



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
22.02.2006 Bulletin 2006/08

(51) Int Cl.:
E02F 3/36 (2006.01)

(21) Application number: **05017356.6**

(22) Date of filing: **10.08.2005**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**
Designated Extension States:
AL BA HR MK YU

(71) Applicant: **Cangini Benne S.R.L.**
47027 Sarsina (IT)

(72) Inventor: **Cangini, Giorgio**
47025 Montecastello - M. Saraceno (FC) (IT)

(74) Representative: **Negrini, Elena**
Agazzani & Associati S.r.l.
Via dell'Angelo Custode 11/6
40141 Bologna (IT)

(30) Priority: **20.08.2004 IT BO20040531**

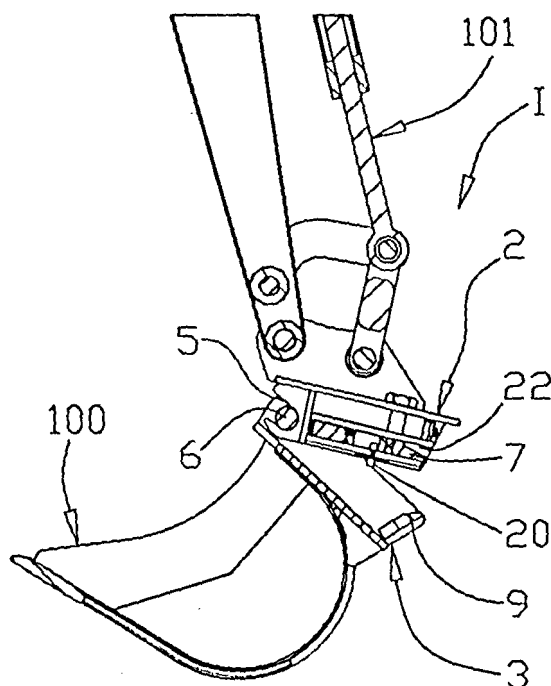
(54) **Safety device for the connection of tools**

(57) A safety device for the connection of tools is provided with a first member (2) and a second member (3) fit to be fixed to a support (101) and a tool (100) for their detachable connection (C).

The device (1) comprises an arrest means (7) associated to one of the members (2, 3) and sliding, due to the effect of driving means (15), respect to its own member (2, 3), between two extreme conditions, internal (N) and external (E) in order to detachably engage in this latter external condition (E) at least a respective housing means (9) of the other member (3, 2) realizing the connection condition (C).

The device (1) comprises feeler pin means (20), rotating connected to one of the members (2, 3) and driven in rotation from the approaching of the other member (3, 2) during the reaching of the connection condition (C), in order to match the driving means (15) causing the operation thereof in direction of the external extreme condition (E) of the arrest means (7).

FIG. 2



Description

[0001] The present invention relates to the technical field concerning the mechanical connection and it refers to a safety device for the connection of tools, particularly for the detachable connection of buckets or other tools to driving means as articulated arms.

[0002] There are known hooking means for tools, such as for buckets and percussion hammers for demolition, provided with a body fixed to such tools and with a second member blocked to a support as the extremity of an articulated arm.

[0003] Such known devices normally are provided with pins or prismatic elements fit to be inserted into slots of the elements for their mutual detachable coupling and blocking. Said devices sometimes are also provided with safety lock fit to stop the pins or the prismatic elements.

[0004] A drawback of such known safety blocks consists in that some of them need the manual operation also during closure, causing loss of time and risks for the operators, and others have closures provided with pins protruding from the tool, and dangerous for the workers and easily to be damaged.

[0005] Other drawback of such known safety devices consists in that they cause big stress and high frictions causing excessive usury and risks of fracture.

[0006] Some of such known devices have an opening driving pin screwed to a rotating block means.

[0007] A drawback of such devices consists in that, in case the driving pin is broken, that can be caused by operators' errors or excessive efforts, the threaded portion of the broken pin occludes the female thread of the rotating block means preventing the connection of a new pin, so it causes big delay and lose of time to open the device and to remove the tools from the articulated arm until the intervention of a specialized operator.

[0008] An object of the present invention is to propose a safety device for the connections of tools can be operated automatically when the arm is approaching to the tool, without losing any time and without risks for the operator.

