of the above-mentioned bolt causes the free ends of the clamp to move together and therefore the clamp to be clamped on the electrical pole of the accumulator.

[0004] In those clamps, an example of which can be found in Patent Applications WO 92/21165 and EP 0809327-A2, the locking bolt is arranged transversely relative to the axis of the clamp so that, when the clamp has been fitted on the upright electrical pole, the bolt extends in the horizontal direction.

[0005] The above-mentioned horizontal arrangement of the locking bolt requires that there be space around it, that is to say, sufficient space around the clamp and therefore the accumulator, to be able to handle the usual locking tools.

[0006] However, in view of the fact that the space provided in the engine compartment of cars for accommodating the accumulators is very restricted and is close to the coachwork, the operation of locking the above-mentioned bolt is very difficult. This is particularly true in cases where the locking of the bolt of the clamp is to be carried out by a robot.

[0007] There is therefore a much-felt need to be able to lock the clamps by acting from above so as to avoid problems of bulk and handling associated with the locking tools.

[0008] In the clamp of Patent Application WO 92/11667, the locking bolt is arranged so that it is upright, that is to say, it is accessible from above for locking. In that case, the clamp is clamped on the battery pole by utilising the deformation of the circular holes in the clamp after the latter has been fitted on the electrical pole of the accumulator, as shown clearly by Figure 3 of the document.

[0009] However, that solution is not satisfactory from some points of view. The fastening of the clamp on the pole is inferior to that which can be obtained using conventional closing devices having a bolt, above all where the electrical pole of the accumulator is of the frustoconical type.

[0010] In addition, that method of fastening the clamp to the electrical pole is suitable only for clamps obtained by stamping and bending a metal plate, and it is not possible to use it for conventional clamps formed by cast blocks of lead alloy.

[0011] The problem to be solved by the present invention is to provide a device for locking an accumulator clamp, which device has structural and functional characteristics such as to satisfy the above-mentioned need and at the same time to avoid the disadvantages discussed with reference to the prior art.

[0012] The problem is solved by a device for locking a battery clamp according to claim 1.

[0013] Other characteristics and the advantages of the locking device according to the invention will become clear from the following description of one of its preferred embodiments which is given by way of non-limiting example with reference to the appended drawings, in which:

- Figure 1 is a perspective view of a locking device according to the invention associated with a clamp, before locking takes place;
- Figure 2 is a perspective view of the locking device of Figure 1 from a different viewpoint;
- Figure 3 is a view in section of the locking device and of a detail of the battery clamp of Figure 1,
- Figure 4 is a view in section of the locking device and of a detail of the battery clamp of Figure 3 after locking has taken place, and
- Figure 5 is a perspective exploded view of the clamp of Figure 1.

[0014] Referring to the appended drawings, 1 generally indicates a locking device for a battery clamp 2 which is substantially in the form of an open ring or U-shaped and which has free ends 5 and 6.

[0015] The clamp 2 is locked on an electrical pole of an accumulator (not shown in the drawings) by causing the above-mentioned free ends to move together.

[0016] In the example of the drawings, the clamp 2 comprises a conductive body formed from metal plate and forming a pair of lower and upper open rings 3 and 4, respectively, for locking on the battery pole. The two open rings 3 and 4 are connected to one another by a pair of respective locking supports 25 and 26.

[0017] On the side remote from the free ends 5 and 6, that is to say, from the pair of supports 25 and 26, the upper ring 4 extends in the form of a squared hooking tab 9 provided with a hooking tooth 10, while the lower ring 3 extends in the form of a squared hooking piece 11 which is provided with an opening for the engagement of the tooth 10. A connection that results from the hooking-in of pieces and that is remote from the pair of supports 25 and 26 is therefore formed between the two rings.

[0018] The open ring 3 extends laterally in the form of an upright bracket 13 ending in a support bracket 14 provided with means known per se for anchoring electri-

cal terminals.

[0019] Preferably, openings 15 for the passage of bolts for locking the ends of electrical cables are formed in the bracket 14.

[0020] The bracket 14 can advantageously end in a locking clip or a cable lug (represented in Figure 5 by a broken line) which is provided with tongues for permanent fastening for clinching to the end of an electrical cable.

[0021] Alternatively, the bracket 14 may have an opening for fastening another locking bolt for a cable end.

