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(54) A CUTTING DEVICE HAVING AN OSCILLATING BLADE FOR LEATHER CUTTING MACHINES

(57) The cutting device (100) comprises an oscillating chamber (1); an oscillating piston (10) predisposed with the head (13) in the oscillating chamber (1) and with the stem (14) connected to a cutting blade (L); a pneumatic activating system (P) communicating with the oscillating chamber (1) so as to pneumatically activate the oscillating piston (10) to vertically oscillate in the oscillating chamber (1) and therefore vertically oscillate the cutting blade (L) for cutting a leather sheet (V).

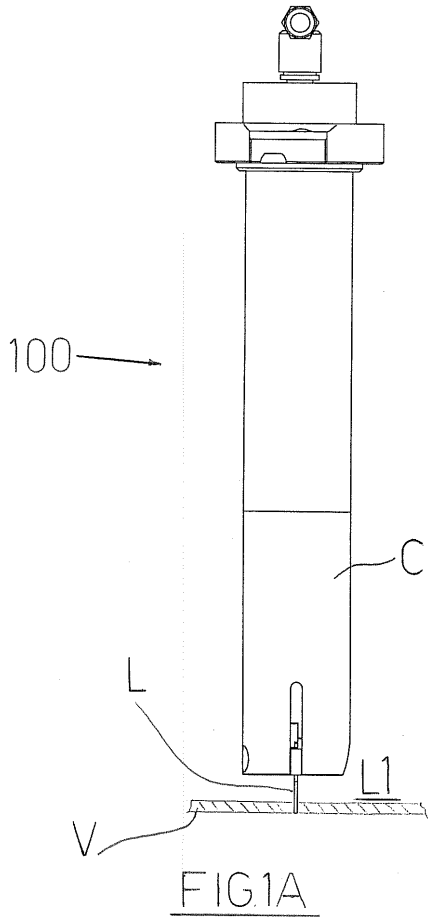

FIG1A

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to the special technical sector relative to cutting machines for cutting material in sheets or rolls, being hides such as leather sheets, leather, synthetic leathers, etc.

[0002] In particular, the present invention relates to a cutting device with an oscillating blade able to be used by and mounted on cutting machines.

DESCRIPTION OF THE PRIOR ART

[0003] In this particular sector cutting machines comprise a frame, situated above a work plane where the materials to be cut are stretched out, such as for example hides (skins, leather), synthetic leathers and the like, a cutting device inferiorly provided with a cutting blade and movement means, borne by the frame and mobile with respect thereto, for moving the cutting device along the three Cartesian axes above the work plane so that the cutting blade can be positioned above the hides, be lowered to cut the leather sheet and be moved along a given cutting pathway so as to cut the leather sheet on the basis of predetermined or desired profiles and/or shapes.

[0004] The cutting devices used for the above aim are predisposed so that the cutting blade can oscillate vertically during the cutting of the leathers, from a lower cutting position to a higher cutting position, while always remaining within the thickness of the material to be scored/cut.

[0005] A first type of cutting device at present used includes causing the cutting blade to oscillate vertically by means of a mechanical activation.

[0006] For example cutting devices are known which comprise a cam member mounted on a shaft that can be activated in rotation, the cam being in contact with a rod or another element connected to the cutting blade.

[0007] In this way, the rotation of the cam member, once the shaft has been activated in rotation, transmits an oscillating movement (alternated vertical translation) to the rod/contact member, and therefore to the cutting blade.

[0008] Types of cutting device are known that are predisposed to be able to cause the cutting blade to oscillate vertically by means of a pneumatic activation.

[0009] For example cutting devices of known type are known comprising an oscillating chamber, having an upper end-run wall and a lower end-run wall, an oscillating piston, predisposed with the head thereof in the oscillating chamber and with the relative stem connected to the cutting blade, and a pneumatic activating system communicating with the oscillating chamber to oscillate the piston in the oscillating chamber between the upper end-run wall and the lower end-run wall, and therefore to vertically oscillate the cutting blade.

[0010] In this type of cutting device of known type, the pneumatic activating system comprises a pneumatic supply source and a discharge, which are predisposed and configured so that the part of the oscillating chamber comprised between the piston head and the upper end-run wall and the part of the oscillating chamber comprised between the head of the piston and the lower end-run wall are alternatively placed in communication with the pneumatic supply and the discharge so as to enable the oscillation of the piston in the oscillating chamber.

[0011] In particular, when the pneumatic supply is placed in communication with the part of the oscillating chamber comprised between the piston head and the upper end-run surface, the part of the oscillating chamber comprised between the piston head and the lower end-run surface is in communication with the discharge, in this case the piston is pneumatically pushed downwards, while when the pneumatic supply is in communication with the part of the oscillating chamber comprised between the piston head and the lower end-run surface, the part of the oscillating chamber comprised between the piston head and the upper end-run surface is in communication with the discharge, in this case the piston is pneumatically pushed upwards, generating an upwards oscillation motion inside the oscillating chamber and the vertical oscillation of the cutting blade.

[0012] In this regard, in these devices of known type, the oscillating chamber comprises two openings and the pneumatic activating system comprises conduits, communicating with the openings and with an obturator or another valve organ such as to place each of the two openings of the oscillating chamber, via the conduits, alternatively in communication with the pneumatic source and the discharge.

[0013] The commutation of the oscillation of the piston is made by means of an obturator or a valve external to the cutting device.

SUMMARY OF THE INVENTION

[0014] The aim of the invention is therefore to provide a new cutting device having an oscillating blade for cutting leather sheets pneumatically activatable and which does not require the use of external valve means for executing the oscillation of the piston.

[0015] The above-described aim is attained by a cutting device having an oscillating blade for leather cutting machines according to the contents of claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The characteristics of the cutting device having the oscillating blade for leather cutting machines proposed by the invention are described in the following with reference to the appended tables of drawings, in which:

- figures 1A and 1B illustrate the cutting device with an oscillating blade for leather cutting machines of the invention in two distinct operating configurations

of the oscillating cutting blade during activating thereof in oscillation for performing the cut of a leather sheet, with figure A1 illustrating the lower cutting position reachable by the cutting blade during oscillation thereof, while figure 1B illustrates the upper cutting position reachable by the cutting blade during oscillation thereof;

- figure 1C illustrates the cutting device with an oscillating blade of the invention in a particular application wherein the cutting blade can be brought in a raised position with respect to the leather sheet, and then extracted and disengaged from the leather sheet, without this involving to the raising of the whole device;

- figure 2A illustrates the cutting device with oscillating blade of the invention in a first preferred but not exclusive embodiment, represented with the relative cutting blade in the operating configuration of figure 1A, i.e. in the lower cutting position reachable by the blade during oscillation thereof;

- figure 2B illustrates the view according to section plane II-II of figure 2A;

- figure 2C illustrates, in a larger scale, detail K of figure 2B;

- figure 3A illustrates the cutting device with oscillating blade of figure 2A, represented with the cutting blade in the operating configuration of figure 1B, i.e. in the upper cutting position reachable by the blade during oscillation thereof;

- figure 3B illustrates the view according to section plane III-III of figure 3A;

- figure 3C illustrates, in a larger scale, detail H of figure 3B;

- figure 4A illustrates the cutting device with oscillating blade of figure 2A, represented with the cutting blade in the special configuration of figure 1C, i.e. with the cutting blade in the non-operating configuration, i.e. in a raised position with respect to the leather sheet, and therefore disengaged from the leather sheet;

- figure 4B illustrates the view according to section plane IV-IV of figure 4A;

- figure 4C illustrates, in a larger scale, detail J of figure 4B.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] With reference to the appended tables of drawings, reference numeral (100) denotes the cutting device with oscillating blade for leather cutting machines proposed by the present invention in its entirety.

[0018] The cutting device (100) of the invention comprises a body (C), a cutting blade (L) for cutting a leather sheet (V) (or another similar material in sheet or roll form, such as leather or synthetic materials) which is stretched out on a work plane.

[0019] The cutting device (100), in this regard, is able to be mounted on cutting machines, for example, numerically controlled.

[0020] It is predisposed so as to pneumatically activate the cutting blade (L) so that it can oscillate vertically to cut the leather sheet (V).

[0021] For this purpose, the cutting device (100) is provided, internally of the body (C), with an oscillating chamber (1) having an upper end-run wall (11) and a lower end-run wall (12), and an oscillating piston (10), having a head (13) and a stem (14), the oscillating piston (10) being predisposed with the head (13) inserted in the oscillating chamber (1), between the upper end-run wall (11) and the lower end-run wall (12), and the stem (14) being connected to the cutting blade (L).