[0009] Other object of the present invention is propose a reliable, strong and simple device and in which the driving pin can be easily replaced in any condition and even in case of fault.

[0010] The characteristics of the invention are underlined in the following, with particular reference to the attached drawings, in which:

- figures 1 and 2 show a lateral view of the device of the invention associated to a support consisting of a hydraulic articulated arm and to a tool consisting in a bucket, in a partially connected condition;
- figure 3 shows a back view of the device, of the support and of the tool of figure 1;
- figures 4 - 6 show the same views of the device, of the support and of the tool of the figures 1 - 3 in a connected condition;

- figure 7 shows a exploded view of the safety device for connecting the tools, object of the present invention;
- figures 8 - 10 show views of the device of figure 7, sectioned by respective orthogonal plans, in an assembled and protruding condition of its one arrest means;
- figures 11 -13 show section views, corresponding to the views of figures 8 - 10, in a retracted condition of the arrest means;
- figures 14 and 15 show enlarged, respectively plant and side, views of the arrest means;
- figure 16 shows a transversal section view of the arrest means;
- figure 17 shows an enlarged lateral view of a driving pin of the device of figure 7;
- figure 18 shows view of the arrest means sectioned according to line XVIII - XVIII of figure 17;
- figures 19 and 20 show enlarged respectively plant and side views of the feeler pin means of figure 7.

[0011] With reference to the figures 1 - 20, numeral 1 indicates the safety device for the connection of tools, object of the present invention, provided with a first member 2 fit to be fixed to a support 101, consisting in a hydraulic articulated arm of an operating means, and provided with a second member 3 fit to be fixed to a tool 100, consisting in a bucket for ground moving. The two members 2, 3 are fixed by means of bolts, welding or pins to the arm and to the bucket for their detachable connection C.

[0012] The first member 2 comprises sliding means 22 for an arrest means 7, constrained to slide inside it, due to driving means 15, between two extreme conditions internal N and external E. in this latter external condition E, the arrest means detachably engages a respective housing means 9 of the second member 3 realizing the connection condition C in cooperation with first 5 and second 6 hook means sited on the opposite extremities of said members 2, 3.

[0013] The hooking means comprise recesses 5 fit to insert or to remove pins 6 in a predetermined mutual inclined position between the members 2, 3, whose further approaching by means of mutual rotation causes the connection condition C.

[0014] The device 1 comprises feeler pin means 20, rotationally connected to the first member 2 and rotated by the approaching of the other member 3 during the achievement of the connection condition C, in order to match the driving means 15 causing of the motion thereof in direction of the extreme external condition E of the arrest means 7.

[0015] The driving means 15 comprise a set of elastic means 16, consisting in compressed helicoids springs, pushing the arrest means 7 in direction of the extreme external condition E. The driving means 15 furthermore comprise block means 18, having an elongated shape, housed in a cavity 17 the arrest means 7.

[0016] One first extremity of block means 18 has a connection means 36 for a driving pin 21 that rotates in a respective seat 37 of the first member 2 of the arrest means 7.

[0017] The block means 18 is provided with a second hook shaped extremity 38 matching, in the external extreme condition E, one shaped protrusion 19 of the cavity 17 in order to prevent the arrest means 7 from sliding towards inside of device 1.

[0018] The second extremity of the block means 18 is also provided with a plane means 39 laterally carried out and matching, in the internal extreme condition N, a correspondent plain portion 40 of the cavity 17 in order to prevent the elastic means 16 from moving the arrest means 7 towards the external of the device 1.

[0019] In order to make the extreme inner condition N more stabile, the plane means 39 is inclined in respect to a plane orthogonal to a line joining the same plane means 39 to the connection means 36 for the driving pin 21; in such a manner the release of the arrest means 7 from the internal extreme condition N requests the application of a sufficient force to obtain a bigger compression of the elastic means.

[0020] Therefore, starting from the inner extreme condition, the rotation of the block 18 in a first direction provokes the release of the arrest means 7 that, under the action of elastic means 16, moves until the external extreme condition E in which it's blocked by the block means itself preventing the accidental exit from the housing 9 of the second member 3 so providing a safe connection condition C.