[0022] A base element 32 of insulating material for the partial accommodation of the conductive body is also associated with the clamp 2. The base element 32 is provided with an upright wall 33 and with a bearing bracket 34 which co-operate with the bracket 13 and the support bracket 14, respectively, to ensure their unequivocal reciprocal positioning.

[0023] A spacer 35 provided with a through-opening extends upwards from the base element 32. The spacer 35 is interposed between the free ends 5 and 6, more precisely between the supports 25 and 26, in order to limit the locking of the rings 3 and 4 to the minimum. The spacer 25 prevents wear on the material of the clamp 2, which, still retaining its resilience, can be reused for repeated mounting and dismounting operations from the electrical pole of the accumulator.

[0024] The clamp 2 corresponds to that forming the subject matter of the previous Patent Application EP 0809327-A2 of the Applicant. However, as will become apparent in the course of the description, the locking device 1 according to the invention can be used effectively also with different clamps, such as, for example, those formed by cast blocks of lead alloy.

[0025] The locking device 1 comprises a pressing element 7 and an abutment surface 20 against which a first free end 5 of the above-mentioned free ends of the clamp 2 abuts, being pushed in a first direction X-X by the other free end 6 under the action of the pressing element, in such a manner as to ensure that the clamp is locked.

[0026] The pressing element 7 can be caused to act in a second direction Y-Y, which is substantially at right-angles to the first direction X-X, so that its position can be varied.

[0027] Advantageously, the locking device 1 comprises means for the angular transmission of the movement of the pressing element 7 from the direction Y-Y to the direction X-X. Consequently, a movement of the pressing element in the second direction Y-Y causes a corresponding movement of the free ends 5 and 6 of the clamp in the direction X-X of locking the clamp 2.

[0028] In a preferred embodiment, the above-mentioned means for the angular transmission of the movement of the pressing element 7, in the form of guide means which are arranged in a plane inclined relative both to the direction X-X and to the direction Y-Y, are associated with the pressing element 7 which acts as a wedge which can be operated from above in the direction Y-Y.

[0029] The locking device 1 comprises a ring-like retaining element 8, which accommodates both the free ends 5 and 6 of the clamp 2 and the pressing element 7. In the locking direction X-X, the free ends 5 and 6 of the clamp are positioned between the pressing element 7 and a portion 20 of the retaining element 8 constituting the above-mentioned abutment surface 20.

[0030] Preferably, the retaining element 8 is formed by a strip which is bent in such a manner as to form a closed ring. At one end, the strip comprises a hooking tab 21 for engagement in a corresponding opening 22 in the opposite end. A connection produced by hooking in is thus formed between the two ends (Figure 3).

[0031] The strip is produced from metal material, preferably steel.

The retaining element 8 comprises a second portion 23 which is opposite to and facing the portion forming the abutment surface 20 and which is arranged in a plane which is inclined relative to the directions X-X and Y-Y. The retaining element 8 is in the form of a right-angled trapezium of which the second portion 23 and the abutment surface 20 constitute the inclined side and the upright side, respectively.

[0032] The second portion 23 is coupled to and in contact with a corresponding inclined surface 24 of the pressing element 7.

[0033] A rod 27 extends upwards in the direction Y-Y from the pressing element 7 with which it is unitary. The rod 27 extends through an opening 28 in the retaining element 8. The end portion of the rod 27 projecting from the opening in the retaining element 8 is threaded and a threaded nut 16 is engaged thereon. By acting on the threaded nut 16, the pressing element 7 is caused to act and is consequently positioned in the direction Y-Y.

[0034] The above-mentioned opening 28 is in the form of an eyelet extending in the direction X-X in order to permit a movement of the rod 27, and therefore of the pressing element 7 which is unitary therewith, in the locking direction X-X.

[0035] Preferably, the locking device 1 comprises a pin 29 having a shank extending axially in the locking direction X-X through respective through-holes in the free ends 5 and 6. The pin 29 comprises a head 30 interposed between the pressing element 7 and the free end 6 of the clamp 2.

[0036] As illustrated in Figures 2 and 4, the portion 20 of the retaining element which is abutted by the end 5 has a hole 31 suitable for permitting the passage of the shank of the pin 29 during the locking of the clamp, as will become clearer in the course of the description.

[0037] The function of the pin 29 is to guide the free ends 5 and 6 during locking, and also to secure them to the locking device 1 in order to prevent them from becoming detached.