[0022] For the pneumatic activation of the vertical oscillation of the cutting blade (L), the cutting device (100) is provided with a suitable pneumatic activating system (P) which is in communication with the oscillating chamber (1).

[0023] The pneumatic activating system (P) comprises a pneumatic supply source (P1) (for example compressed air, represented schematically by a square in the appended figures) and at least a discharge (S1, S2).

[0024] The pneumatic activating system (P) is designed in such a way that the pneumatic supply source (P1) and the at least a discharge (S1, S2) are predisposed and configured so that a first part (1A) of the oscillating chamber (1) comprised between the head (13) of the oscillating piston (10) and the lower end-run wall (12) and a second part (1B) of the oscillating chamber (1) comprised between the head (13) of the oscillating piston (10) and the upper end-run wall (11) are placed in communication alternatively with the pneumatic supply source (P1) and the at least a discharge (S1, S2).

[0025] In this way, when the first part (1A) of the oscillating chamber (1) (comprised between the head (13) of the oscillating piston (10) and the lower end-run wall (12) of the oscillating chamber (1)) is in communication with the pneumatic supply source (P1), the second part (1B) of the oscillating chamber (1) (comprised between the head (13) of the oscillating piston (10) and the upper end-run wall (11) of the oscillating chamber (1)) is in communication with the at least a discharge (S1, S2) in such a way that the oscillating piston (10) can be pneumatically pushed upwards [*see for example figures 2B, 2C which illustrate this situation with the head (13) of the oscillating piston (10) in contact with the lower end-run wall (12), and therefore in the condition of being pushed upwards, i.e. towards the upper end-run wall (11) of the oscillating chamber (1)*].

[0026] In a specular way, when the first part (1A) of the oscillating chamber (1) (comprised between the head (13) of the oscillating piston (10) and the lower end-run wall (12) of the oscillating chamber (1)) is in communication with the at least a discharge (S1, S2), the second part (1B) of the oscillating chamber (1) (comprised between the head (13) of the oscillating piston (10) and the upper end-run wall (11) of the oscillating chamber (1)) is in communication with the pneumatic supply source (P1) in such a way that the oscillating piston (10) can be pneumatically pushed downwards [*see for example figures 3B, 3C which illustrate this situation with the head (13) of the oscillating piston (10) in contact with the upper end-run wall (11), and therefore in the condition of being pushed downwards, i.e. towards the lower end-run wall (12) of the oscillating chamber (1)*].

[0027] Therefore, the pneumatic activating system (P) present in the cutting device (100)) is able to pneumatically activate the oscillating piston (10) to oscillate in the oscillating chamber (1), between the lower end-run wall (12) and the upper end-run wall (11) and, consequently, to vertically oscillate the cutting blade (L).

[0028] In particular, the cutting blade (L) is thus made to oscillate vertically between a lower cutting position (L1) (see figures 1A, 2A, 2B), defined when the head (13) of the oscillating piston (10) reaches abutment against the lower end-run wall (12) of the oscillating chamber (1), and an upper cutting position (L2) (see figures 1B, 3A, 3B), defined when the head (13) of the oscillating piston (10) reaches abutment against the upper end-run wall (11) of the oscillating chamber (1).

[0029] For this purpose, the cutting device (100) is such that the upper end-run wall (11) is predisposed in the body (C) at a distance with respect to the lower end-run wall (12) so that when the head (13) of the oscillating piston (109) reaches contact with the upper end-run wall (11), the cutting blade (L) reaches an upper cutting position (L2) so that it remains always in contact with the leather sheet (V) to be cut with the aim of guaranteeing continuity of the cutting operation.

[0030] The peculiarities of the present invention consist in the peculiar structure of the pneumatic activating system (P) which does not require any external commutating valve means.

[0031] In fact, the cutting device (100) of the present invention has the below-described special characteristics concerning the ways in which the oscillating piston (10) is pneumatically activated to oscillate in the oscillating chamber (1), between the upper end-run wall (11) and the lower end-run wall (12), with the aim of activating the cutting blade (L) to oscillate vertically between the upper cutting position (L2) and the lower cutting position (L1).

[0032] The body (C) comprises a cylinder (16) while the stem (14) of the oscillating piston (10) is predisposed so as to be slidable alternatingly in the cylinder (16).

[0033] Further, the stem (14) of the oscillating piston (10) is conformed so as to exhibit: two annular portions (141, 142) in slidable contact with the walls of the cylinder (16) and an annular recess (140) comprised between the two annular portions (141, 142); an internal conduit (17); and is provided with through-holes (18) predisposed in a position below the annular recess (140) in order to place the outside of the stem (14) in communication with the internal conduit (17).

[0034] The head (13) of the oscillating piston (10) is instead provided with through-holes (130) for placing the internal conduit (17) of the stem (14) in communication with the second part (1B) of the oscillating chamber (1) comprised between the head (13) of the oscillating piston (10) and the upper end-run wall (11) of the oscillating chamber (1).

[0035] In turn, the pneumatic activating system (P) comprises: a switching chamber (8) in a portion of the internal walls of the cylinder (16), a main conduit (81) predisposed in the body (C) so as to be in communication with the pneumatic supply source (P1) and with a lower part of the switching chamber (8); a secondary conduit (82) predisposed in the body (C) so as to be in communication with an upper part of the switching chamber (8) and with the oscillating chamber (1) through a passage hole (83) in the lower end-run wall (12) of the oscillating chamber (1); an upper discharge (S1) communicating with outside realised in the cylinder (16) in a position above the switching chamber (8) and a lower discharge (S2) communicating with outside realised in the cylinder (16) in a position below the switching chamber (8).

[0036] In particular, the annular recess (140) of the stem (14) has dimensions such that, and with the holes (18) of the stem (14) positioned with respect to the annular recess (140) such that, with the alternating sliding of the stem (14) internally of the cylinder (16), the following conditions and situations are established:

when the annular recess (140) of the stem (14) is positioned at the switching chamber (8), the holes (18) of the stem (14) are positioned at the lower discharge (S2), so that the main conduit (81) is in communication through the annular recess (140) with the secondary conduit (82) and therefore the pneumatic supply source (P1) is in communication with the first part (1A) of the oscillating chamber (1) between the head (13) of the oscillating piston (10) and the lower end-run wall (12), while the second part (1B) of the oscillating chamber (1) between the head (13) of the oscillating piston (10) and the upper end-run wall (11) is in communication with the lower discharge (S2) through the through-holes (130) of the head (13) of the oscillating piston (10), the internal conduit (17) of the stem (14) and the holes (18) of the stem (14), so that the oscillating piston (10) can be pneumatically pushed upwards (see for example figures 2B, 2C)

and when the annular recess (140) of the stem (14) is positioned at both the upper discharge (S1) and

the upper part of the switching chamber (8) communicating with the secondary conduit (82), the holes (18) of the stem (14) are in the lower part of the switching chamber (8) and communicating with the main conduit (81), so that the pneumatic supply source (P1), through the holes (18) of the stem (14), the internal conduit (17) of the stem (14) and the through-holes (130) present in the head (13) of the oscillating piston (10), is in communication with the second part (1B) of the oscillating chamber (1) between the upper end-run wall (11) and the head (13) of the oscillating piston (10), while the first part (1A) of the oscillating chamber (1) between the head (13) of the oscillating piston (10) and the lower end-run wall (12) is in communication with the upper discharge (S1) through the secondary conduit (82), so that the oscillating piston (10) can be pneumatically pushed downwards (see for example figures 3B, 3C).

[0037] By way of example, in the following a possible operating cycle of the cutting device (100) of the invention is described, starting for example from the situation illustrated in figures 2B and 2C, in which the pneumatic supply source (P1) is active and the oscillating piston (10) has the relative head (13) in contact with the lower end-run wall (12) of the oscillating chamber (1), i.e. with the cutting blade (L) which is in the lower cutting position (L1).

[0038] In this situation, the stem (14) of the oscillating piston (10) is, with respect to the cylinder (16) of the body (C), in a position such that the recess (140) of the stem (14) is positioned at the switching chamber (8), placing the main conduit (81) in communication with the secondary conduit (82), while the holes (18) of the stem (14) are positioned at the lower discharge (S2).

[0039] Therefore the pneumatic supply source (P1), via the main conduit (81), the switching chamber (8) the secondary conduit (82) and the passage hole (83) is in communication with the first part (1A) of the oscillating chamber (1) comprised between the head (13) of the oscillating piston (10) and the lower wall (12) of the oscillating chamber (1), while the second part (1B) of the oscillating chamber (1) comprised between the head (13) of the oscillating piston (10) and the upper wall (11) of the oscillating chamber (1), via the holes (130) of the head (13), the internal conduit (17) of the stem (14) and the holes (18) of the stem (14), is in communication with the lower discharge (S2).