[0021] The rotation of the block means 18 in a second direction, opposite to the first one, provokes the release of the arrest means 7 and, overcoming the force of the elastic means, its translation until the internal extreme condition N in which it is removably blocked by the block means 18.

[0022] To facilitate the moving of the arrest means 7 in the direction of the internal extreme condition N by means of the rotation in the second direction of the driving pin 21, the block means 18 laterally comprises a cam portion 41 bordering on the plane means 39, fit to match in sliding manner a corresponding portion 42 of the cavity 17.

[0023] The arrest means 7 is equipped with a spring means 43 protruding in the cavity 17 in order to match the block means 18 in the external extreme condition E, keeping in such condition, the second hook shaped extremity 38 of the block means 18 in elastic matching against the shaped protrusion 19 of the cavity 17.

[0024] The driving pin 21 has an external head 44, drivable by means of a key 45 for the rotation of a stem 46 an extremity thereof having an insert 47 for the connection means 36 of the block means 18.

[0025] The insert 47 and the connection means 36 are almost complementary shaped and have respective anti-rotational plans almost parallel to their longitudinal axis.

[0026] The stem 46 is provided with an annual housing

48 adjacent to the head 44 and fit to be engaged by the edges of an open slot of an arrest plate 49 that can be detached for the driving pin 21 disassembling by means of the simply removal of the fixing screws of the arrest plate 49.

[0027] In this way, it is possible, quickly and easily, to extract and to replace a broken driving pin with a spare part without the intervention of a specialist.

[0028] The feeler pin means 20 comprises a rotating connection 32 to the first member 2 and has a first extremity 30 and a second extremity 31 with matching curved surfaces and respectively fit to match the second member 3 and the block means 18.

[0029] Such matching of the second extremity 31 with the block means 18 causes the release and the rotation of this latter allowing the elastic means 16 to push the arrest means 7 towards the external extreme condition E when the members are approaching in the connection condition C.

[0030] Thus such approaching between members 2, 3, whose first hooking means 5 and second hooking means 6 are connected, causes automatically the insertion into the housing 9 of the arrest means 7 and the blocking of this latter by the blocking means 18 obtaining a safety connection condition.

[0031] The rotating connection 32 comprises a passing hole of the feeler pin means 20 and a respective pin 33 blocked in one concave housing 34 of respective member 2, 3 from a arrest plate 35 fixed by means of screws or welding.

[0032] The rotating connection 32, the first 30 and the second 31 extremities of the feeler pin means 20 are disposed at the angles of a triangle and the pin 33 of the rotating connection is orthogonal to the driving pin 21.

[0033] The arrest means 7 is approximately shaped as a flattened parallelepiped with almost flat main faces first 13 and second 14.

[0034] The second main face 14 has, close to its one transversal edge in respect to sliding direction D, a wedge surface 10 inclined toward the first face 13.

[0035] The wedge surface 10 terminates with at least a safety portion 115 joined to the second face 14 by said wedge surface 10.

[0036] The safety portion 115 is parallel to the main faces 13, 14 or is slightly inclined in direction of the wedge surface 10.

[0037] The hooking means, first 5 and second 6, are disposed on the sides of the members 2, 3 almost opposite to the wedge surface 10 and to the housing means 9.

[0038] An advantage of the present invention is to provide an automatic safety device for connecting the tool when the arm is approaching to the tool, without loss of time and without risks for the operator.

[0039] Other advantage is to provide a reliable, strong and simple device and in which the driving pin can be easily replaced in any condition and also in case of fault.