[0038] Alternatively, the free ends 5 and 6 of the clamp 2 can be clamped onto the locking device 1 by arranging

grooves in the external surfaces of the free ends of the clamp, which grooves extend in the direction X-X and in which the retaining element 8 can be inserted.

[0039] During the mounting of the locking device 1 on the clamp 2, the pin 29 is inserted in the through-holes in the free ends 5 and 6, starting from the free end 5 and until the head 30 is brought into contact with the latter.

[0040] Subsequently, the pressing element 7 is associated with the retaining element 8 by inserting the rod 27 in the opening 28 and tightening the threaded nut 16.

[0041] The metal strip constituting the retaining element 8 is then positioned around the free ends 5 and 6 of the clamp 2 and is closed on itself until the hooking connection (Figure 3) of the tab 21 in the opening 22 is achieved.

[0042] During the operation of the locking device 1, it is necessary only to tighten the threaded nut 16 on the threaded rod 27 to obtain an upward movement and therefore a different positioning of the pressing element 7 in the direction Y-Y.

[0043] As explained above, because the inclined surface 24 of the pressing element 7 is engaged with and in contact with the inclined portion 23 of the retaining element 8, the upward movement causes the pressing element 7 to move in the locking direction X-X towards the abutment surface 20.

[0044] It is worthwhile confirming that the above-mentioned movement of the pressing element 7, and therefore of the rod 27, in the direction X-X is rendered possible by the eyelet configuration, extending in the direction X-X, of the opening 28.

[0045] The above-mentioned movement of the pressing element 7 in the locking direction X-X brings about an equal movement of the free end 6 which in its turn pushes the free end 5 into abutment with the abutment surface 20. In short, an upward movement of the pressing element 7 in the direction Y-Y causes the two free ends of the clamp 2 to move together, or, in other words, causes the desired locking of the clamp.

[0046] It will be appreciated that the force for locking the clamp 2 on the electrical pole of an accumulator is a function of the tightening torque exerted on the threaded nut 16.

[0047] The movement of the pressing element 7 in the direction X-X is transmitted to the free end 6 by the interposition of the head 30 of the pin 29. During the locking of the clamp 2, therefore, a corresponding movement of the entire pin 29 towards the abutment surface 20 occurs. The through-hole 31 of the abutment surface 20 permits the passage of the shank of the pin 29 during the locking of the clamp 2.

[0048] The inclined portion 23 of the retaining element 8 acts as an inclined guide for the pressing element 7.

[0049] In an equivalent manner, in order to remove the battery clamp from the electrical pole on which it is mounted, it is necessary only to unscrew the threaded nut 16.

[0050] As will be appreciated from what has been described above, the device for locking a battery clamp according to the invention satisfies the requirement of carrying out the locking of the clamp by acting from above, in such a manner as to avoid problems of bulk and handling the locking tools, and at the same time the requirement of avoiding the problems presented by the locking devices of the prior art.

[0051] In fact, the locking device according to the invention enables the battery clamp on which it is mounted to be locked by acting from above, for example using a socket spanner, on the threaded nut associated with the rod of the pressing element.

[0052] A further advantage of the locking device according to the invention resides in the fact that it is suitable for use with commercially available battery clamps.

[0053] It will be appreciated that, in order to satisfy contingent and specific requirements, a person skilled in the art could introduce numerous modifications and variants to the locking device described above which would all, however, be contained within the scope of protection of the invention as defined by the following claims.

[0054] For example, as an alternative to what has been described above, the head 30 of the pin 29 may have a surface which is inclined, relative to the directions X-X and Y-Y, and in contact with a corresponding inclined surface of the pressing element. In that case, the pressing element would constitute a wedge movable only in the direction Y-Y.

[0055] Alternatively, the pressing element may have an inclined surface directly in contact with a corresponding inclined surface of a free end of the clamp.

[0056] The above-mentioned means for the angular transmission of the movement of the pressing element may be in the form of a lever system or another functionally equivalent system.

Claims

1. A device (1) for locking a battery clamp (2), which is substantially in the form of an open ring, by moving the free ends (5, 6) of the clamp (2) together, wherein the locking device (1) comprises a pressing element (7) and an abutment surface (20) which is abutted by a first free end (5) of the clamp (2), which end is pushed, in a first direction (X-X), by the other free end under the action of the pressing element (7), characterised in that the pressing element (7) can be caused to act in a second direction (Y-Y), which is substantially at right-angles to the first direction (X-X), in order to vary its position, and in that the device comprises means for the angular transmission of the movement of the pressing element (7) from the second direction (Y-Y) to the first direction (X-X), a movement of the pressing element (7) in the second direction (Y-Y) causing a corresponding movement of the free ends (5, 6) of

the clamp (2) in the first direction (X-X).