[0040] The pneumatic flow originating from the pneumatic supply source (P1) therefore arrives in the first part (1A) of the oscillating chamber (1), below the head (13) of the oscillating piston (10), consequently pushing it upwards, as the second part (1B) of the oscillating chamber (1), above the head (13) of the oscillating piston (10), is connected with the lower discharge (S2).

[0041] The oscillating piston (10) is thus pushed upwards, with a contextual sliding upwards of the stem (14) thereof in the cylinder (16) and a displacement upwards of the cutting blade (L).

[0042] When the head (13) of the oscillating piston (10) abuts against the upper end-run wall (11) of the oscillating chamber (1), (see figures 3B, 3C), the cutting blade (L) reaches the upper cutting position (L2) thereof, while the upwards sliding of the stem (14) in the cylinder (16) of the body (C) determines the following condition (see in particular figure 3C):
the holes (18) of the stem (14) are at the lower part of the switching chamber (8) and therefore communicating with the main conduit (81), the recess (140) of the stem (14) is positioned at both the upper discharge (S1) and the upper part of the switching chamber (8), and are therefore communicating with the secondary conduit (82).

[0043] In this situation, the main conduit (81), through the holes (18) of the stem (14), the internal conduit (17) of the stem (14) and the holes (130) of the head (13) of the oscillating piston (10), is in communication with the second part (1B) of the oscillating chamber (1) comprised between the head (13) of the oscillating piston (10) and the upper wall (11) of the oscillating chamber (1), while the first part (1A) of the oscillating chamber (1) below the head (13) of the oscillating piston (10), through the passage holes (83) and the secondary conduit (82), is communicating with the upper discharge (S1).

[0044] Therefore, the pneumatic flow originating from the pneumatic supply source (P1) arrives in the second part (1B) of the oscillating chamber (1), above the head (13) of the oscillating piston (10), consequently pushing it downwards, as the first part (1A) of the oscillating chamber (1), below the head (13) of the oscillating piston (10), is connected with the upper discharge (S1): the oscillating piston (10) is thus pushed downwards, with a contextual sliding downwards of the stem (14) in the cylinder (16) and a downwards displacement of the cutting blade (L), in order to return into the preceding situation, see figure 2C i.e. into the lower cutting position (L1) thereof.

[0045] The cycle described in the following is repeated as long as the pneumatic supply source (P1) is active, thus determining the oscillation of the cutting blade (L) between the lower cutting position (L1) and the upper cutting position (L2).

[0046] Therefore, grace of the peculiar structure and configuration of the pneumatic activating system according to the present invention, as above described, the commutation of the oscillation of the piston is activated by the same piston, on the basis of the position of the relative stem within the cylinder, and in particular with respect to the switching chamber and to the two discharges.

[0047] The peculiar pneumatic activating system of the present invention finds its application in all the cutting device wherein the oscillation of the cutting blade is required for cutting, and, for example, also in those cutting device wherein it is necessary to raise and extract the cutting blade above the leather sheet as shown in figure 1C.

[0048] In these cases, as shown for example in figures

2B, 2C, 3B, 4B and 4C, the cutting device (100) comprises also an auxiliary chamber (2) and an auxiliary piston (23), having a head (24) and a stem (25).

[0049] In particular, the auxiliary chamber (2) is arranged superiorly of the oscillating chamber (1) and is provided with an opening (20) predisposed so as to be in communication with the pneumatic supply source (P1), and has an upper abutment surface (21) and a lower abutment surface (22), while the auxiliary piston (23) is predisposed in such a way that the head (24) thereof is situated internally of the auxiliary chamber (2) and the relative stem (25) is connected to the head (13) of the oscillating piston (10) through a hole (110) present in the upper end-run wall (11) of the oscillating chamber (1).

[0050] In greater detail, the auxiliary chamber (2) and the stem (25) of the auxiliary piston (23) are dimensioned in such a way that the auxiliary piston (23), when the pneumatic supply source (P1) is active such as to oscillate the oscillating piston (10) in the oscillating chamber (1) between the lower end-run wall (12) and the upper end-run wall (11), oscillates in the auxiliary chamber (2) up to reaching at most an upper end-run position (FC) which is distant from and below the upper abutment surface (21) of the auxiliary chamber (2) (see for example figure 3B).

[0051] The cutting device (100), in these cases, comprises a thrust element (3) which is predisposed in the auxiliary chamber (2) in such a way as to be interposed between the head (24) of the auxiliary piston (23) and the surface of the lower abutment surface (22) of the auxiliary chamber (2).

[0052] For example, the thrust element (3) can be constituted by a sleeve having a passage hole for sliding passage of the stem (25) of the auxiliary piston (23) having a shape such as to be interposed between the head (24) of the auxiliary piston (23) and the lower abutment surface (22) of the auxiliary chamber (2), and to constitute an abutment for the head (24).

[0053] In particular, during activation of the pneumatic supply source (P1) for pneumatically activating the oscillating piston (10) in the oscillating chamber (1), and thus vertically oscillating the cutting blade (L) between the lower cutting position (L1) and the upper cutting position (L2), the thrust element (3) is such as to be maintained pneumatically in contact with the lower abutment surface (22) by means of a pneumatic flow which enters from the opening (20) of the auxiliary chamber (2) which is in communication with the pneumatic supply source (P1).

[0054] The thrust element (3), following the deactivation of the pneumatic supply source (P1), is activatable to raise and push upwards the head (24) of the auxiliary piston (23) and thus raise the auxiliary piston (23) up to placing it with the head (24) thereof in abutment against the upper abutment surface (21) of the auxiliary chamber (2) with a contextual raising of the oscillating piston (10) (the stem (25) of the auxiliary piston (23) is connected to the head (13) of the oscillating piston (10) as mentioned in the foregoing) and thus the raising of the cutting blade (L) above the upper cutting position (L2).

[0055] For these purposes, the upper end-run wall (11) of the oscillating chamber (1) is configured and predisposed in the body (C) in such a way as:

> to be able to assume a static configuration in a predetermined working position (PL) (figures 2B, 2C, 3B, 3C), during activation of the pneumatic supply source (P1) in order to define the upper end-run limit of the oscillating piston (10) in the oscillating chamber (1),
>
> and when the pneumatic supply source (P1) is deactivated and the thrust element (3) is activated to raise, to be dynamically movable upwards with respect to the body (C) in order to enable a raising of the oscillating piston (10) up to when the auxiliary piston (23) reaches abutment with the head (24) thereof against the upper abutment surface (21) of the auxiliary chamber (2) .

[0056] Therefore, immediately and contextually with the deactivation of the pneumatic supply source (P1), the cutting blade (L) is lifted into a raised position (LR) above the upper cutting position (L2) thereof beyond the thickness of the leather sheet (V), and thus be extracted and disengaged completely from the leather sheet (V) (figures 1C, 4A and 4B), all without requiring any movement or raising of the whole device or the body of the device bearing the cutting blade.

[0057] According to a possible embodiment, shown by way of example in the figures, the cutting device (100) can be predisposed and configured, for the purposes of the raising activation of the thrust element (3), so as to comprise an elastic element (31).

[0058] The elastic element (31) is predisposed so as to be interposed between the thrust element (3) and the lower abutment surface (22) of the auxiliary chamber (2),

[0059] In particular, the elastic element (31) is configured in such a way as to be compressable and be elastically loadable when the thrust element (3) is maintained pneumatically in contact with the lower abutment surface (22) by a pneumatic flow which enters from the opening (20) of the auxiliary chamber (2) communicating with the pneumatic supply source (P1), during the activation of the pneumatic supply source (P1).

[0060] In this way the elastic element (31) is placed in the condition to be able to elastically activate the raising of the thrust element (3) to push the head (24) of the auxiliary piston (23) upwards and therefore push and lift upwards the auxiliary piston (23) and bring the relative head (24) against the upper abutment surface (21) following the deactivation of the pneumatic supply source (P1), and therefore raise the oscillating piston (10) and consequently the cutting blade (L) into the raised position (LR), extracted and disengaged from the leather sheet (V).

[0061] In this regard, the thrust element (3) comprises an inferiorly open annular seating (32), while the elastic element (31) is constituted by a helical spring (31) predisposed in the annular seating (32) so as to be in contact with a relative lower end with the lower abutment surface (22) of the auxiliary chamber (2).