Claims

1. Safety device for the connection of tools provided with a first member (2) and a second member (3) fit to be fixed to a support (101) and a tool (100) for their detachable connection (C); said device (1) comprises an arrest means (7) associated to one of the members (2, 3) and sliding, due to the effect of driving means (15), in respect to its own member (2, 3), between two extreme conditions internal (N) and external (E), in order to detachably engage in this latter external condition (E) at least a respective housing means (9) of the other member (3, 2) realizing the connection condition (C); said device (1) **characterized in that** it comprises a feeler pin means (20), connected in a rotating manner to one of the members (2, 3) and driven in rotation, by the approaching of the other member (3, 2) during the reaching of the connection condition (C), in order to match the driving means (15) causing the operation thereof in direction of the external extreme condition (E) of the arrest means (7).
2. Device according to claim 1 **characterized in that** the driving means (15) comprise a set of elastic means (16) to push the arrest means (7) in direction of the external extreme condition (E) and comprise a block means (18) positioned in a cavity (17) of the arrest means (7) and rotating between two conditions in which it blocks the arrest means (7) respectively in the extreme blocking conditions of the arrest means (7) in the internal (N) and toward the external (E).
3. Device according to claim 2 **characterized in that** it the feeler pin means (20) includes a rotating connection (32) to the member (2, 3) of the arrest means (7) and includes a first extremity (30) and a second extremity (31) respectively fit to match the other member (3, 2) and the block means (18) in order to cause the rotation thereof and to allow the elastic means (16) to push the arrest means (7) toward the external extreme condition (E) when the members are approaching to the connection condition (C).
4. Device according to claim 3 **characterized in that** the first (30) and second (31) extremities of the feeler pin means (20) include respective matching curved surfaces.
5. Device according to claim 3 **characterized in that** the rotating connection (32), the first (30) and second (31) extremities of the feeler pin means (20) are disposed at angles of a triangle.
6. Device according to claim 3 **characterized in that** the rotating connection (32) comprises a passing hole of the feeler pin means (20) and a respective pin (33) blocked in one concave housing (34) of the respective member (2, 3) by an arrest plate (35).
7. Device according to claim 2 **characterized in that** the block means (18) has an elongated shape and it includes a first extremity having a connection means (36) for a driving pin (21) rotating in one respective housing (37) of the member (2, 3) of the arrest means (7).
8. Device according to claim 7 **characterized in that** the block means (18) includes a second hook shaped extremity (38) matching, in the external extreme condition (E), one shaped protrusion (19) of the cavity (17) to prevent the arrest means (7) sliding toward the inside of the device (1).
9. Device according to claim 7 **characterized in that** the second extremity of the block means (18) includes a plane means (39) matching, in the internal extreme condition (N), a corresponding plane portion (40) of the cavity (17) in order to prevent the elastic means (16) to move the arrest means (7) towards the outside of the device (1).
10. Device according to claim 9 **characterized in that** the plane means (39) of the second extremity of the block means (18) is inclined in respect to a plane orthogonal to a line joining the same plane means (39) to the connection means (36) for the driving pin (21) to make more stable the internal extreme condition (N).
11. Device according to claim 7 **characterized in that** the block means (18) is laterally provided with a cam portion (41) fit to match a corresponding portion (42) of the cavity (17) for translate the arrest means (7) in direction of internal extreme condition (N) due to the rotation of the driving pin (21).
12. Device according to claims 10 and 11 **characterized in that** the cam portion (41) borders on the plane means (39) of the block means (18).
13. Device according to claim 2 **characterized in that** the arrest means (7) is equipped with a spring means (43) protruding in the cavity (17) to match the block means (18) in the external extreme condition (E).
14. Device according to claim 7 **characterized in that** the driving pin (21) includes a head (44) external drivable by a key (45) for the rotation of a stem (46) having at an extremity an insert (47) for the connection means (36) of the block means (18).
15. Device according to claim 14 **characterized in that** the insert (47) and the connection means (36) are shaped almost complementary and have respective

anti-rotation plans almost parallel to their longitudinal axis.

16. Device according to claim 14 **characterized in that** the stem (46) includes an annular housing (48) adjacent to the head (44) and fit to be engaged to a arrest plate (49) detachable for the disassembling the driving pin (21). 5
17. Device according to claim 1 **characterized in that** the arrest means (7) is approximately flattened parallelepiped shaped with a first main face (13) almost flat and the opposite second main face (14) having, in proximity of an edge thereof, transversal in respect to the sliding direction (D), a wedge surface (10) inclined toward the first face (13) and joining the second face (14) with at least a plane safety portion (115) almost parallel to the main faces (13, 14). 10 15
18. Device according to claim 17 **characterized in that** the at least a plane safety portion (115) is slightly inclined in direction of the wedge surface (10). 20
19. Device according to claim 1 **characterized in that** the arrest means (7) is constrained to slide inside the sliding means (22) of the first member (2). 25
20. Device according to claim 1 **characterized in that** the members (2, 3) are provided with respective hooking means, first (5) and second (6), for the rotating and detachable connection to said members (2, 3). 30
21. Device according to claim 17 **characterized in that** the hooking means first (5) and second (6) are on sides of the members (2, 3) almost opposite to the wedge plan (10) and to the housing means (9). 35