2. A locking device (1) according to claim 1, wherein the means for the angular transmission of movement comprise means (23) for guiding the pressing element (7) which are arranged in a plane which is inclined relative to the first direction (X-X) and the second direction (Y-Y), the pressing element (7) acting as a wedge.

3. A locking device (1) according to claim 2, wherein the pressing element (7) is a wedge.

4. A locking device (1) according to any one of the preceding claims, wherein the locking device (1) comprises a ring-like retaining element (8) which accommodates the free ends (5, 6) of the clamp (2), and the pressing element (7), the free ends (5, 6) of the clamp (2) being positioned in the first direction (X-X) between the pressing element (7) and a first portion of the retaining element (8), which portion constitutes the abutment surface (20).

5. A locking device (1) according to claim 4, wherein a rod (27) extending in the second direction (Y-Y) is unitary with the pressing element (7) and has a threaded portion projecting from an opening (28) in the retaining element (8), a threaded nut (16) being engaged on the projecting portion, and, by acting on the threaded nut (16), the pressing element (7) is caused to act and is positioned in the second direction (Y-Y).

6. A locking device (1) according to claim 4, wherein the guide means arranged in an inclined plane are in the form of a second portion (23) of the retaining element (8), which portion is coupled to and in contact with a corresponding inclined surface (24) of the pressing element (7).

7. A locking device (1) according to claims 5 and 6, wherein:

- the first portion (20) and the second portion (23) of the retaining element (8) are arranged opposite one another in the first direction (X-X) and
- the opening (28) in the retaining element (8) extends in the first direction (X-X) in order to permit a movement of the rod (27) in the first direction (X-X).

8. A locking device (1) according to claim 1, wherein the locking device (1) comprises a pin (29) of which the shank extends axially in the first direction (X-X) through respective through-holes formed in the free ends (5, 6) of the clamp (2), the head (30) of the pin (29) being interposed between the pressing element (7) and the second free end (6) of the clamp (2).

9. A locking device (1) according to claims 4 and 8, wherein the first portion (20) of the retaining element (8) has a hole (31) permitting the passage of the shank of the pin (29).

10. A locking device (1) according to claim 8, wherein the coupled and contacting surfaces of the pressing element (7) and of the head (30) of the pin (29) are surfaces that are inclined relative to the first direction (X-X) and the second direction (Y-Y).

11. A locking device (1) according to claim 4, wherein the retaining element (8) comprises a strip which is bent in the form of a ring and which comprises at one end a hooking tab (21) for engagement in a corresponding opening (22) in the opposite end.

12. A locking device (1) according to claim 11, wherein the strip is produced from metal material.

13. A locking device (1) according to claim 11, wherein the strip is produced from piano wire steel.

14. A locking device according to claim 4, wherein the pressing element comprises a surface which is inclined relative to the first direction (X-X) and the second direction (Y-Y), the inclined surface being coupled to and in contact with a corresponding inclined surface of the second free end of the clamp.

15. A battery clamp (2), characterised in that it comprises a locking device according to one or more of the preceding claims.