[0062] The cutting device (100), in the case it is configured to made the raising and extraction of the cutting blade above from the leather sheet, further comprises:

a manoeuvring chamber (4) inside the body (C), between the oscillating chamber (1) and the auxiliary chamber (2);

a piston (40) predisposed in the manoeuvring chamber (4) and having a lower wall (41) and provided with a through hole (42) for passage of the stem (25) of the auxiliary piston (23) for connection thereof with the head (13) of the oscillating piston (10):

a connecting element (43) which connects and constrains the piston (40) to the thrust element (3) through a passage hole (28) present in the lower abutment surface (22) of the auxiliary chamber (2).

[0063] In this way, when the thrust element (3) is maintained pneumatically in contact with the lower abutment surface (22) of the auxiliary chamber (2) by means of a pneumatic flow which enters from the opening (20) of the auxiliary chamber (2) communicating with the pneumatic supply source (P1) during the activation of the pneumatic supply source (P1), the piston (40) is maintained, by the connecting element (43) with the thrust element (3), in a predetermined position so that the relative lower wall (41) is positioned in said working position (PL) in order to constitute the upper end-run wall (11) of the oscillating chamber (1) and to define the upper end-run limit of the oscillating piston (10) (figures 2B, 2C, 3B, 3C).

[0064] Further, owing to the presence of the connecting element (43) between the thrust element (3) and the piston (40), when the pneumatic supply source (P1) is deactivated and the thrust element (3) is raised, by means of the elastic element (31), to push and raise the auxiliary piston (23) against the upper abutment surface (21) of the auxiliary chamber (2), the piston (40) is also raised in the manoeuvring chamber (4) and the relative lower wall (41) displaced upwards so as to enable the raising of the oscillating piston (10) beyond the upper end-run limit reached in the oscillating run thereof and thus enable the raising of the cutting blade (L) into the raised position (LR).

[0065] The connecting element (43) comprises a stem (44) that is internally hollow and a head (45) at a lower end of the stem (44), the connecting element (43) is predisposed in the manoeuvring chamber (4) so that the upper end of the stem (44) is fixed to the thrust element (3) through the passage hole (28) in the lower abutment surface (22) of the auxiliary chamber (2), the head (45) is connected and fixed to the piston (40), while the stem (44) slidably accommodates internally thereof the stem (25) of the auxiliary piston (23).

[0066] The manoeuvring chamber (4) comprises, at or in proximity of the upper part thereof, an opening (48) communicating with the pneumatic supply source (P1) of the pneumatic activating system (P), so that when the pneumatic supply source (P1) is active, a pneumatic flow enters the manoeuvring chamber (4) and acts on the head (45) of the connecting element (43) to keep the piston (40) pushed downwards and thus maintain the lower surface (41) thereof which defines the upper end-run wall (11) of the oscillating chamber (1) stably stationary in the work position (PL), thus preventing the impacts and abutments of the head (13) of the oscillating piston (10) from displacing the piston (40) upwards.

[0067] At the moment when there is a need to change cutting direction, and therefore to disengage and completely extract the cutting blade (L) of the leather sheet (V), it will be sufficient to deactivate the pneumatic supply source (P1) and the thrust element (3) will be activated to rise so as to push and lift the auxiliary piston (23) up to setting the relative head (24) in abutment against the upper abutment surface (21) of the auxiliary chamber (2), thus also causing the lifting of the connecting element (43) which displaces the piston (40) upwards, thus enabling the oscillating piston (10) to be raised, owing to the connection of the relative head (13) with the stem (25) of the auxiliary piston (23), beyond the upper end-run height normally reached during the oscillation thereof (i. e. beyond the height of the upper end-run wall (11) of the oscillating chamber (1) defined by the lower part (41) of the piston (40) when positioned in the working position (PL)), and thus raise the cutting blade (L) into the raised position (LR) thereof, disengaging and extracting it from the leather sheet (V).

Claims

1. A cutting device (100) having an oscillating blade for leather cutting machines, comprising:

a body (C);

a cutting blade (L) for cutting a leather sheet (V) stretched on a work plane;

an oscillating chamber (1) internally of the body (C) comprising an upper end-run wall (11) and a lower end-run wall (12);

an oscillating piston (10), having a head (13) and a stem (14), the oscillating piston (10) being predisposed with the head (13) inserted in the oscillating chamber (1), between the upper end-run wall (11) and the lower end-run wall (12), and the stem (14) being connected to the cutting blade (L);

a pneumatic activating system (P) communicating with the oscillating chamber (1), the pneumatic activating system (P) comprising a pneu-

matic supply source (P1) and at least a discharge (S1, S2) which are predisposed and configured so that a first part (1A) of the oscillating chamber (1) comprised between the head (13) of the oscillating piston (10) and the lower end-run wall (12) and a second part (1B) of the oscillating chamber (1) comprised between the head (13) of the oscillating piston (10) and the upper end-run wall (11) are placed in communication alternatively with the pneumatic supply source (P1) and the at least a discharge (S1, S2) in such a way as to pneumatically activate the oscillating piston (10) to oscillate inside the oscillating chamber (1) between the lower end-run wall (12) and the upper end-run wall (11), and therefore to cause the cutting blade (L) to oscillate vertically between a lower cutting position (L1) of the leather sheet (V) and an upper cutting position (L2) of the leather sheet (V),
the upper end-run wall (11) being predisposed in the body (C) with respect to the lower end-run wall (12) so that when the cutting blade (L) reaches the upper cutting position (L2) during the vertical oscillation thereof it remains in contact with the leather sheet (V) to be cut;
the body (C) comprising a cylinder (16) and in that the stem (14) of the oscillating piston (10) is predisposed so as to be slidable alternatingly in the cylinder (16);
characterised in that:

the stem (14) of the oscillating piston (10) being conformed so as to exhibit: two annular portions (141, 142) in slidable contact with the walls of the cylinder (16) and an annular recess (140) comprised between the two annular portions (141, 142), an internal conduit (17) and being provided with through-holes (18) predisposed in a position below the annular recess (140) in order to place the outside of the stem (14) in communication with the internal conduit (17);
the head (13) of the oscillating piston (10) being provided with through-holes (130) for placing the internal conduit (17) of the stem (14) in communication with the second part (1B) of the oscillating chamber (1) comprised between the head (13) of the oscillating piston (10) and the upper end-run wall (11) of the oscillating chamber (1);
the pneumatic activating system (P) comprising: a switching chamber (8) in a portion of the internal walls of the cylinder (16), a main conduit (81) predisposed in the body (C) so as to be in communication with the pneumatic supply source (P1) and with a lower part of the switching chamber (8), a secondary conduit (82) predisposed in the body (C) so as to be in communication with an upper part of the switching chamber (8) and with the oscillating chamber (1) through a passage hole (83) in the lower end-run wall (12) of the oscillating chamber (1), an upper discharge (S1) communicating with outside realised in the cylinder (16) in a position above the switching chamber (8) and a lower discharge (S2) communicating with outside realised in the cylinder (16) in a position below the switching chamber (8);
the annular recess (140) of the stem (14) having dimensions such that, and with the holes (18) of the stem (14) being positioned with respect to the annular recess (140) such that, with the alternating sliding of the stem (14) internally of the cylinder (16):

when the annular recess (140) of the stem (14) is positioned at the switching chamber (8), the holes (18) of the stem (14) are positioned at the lower discharge (S2), so that the main conduit (81) is in communication through the annular recess (140) with the secondary conduit (82) and therefore the pneumatic supply source (P1) is in communication with the first part (1A) of the oscillating chamber (1) between the head (13) of the oscillating piston (10) and the lower end-run wall (12), while the second part (1B) of the oscillating chamber (1) between the head (13) of the oscillating piston (10) and the upper end-run wall (11) is in communication with the lower discharge (S2) through the through-holes (130) of the head (13) of the piston (10), the internal conduit (17) of the stem (14) and the holes (18) of the stem (14), so that the oscillating piston (10) can be pneumatically pushed upwards;
and when the annular recess (140) of the stem (14) is positioned at both the upper discharge (S1) and the upper part of the switching chamber (8) communicating with the secondary conduit (82), the holes (18) of the stem (14) are in the lower part of the switching chamber (8) and communicating with the main conduit (81), so that the pneumatic supply source (P1), through the holes (18) of the stem (14), the internal conduit (17) of the stem (14) and the through-holes (130) present in the head (13) of the oscillating piston (10), is in communication with the second part (1B) of the oscillating chamber (1) be-

tween the upper end-run wall (11) and the head (13) of the oscillating piston (10), while the first part (1A) of the oscillating chamber (1) between the head (13) of the oscillating piston (10) and the lower end-run wall (12) is in communication with the upper discharge (S1) through the secondary conduit (82), so that the oscillating piston (10) can be pneumatically pushed downwards.