40

45

50

55

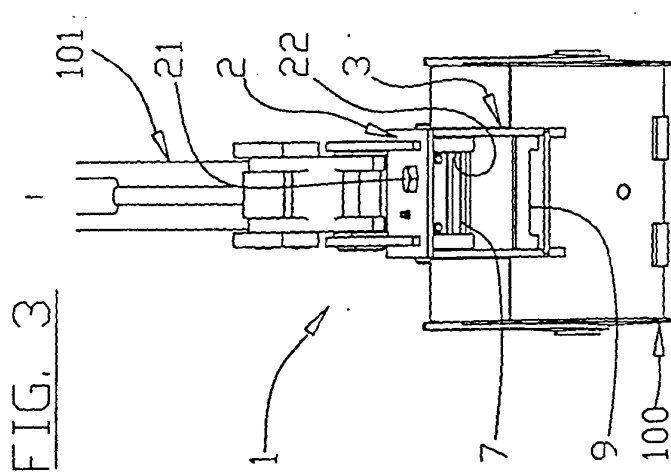
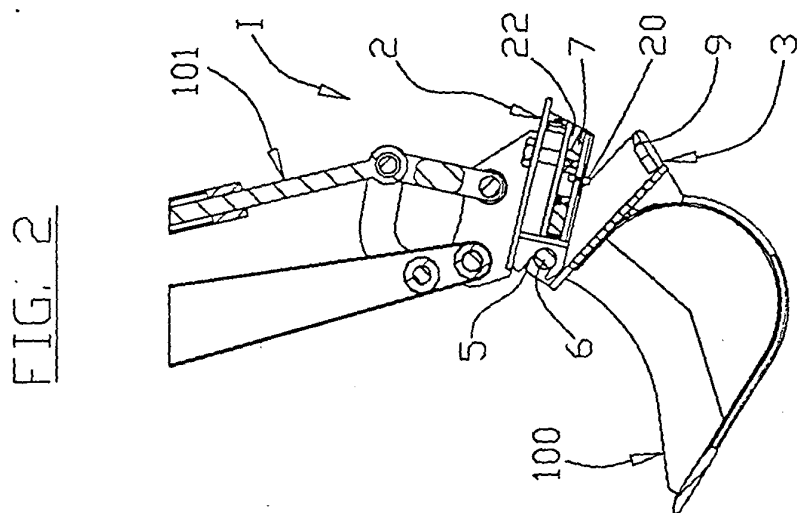
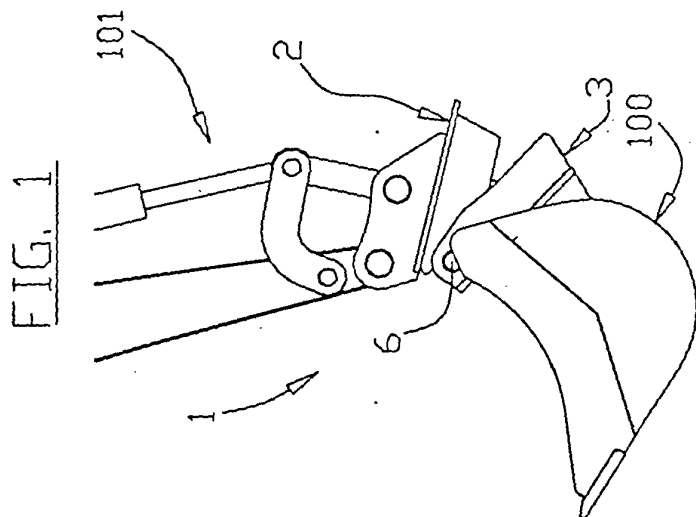