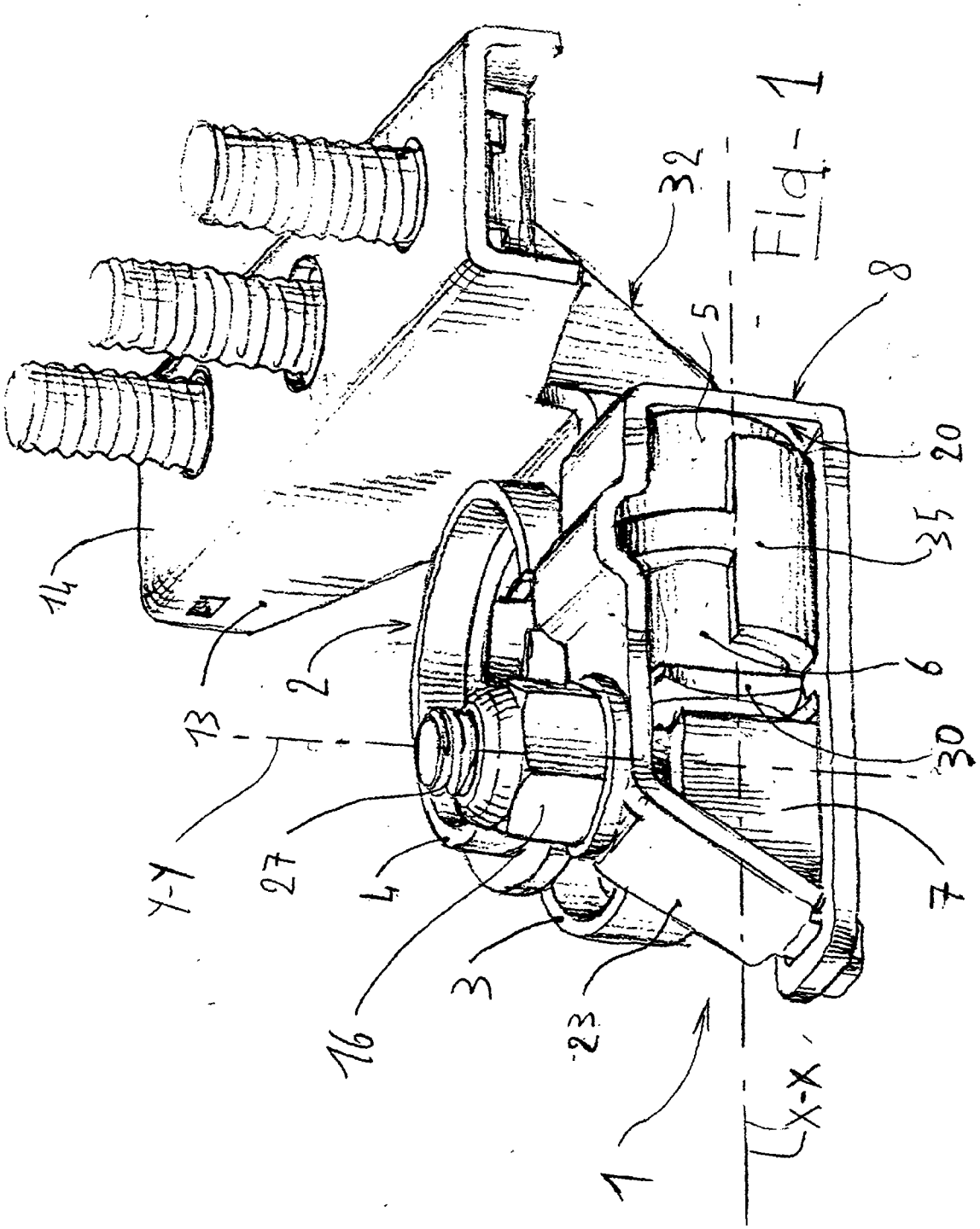

Fig. 1

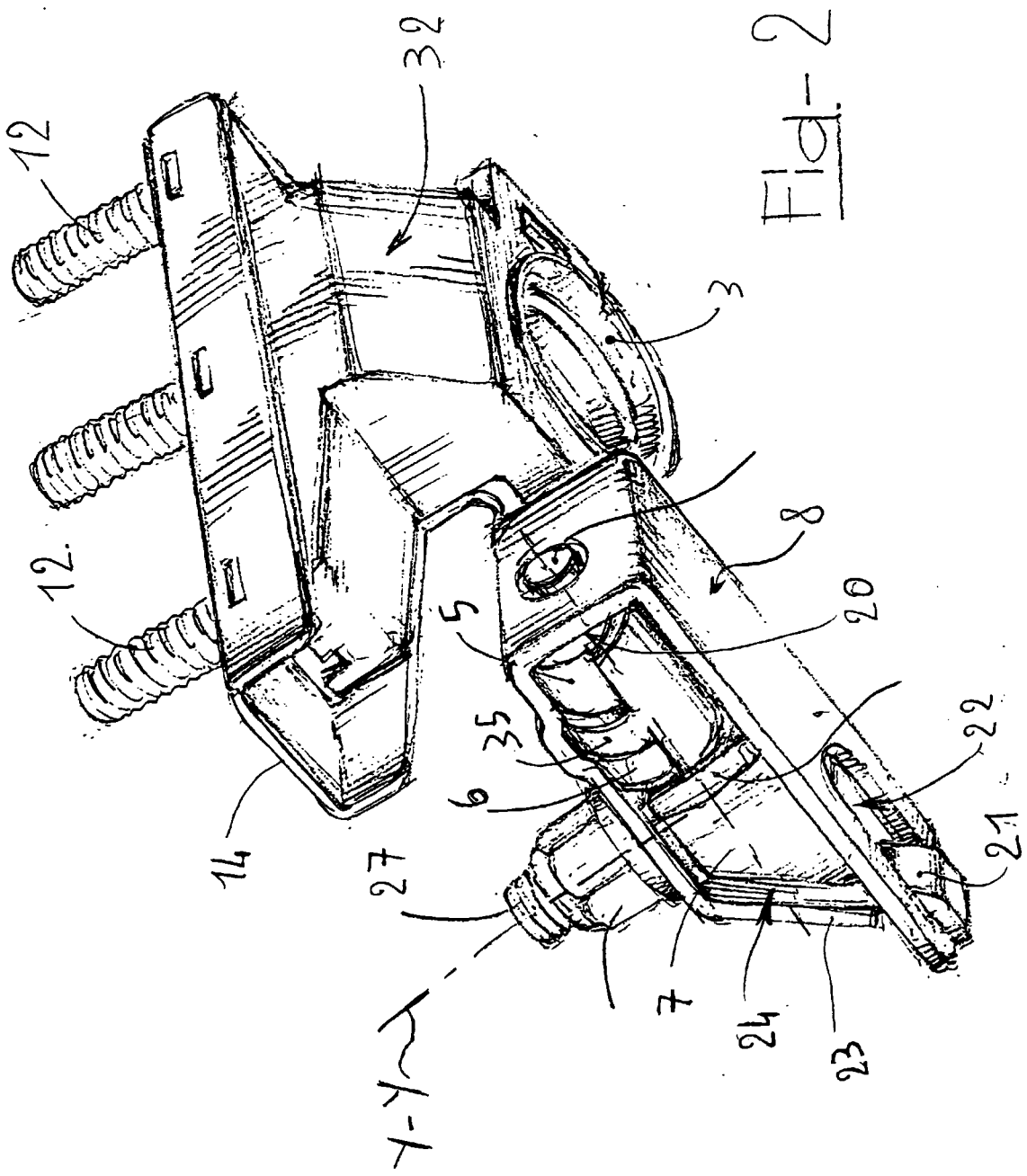

Fig. 2