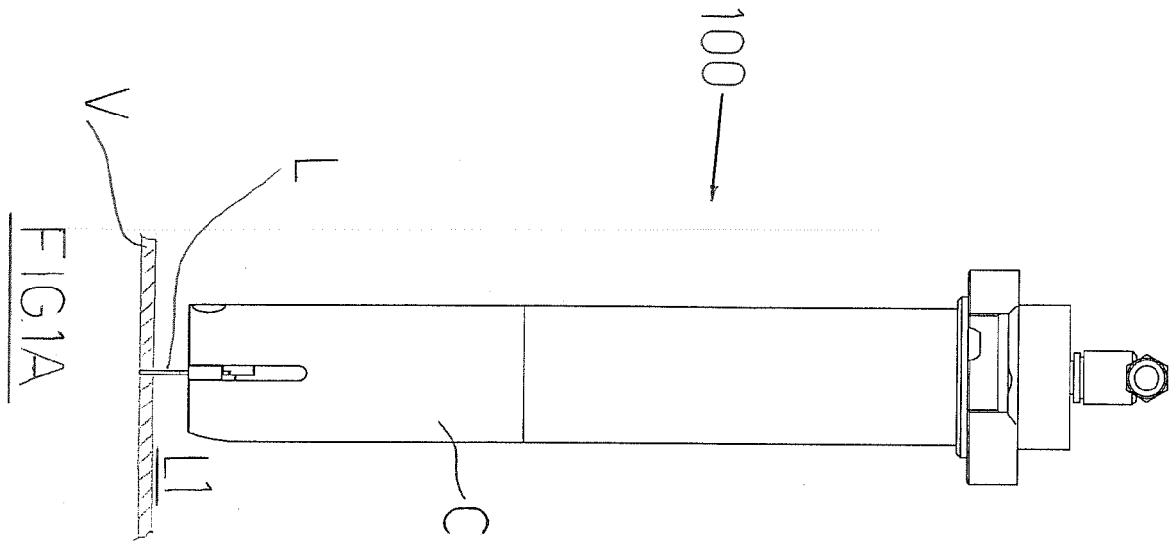


FIG.1A

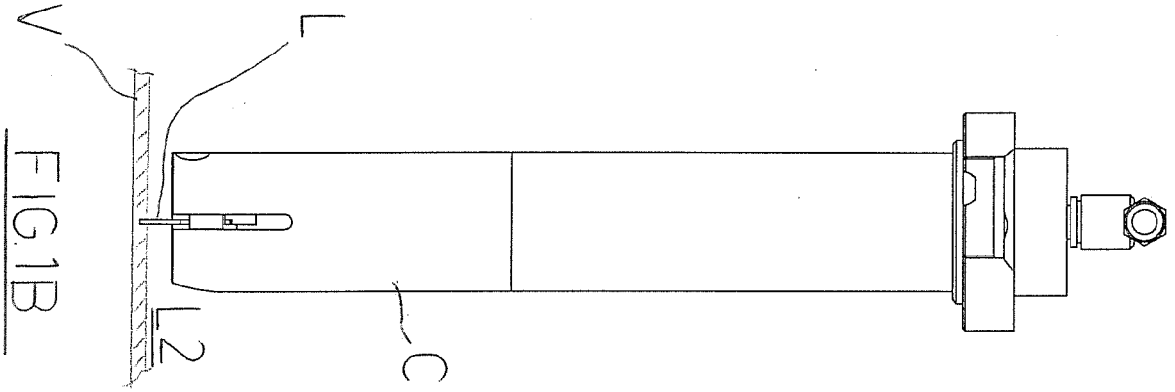


FIG.1B

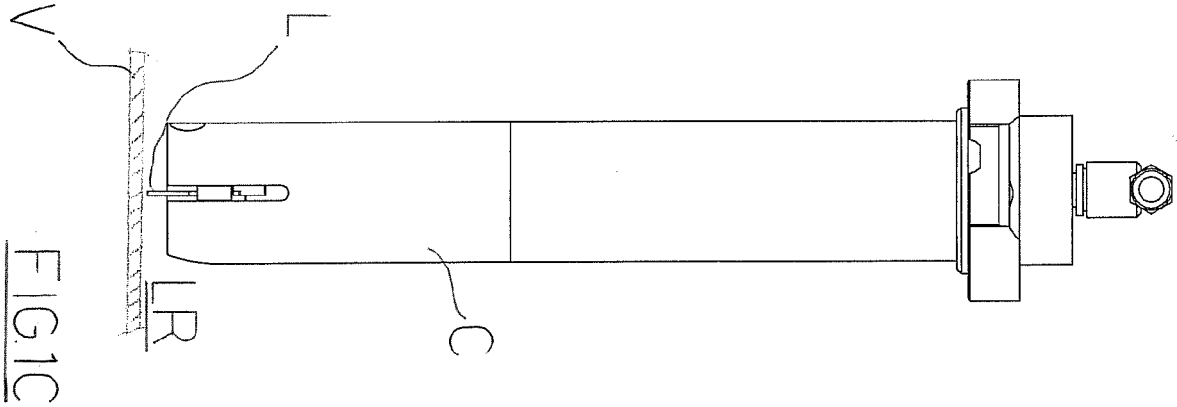


FIG.1C

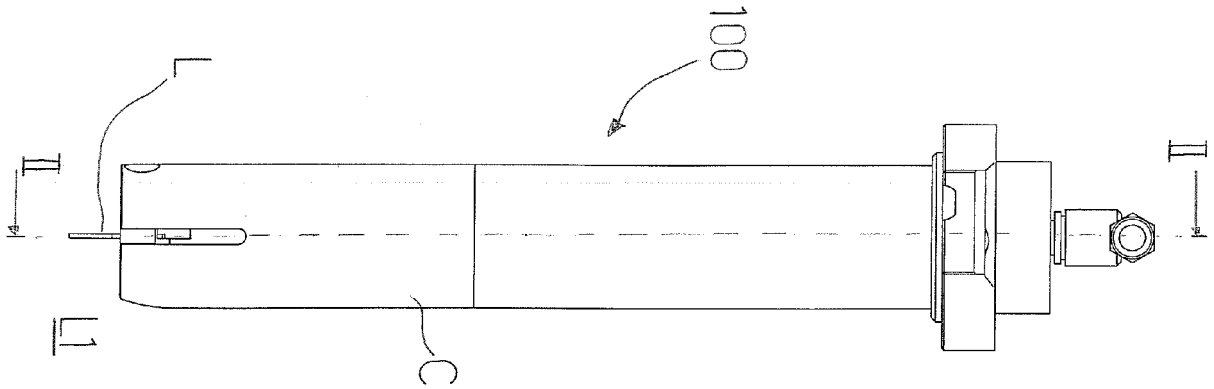

100
L
II
II
L1
C

FIG.2A

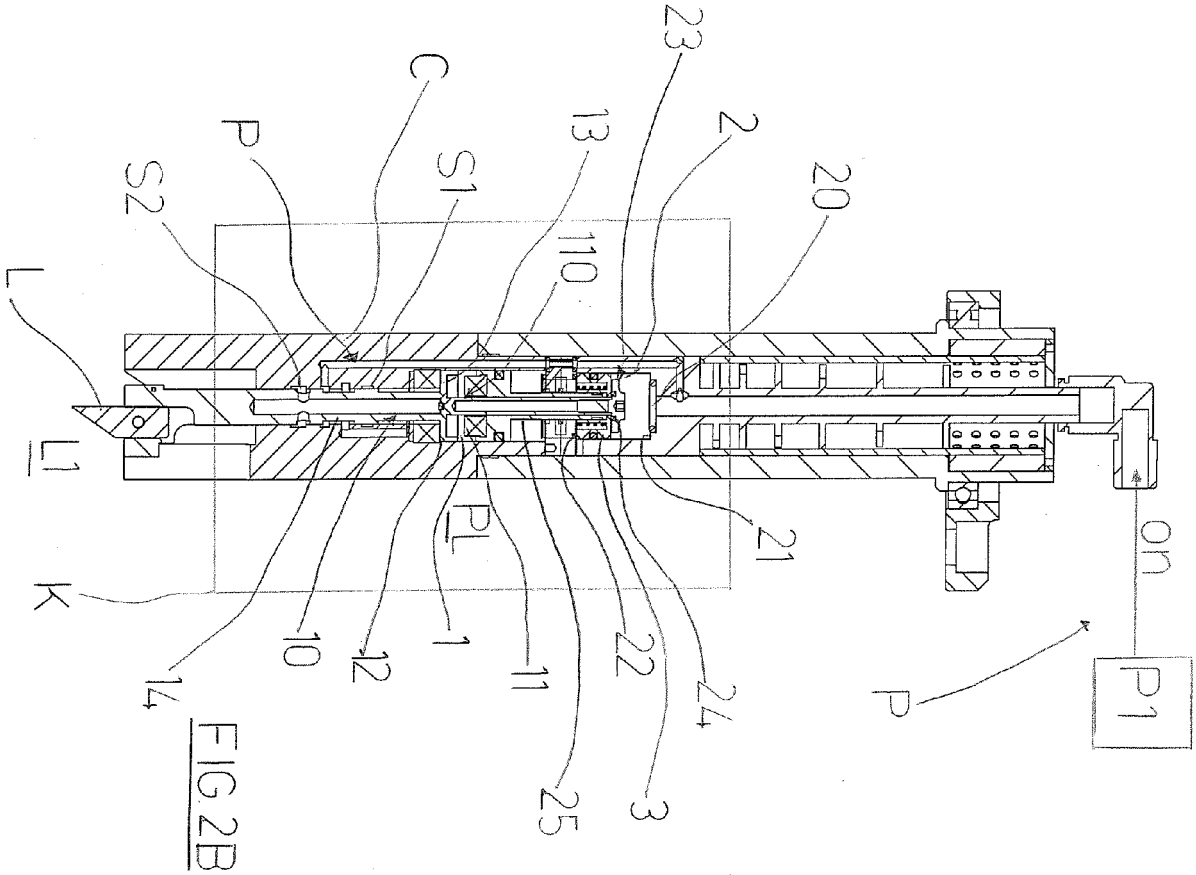