FIG. 4

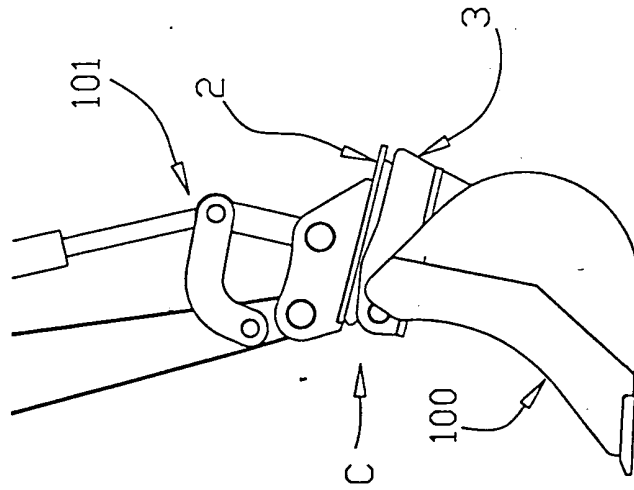


FIG. 5

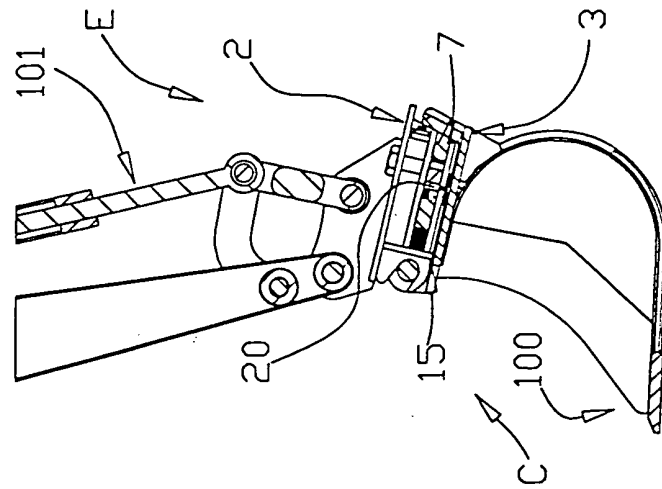


FIG. 6

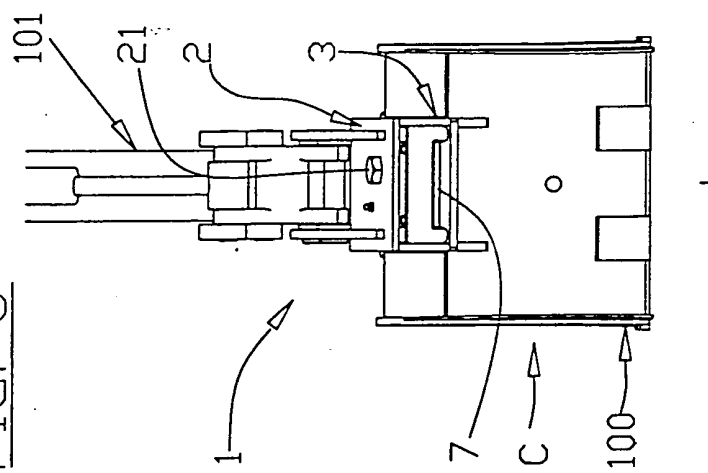


FIG. 10

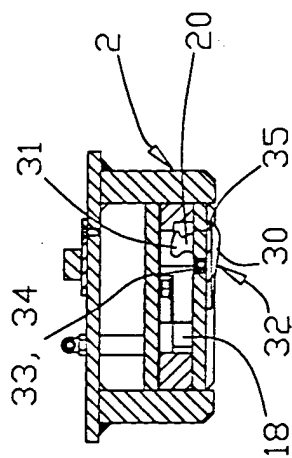


FIG. 8

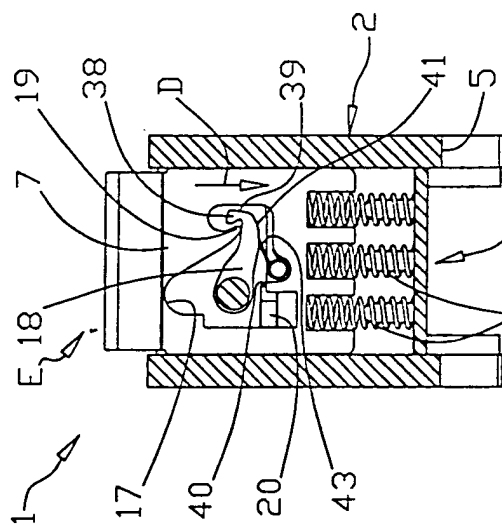


FIG. 7