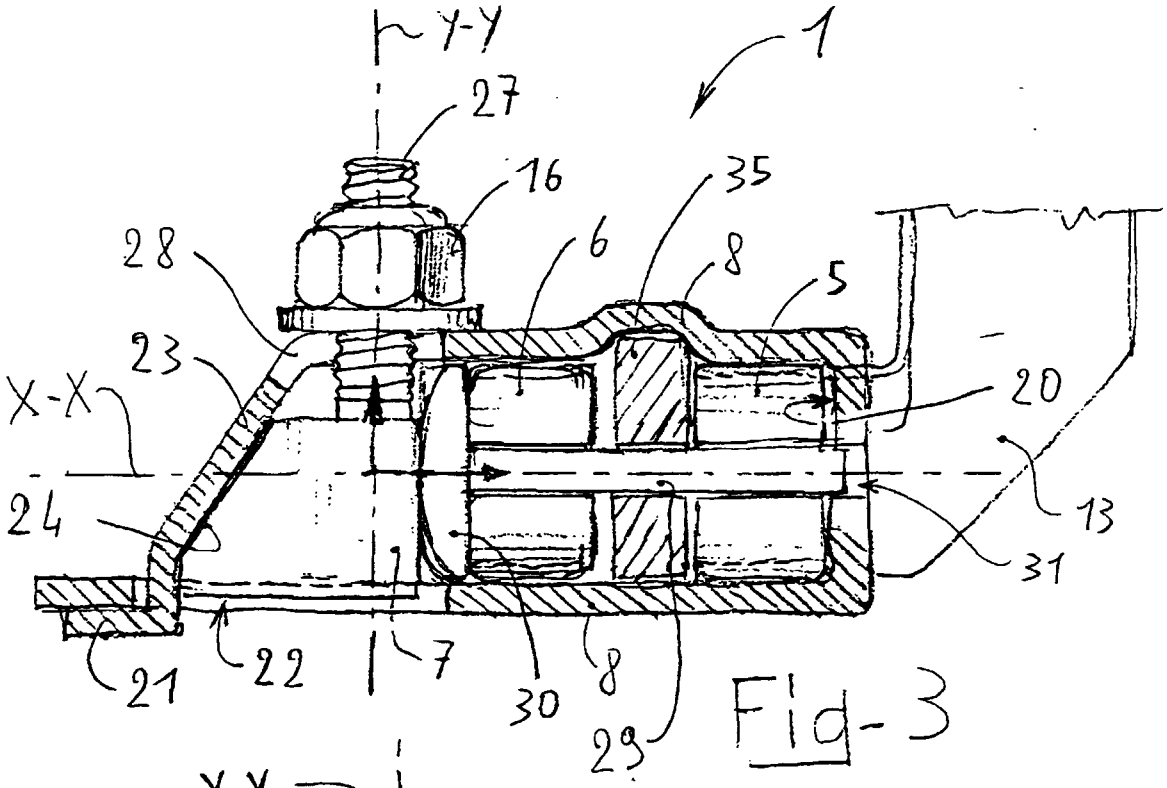
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Fig-3