23
C
2
P
13
S1
20
S2
110
L
L1
PL
21
on
K
10
12
1
11
22
24
14
25
3
P
P1

FIG.2B

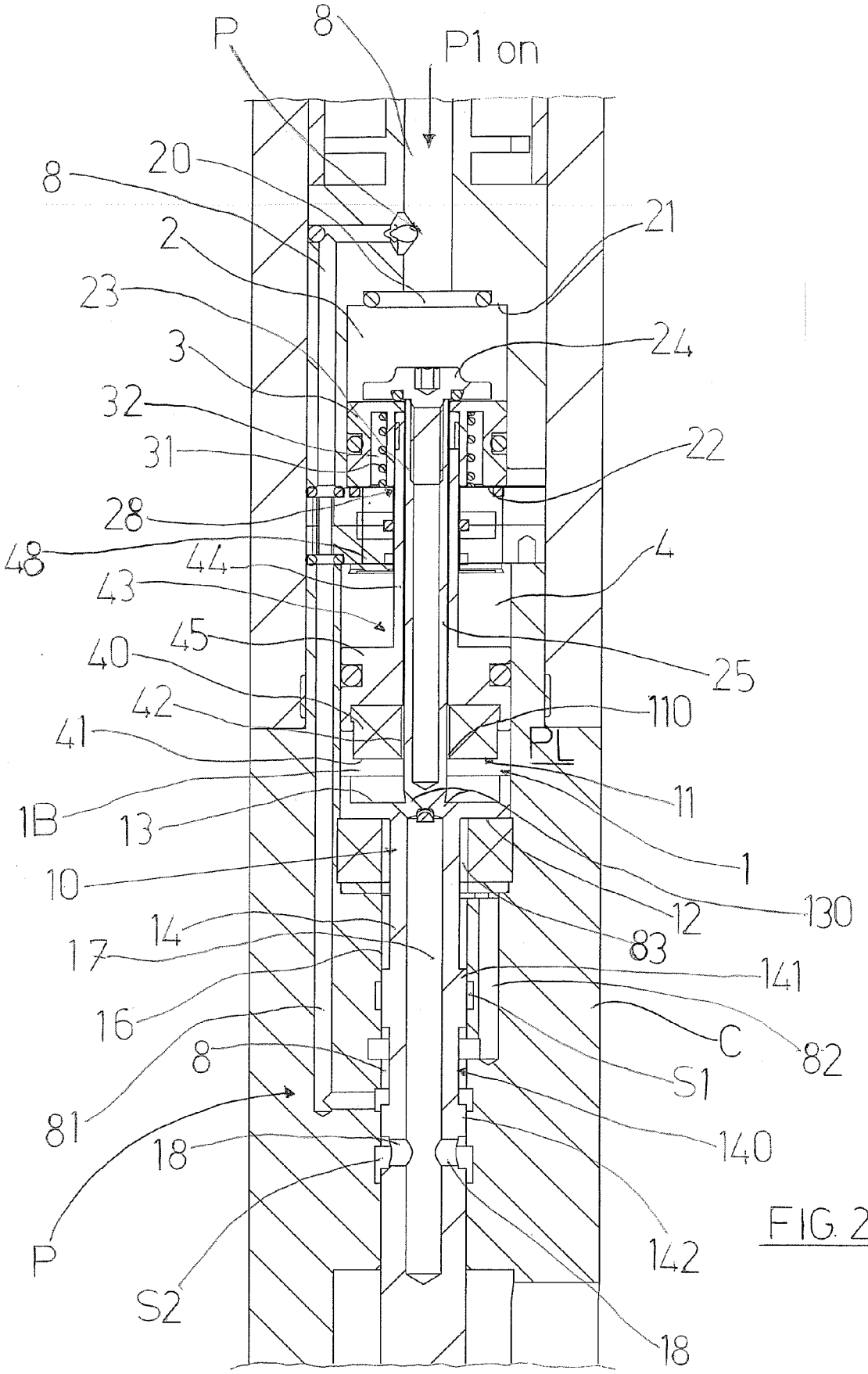

P
8
P1 on
20
8
2
21
23
24
3
32
31
22
28
48
44
4
43
45
25
40
42
110
41
PL
11
1B
13
1
10
12
130
14
83
17
141
16
C
82
8
S1
81
140
18
P
142
S2
18

