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(54) **A blocking device**

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Dispositif de blocage

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(73) Proprietor: **Emmegi S.P.A.
41010 Soliera (MO) (IT)**

(72) Inventors:
• **Villa, Marco
42122 Reggio Emilia (IT)**
• **Ghizzoni Giulio
42017 Novellara (Regio Emilia) (IT)**

(74) Representative: **Gotra, Stefano
BUGNION S.p.A.
Via M. Vellani Marchi, 20
41124 Modena (IT)**

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Description

[0001] The invention relates to a blocking device which can be used in a cutting-off machine for keeping stationary a work-piece. The invention further relates to a cutting-off machine comprising a blocking device of the above-mentioned type.

[0002] To block a work-piece on a cutting-off machine, it is possible to use a blocking device comprising a case inside which a stem is movable, the stem extending along a longitudinal axis. A presser element is mounted at an end of the stem which exits from the case, the presser element being capable of engaging with a surface of the work-piece, such as to exert on this surface a pressure that pushes the work-piece against an abutment plane. Thus, the work-piece can be blocked against the abutment plane and can be cut by a blade supported by a cutting head of the cutting-off machine.

[0003] A blocking device is known in which the stem performs an initial straight stroke along an advancement direction that is parallel to the longitudinal axis of the stem. Thereafter, the stem is advanced further along the advancement direction and simultaneously rotated about its longitudinal axis.

[0004] A blocking device of this type can be theoretically used to block a work-piece on a cutting-off machine. During the initial straight stroke, the stem exits from the case by a predefined amount and positions the presser element close to the work-piece. At this point, by rotating the stem - which continues to advance in the advancement direction - about the longitudinal axis, the presser element is brought into contact with the work-piece. After the presser element has contacted the work-piece, the stem has to be further rotated, in order that the presser element may exert the required pressure on the work-piece. However, since the stem continues to be advanced along the advancement direction while it is being rotated, the presser element slides on the work-piece while it is pushed against the work-piece. This leads to some drawbacks.

[0005] Firstly, a significant part of the force applied by the blocking device is used to overcome friction that is generated when the presser element slides in contact with the work-piece. This reduces the intensity of the force with which the presser element effectively pushes the work-piece against the abutment plane. The blocking device can consequently be unable to effectively block the work-piece during the cutting operation. The cutting precision can therefore be compromised.

[0006] Finally, the presser element can damage the surface of the work-piece on which it slides, especially if said surface is painted.

[0007] US 2007/0075472 discloses a blocking device as per the preamble of claim 1, a clamp including a body, a lead pin moveable relative to the body and an actuator supported by the body. The actuator is axially moveable between an extended position and a retracted position. The actuator includes a camshaft drivingly coupled to the

lead pin. Axial movement of the camshaft causes the lead pin to rotate between a first position aligned with a first longitudinal axis and a second position aligned with a second longitudinal axis laterally offset from the first longitudinal axis.

[0008] An object of the invention is to improve the blocking devices used to block a work-piece on a cutting-off machine.

[0009] A further object is to provide a blocking device which allows a work-piece to be effectively blocked on a cutting-off machine.

[0010] Another object is to provide a blocking device which enables reducing the force dissipated to overcome the friction forces generated when the work-piece has to be blocked.

[0011] A still further object is to provide a blocking device for blocking a work-piece on a cutting-off machine, in which the risks of damaging the surface of the work-piece on which the blocking device acts are reduced. According to the invention, there is provided a blocking device for blocking a work-piece on a cutting-off machine, having the features set out in claim 1.

[0012] Owing to the invention, it is possible to prevent the presser element from sliding in contact with the work-piece when blocking the work-piece on the cutting-off machine. In fact, the stem is first pushed to the outside of the case up to reaching the desired axial position, i.e. the extended position, in which the presser element is brought close to the work-piece, without however coming into contact with the work-piece. Once the extended position has been reached, the stop means prevent the stem from further advancing along the longitudinal axis, while the rotating means rotate the stem up to when the presser element reaches contact with the work-piece and blocks it against an abutment surface. The presser element is therefore brought into contact with the work-piece only owing to a rotation movement.

[0013] Thus it is possible to exploit, for blocking the work-piece on the cutting-off machine, substantially all the force that the presser element applies to the piece in the moment at which the presser element comes into contact with the work-piece itself. It is no longer necessary to use a fraction of the force applied by the presser element to overcome the friction which is generated when the presser element slides in contact with the work-piece, since sliding between the presser element and the work-piece is substantially eliminated. This enables effective blocking of the work-piece on the cutting-off machine. Consequently, the piece can be cut very precisely.