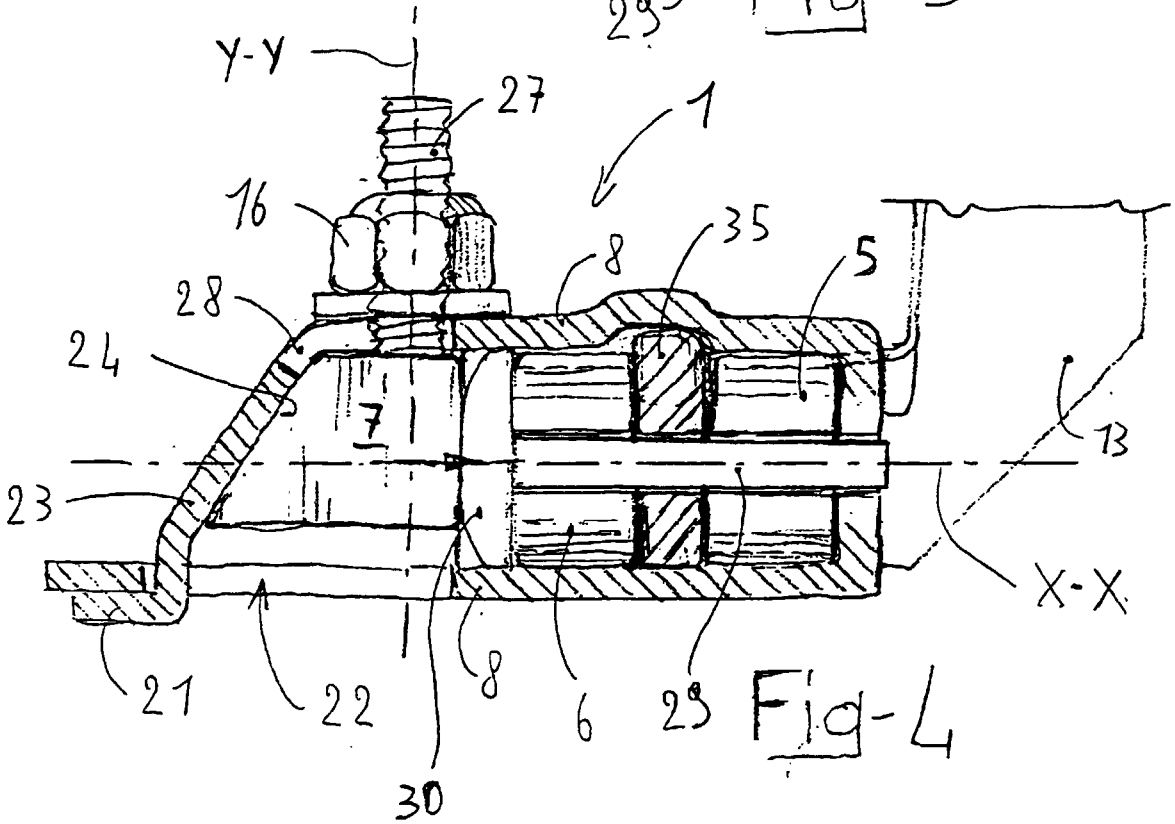
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Fig-4