FIG. 2C

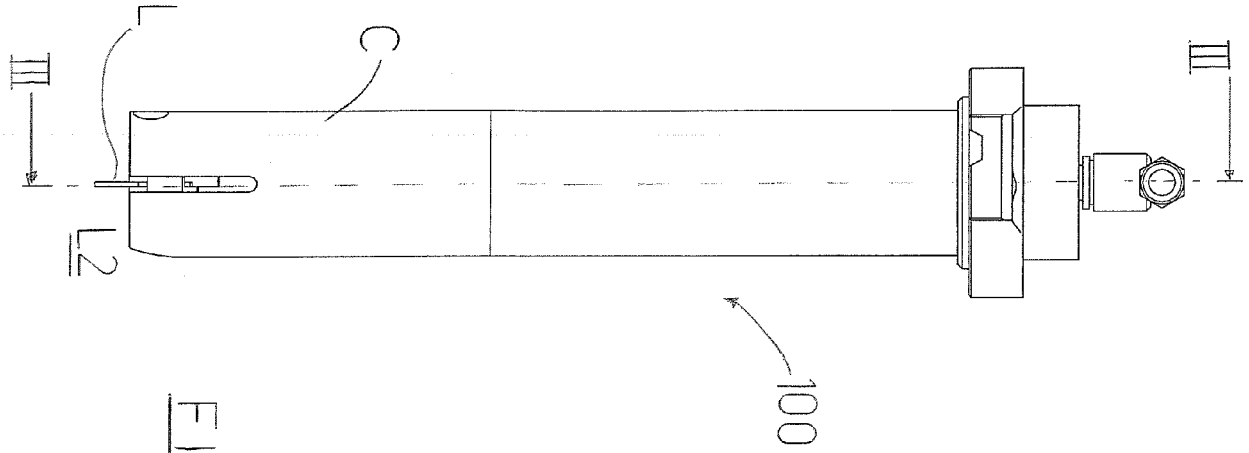

L
C
III
III
L2
100

FIG. 3A

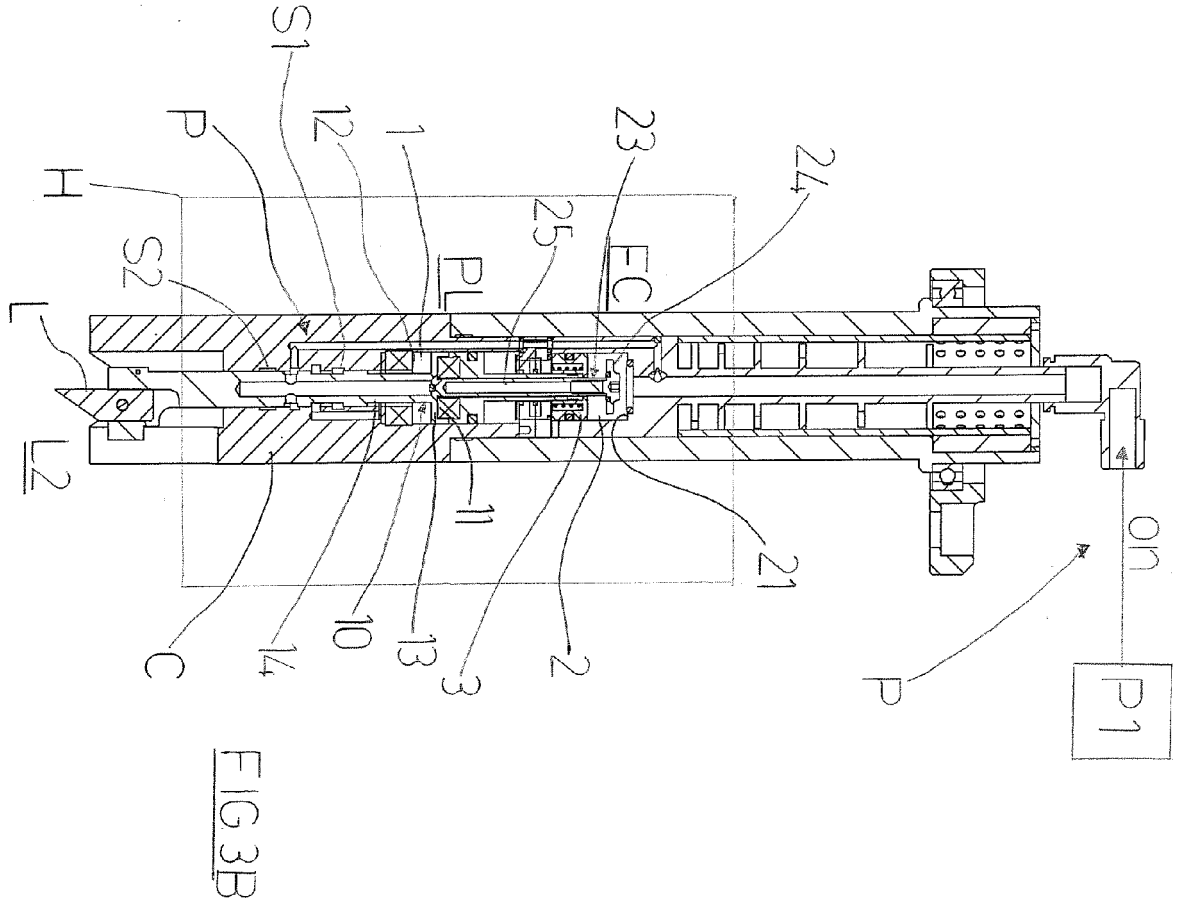
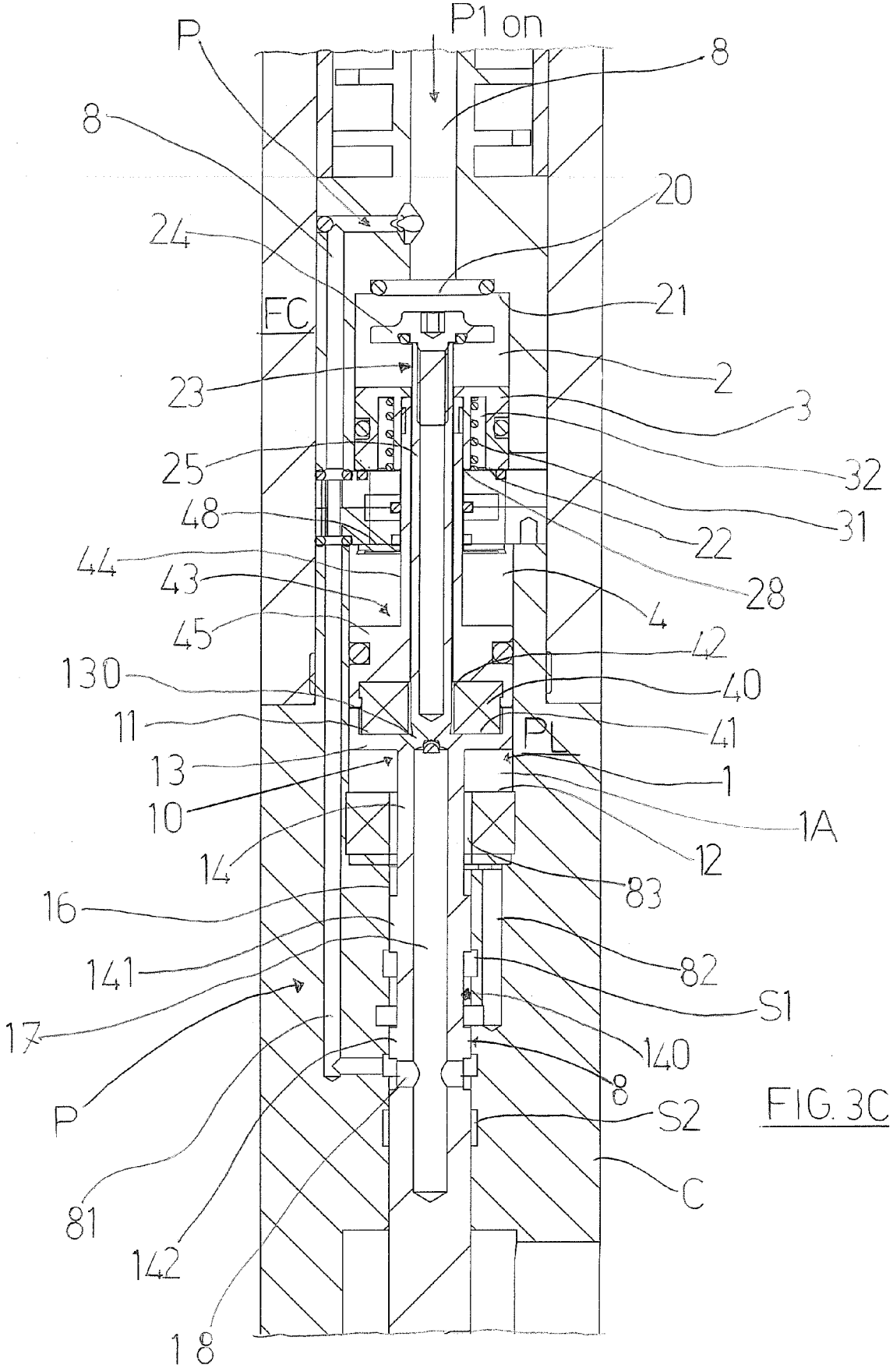

S1
P
12
1
23
27
H
25
S2
PL
EC
L
L2
11
21
On
C
14
10
13
3
2
P
P1

FIG 3B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P1 on
8
8
20
24
FC
21
23
2
3
25
32
48
31
22
44
43
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42
130
40
11
41
PL
13
1
10
1A
12
14
83
16
82
141
S1
17
140
8
P
S2
C
81
142
18