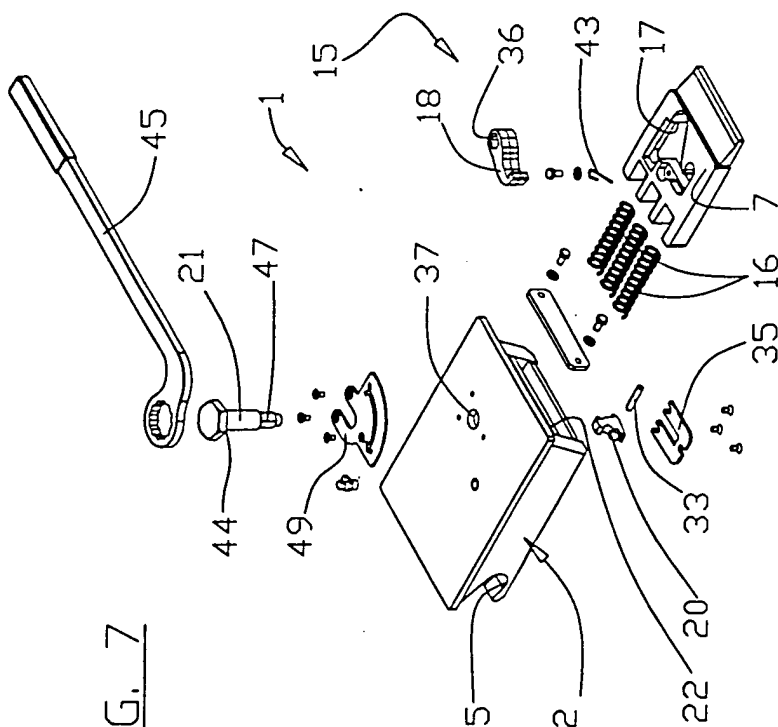


FIG. 9

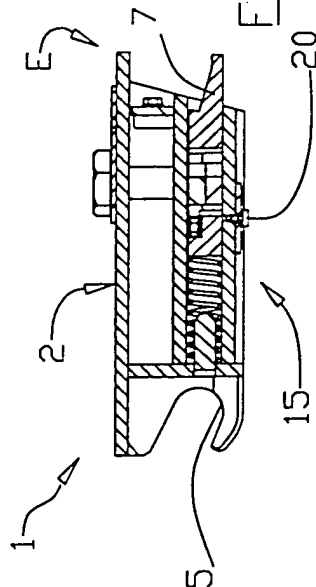


FIG. 14

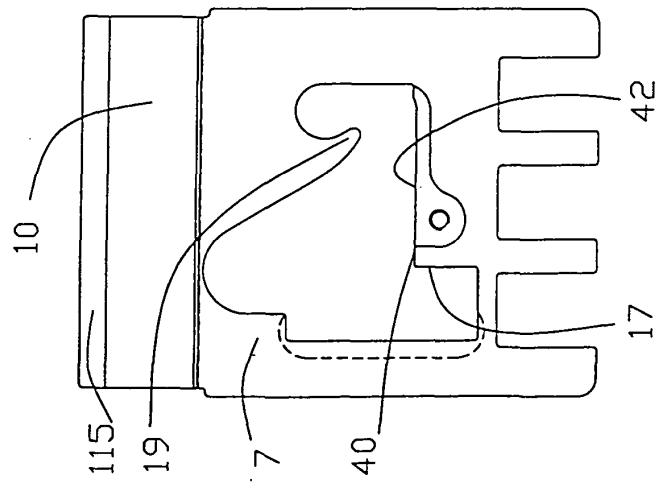


FIG. 12

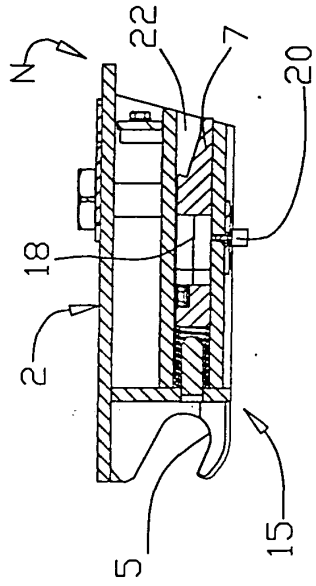


FIG. 13

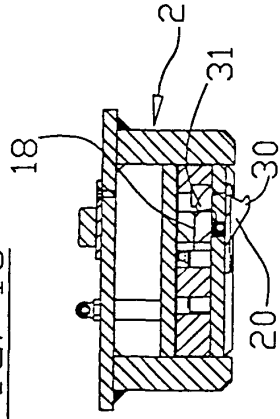


FIG. 16



FIG. 15

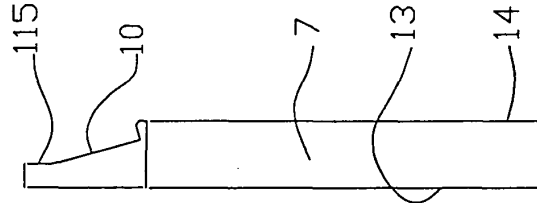