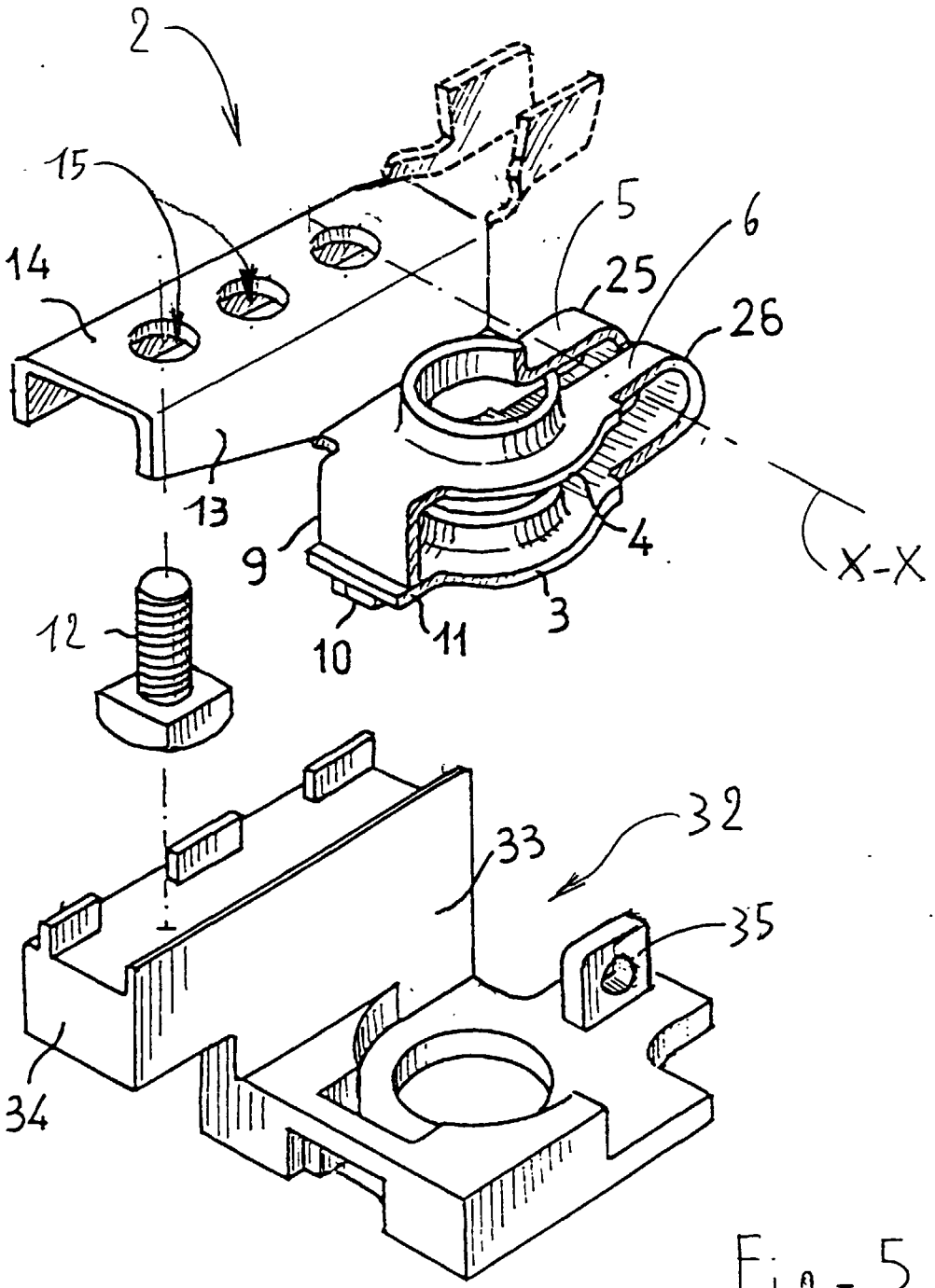

Fig-5

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EUROPEAN SEARCH REPORT

Application Number
EP 98 83 0483

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DE 196 36 685 C (F.WELCKER ET AL) 8 January 1998 (1998-01-08) * column 1, line 13 - line 18 *	1-4,15	H01R11/28
A	* column 2, line 36 - line 59; figures 1-3 *	5,7	
D,A	EP 0 809 327 A (MECCANOTECNICA CODOGNESE) 26 November 1997 (1997-11-26) * column 3, line 28 - line 34; figure 1 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	15 January 1999	ALEXATOS G.

CATEGORY OF CITED DOCUMENTS

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