FIG. 3C

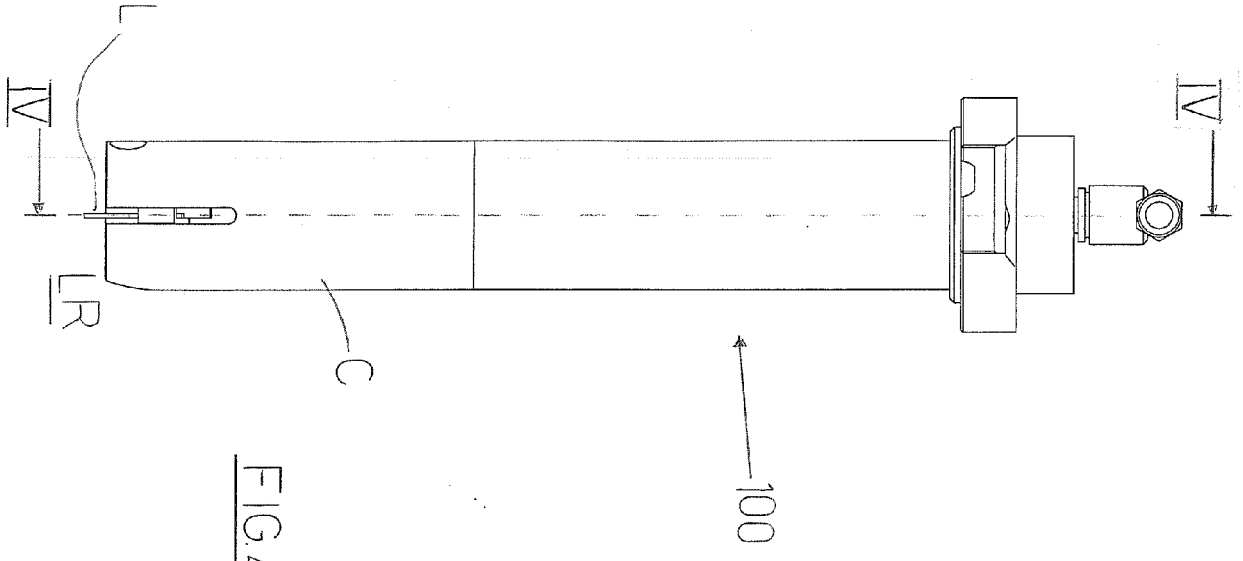


FIG.4A

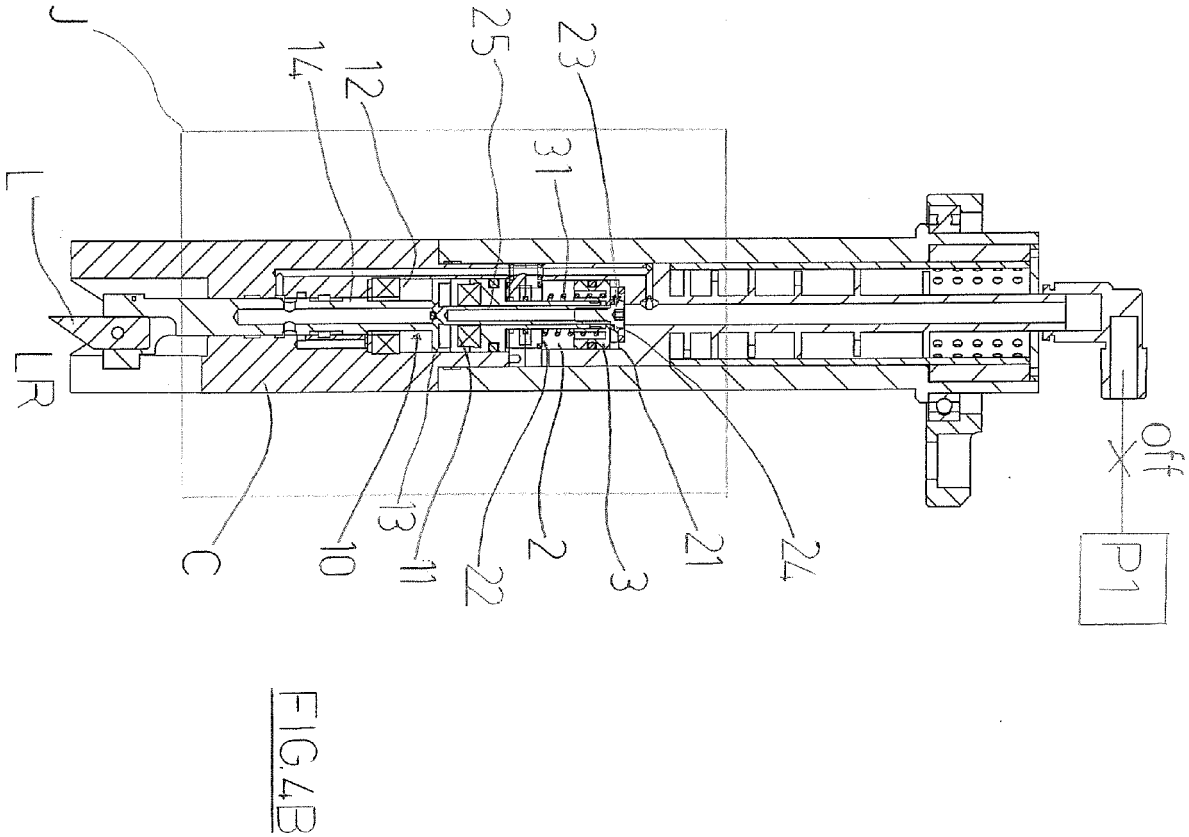
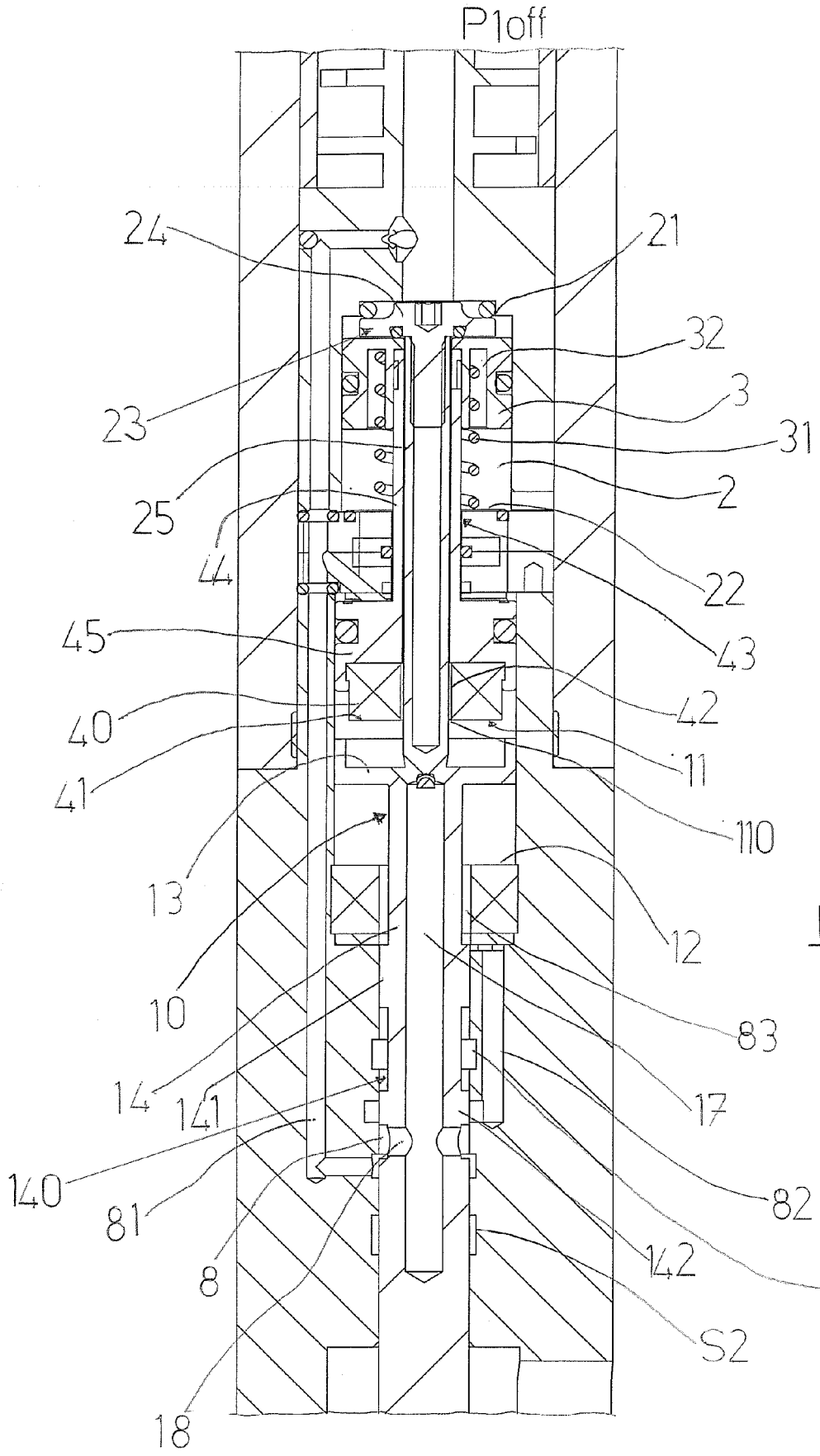


FIG.4B


P1off
24
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23
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25
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45
42
40
11
41
110
13
12
10
83
14
17
141
140
82
81
142
8
S1
S2
18

FIG 4C

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EUROPEAN SEARCH REPORT

Application Number
EP 18 21 2813

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2015/154830 A1 (COMELZ SPA [IT]) 15 October 2015 (2015-10-15) * page 1, line 7 - page 3, line 13 *	1	INV. C14B5/00 A43D8/00 B26D5/04
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C14B
A43D
B26D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 January 2019	Bichi, Marco

CATEGORY OF CITED DOCUMENTS

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15-01-2019

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