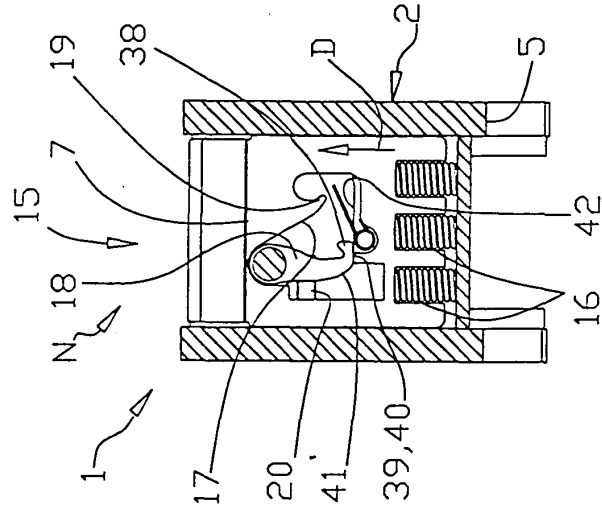


FIG. 11



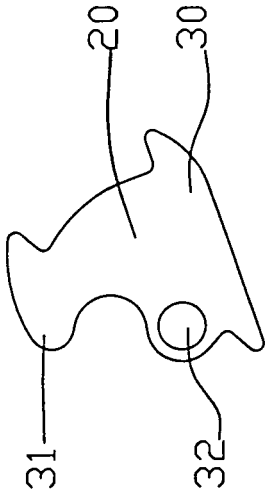


FIG. 20

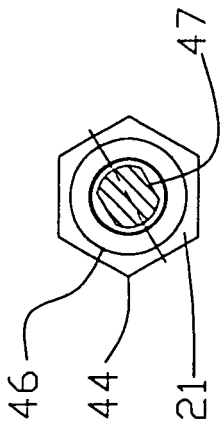


FIG. 18

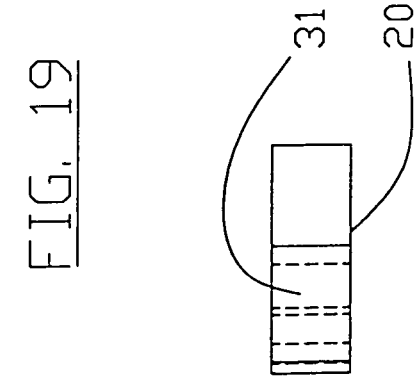


FIG. 19

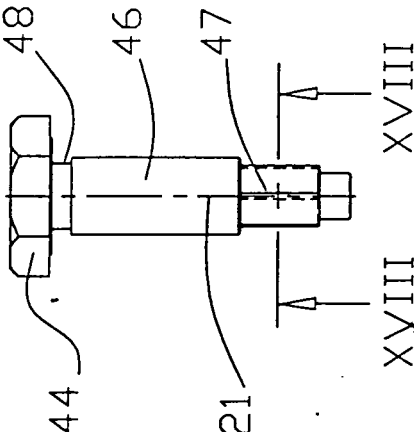


FIG. 17