[0014] Furthermore, by preventing the presser element from sliding in contact with the work-piece, it is possible to reduce the risk of damaging the surface of the work-piece, even in a case where the surface is decorated or painted.

[0015] In an embodiment, a cutting-off machine is provided that comprises a blocking device of the above-described type. The blocking device can be mounted on the cutting-off machine such that the longitudinal axis of

the stem is substantially horizontal.

[0016] The presser element can be connected to the stem via a connecting arm, such that the presser element can engage with an upper surface of the work-piece.

[0017] In this way, the presser element can apply on the work-piece a blocking force which is directed vertically, though the stem is arranged in a horizontal position. This enables the blocking device to be located in a position which is relatively far from the blade of the cutting-off machine, i.e. in a position in which the blocking device does not interfere with the movements of the blade.

[0018] The invention can be better understood and carried out with reference to the accompanying figures of the drawings, which illustrate a non-limiting embodiment thereof, in which:

Figure 1 is an exploded perspective view showing the components of a blocking device;

Figure 2 is a side view of the blocking device of Figure 1;

Figure 3 is a view taken in direction A of Figure 2;

Figure 4 is a section taken along plane IV-IV of Figure 2;

Figure 5 is a section taken along plane V-V of Figure 3, showing a stem of the blocking device in a retracted position and highlighting an operative portion associated to the stem in a half-view semi-section;

Figure 6 is a section like in Figure 5, showing the stem in an extended position;

Figure 7 is a section like in Figure 5, showing the stem in an extended and rotated position;

Figure 8 is a perspective view of a blocking device supported by a support bracket;

Figure 9 is a perspective view of a blocking device mounted on a cutting-off machine.

[0019] Figure 2 shows a blocking device 1 that can be used on a cutting-off machine for blocking a work-piece, in particular a section bar, against an abutment surface of the cutting-off machine, such that the work-piece is kept stationary while a blade of the cutting-off machine cuts the work-piece. The blocking device 1 comprises a case 2 which at least partially houses a stem 3, the stem 3 extending along a longitudinal axis X.

[0020] The case 2 comprises a jacket or tubular element 4 which extends along the longitudinal axis X. As shown in Figure 1, the tubular element 4 is shaped as a sleeve having two open opposite ends. The tubular element 4 is delimited internally by two guide surfaces 5, extending along the longitudinal axis X. The guide surfaces 5 can be substantially flat. The guide surfaces 5 are diametrically opposite one another. The tubular element 4 is further delimited by curved portions of internal surface, in particular cylindrical portions, interposed between the guide surfaces 5.

[0021] The open ends of the tubular element 4 are closed respectively by a first closing element 6 and by a second closing element 7, which can be shaped as cov-

ers. The first closing element 6 and the second closing element 7 can be fixed to one another by means of a plurality of tie-rods 8, for example a pair of tie-rods 8. In the illustrated example, the tie-rods 8 are blocked on the first closure element 6, pass through the thickness of the tubular element 4 and exit from respective holes obtained in the second closing element 7. A plurality of threaded nuts 9 is associated to the second closing element 7, each of the threaded nuts 9 engaging with a tie-rod 8 such as to fasten the second closing element 7 against the tubular element 4.

[0022] The stem 3 has a first end that exits from the case 2. A presser element can be fixed to said first end, the presser element being suitable for engaging with the work-piece, as will be more fully described herein below. The stem 3 further has a second end, opposite the first end, arranged inside the case 2. An operating portion 10 is fixed to the second end of the stem 3, the operating portion 10 being arranged for controlling the stem 3. The operating portion 10 comprises a hollow body 11 having an internal recess 21, shown for example in Figure 4. The hollow body 11 is delimited by an external surface which extends about the longitudinal axis X and can be substantially cylindrical. At least one helical guide, which can comprise a helical groove 12, is obtained on the external surface of the hollow body 11. In the illustrated example, two helical grooves 12 are provided, one opposite the other. The function of the helical grooves 12 will be more fully explained herein below. The helical grooves 12 extend about the longitudinal axis X.

[0023] The operating portion 10 can further comprise a threaded tang 13, which projects from the hollow body 11 for engaging in a corresponding threaded hole obtained in the stem 3. Owing to the threaded tang 13, the stem 3 can be fixed to the operating portion 10, such that the stem 3 and the operating portion 10 behave as a single body. Naturally it is possible to fix the stem 3 to the operating portion 10 also using connecting means that are different from the threaded tang 13. It is also possible to manufacture the stem 3 and the operating portion 10 in a single piece.

[0024] The operating portion 10 has a diameter that is greater than the stem 3, such that a shoulder 33 is defined in a passage zone between the stem 3 and the operating portion 10, as shown in Figure 5.

[0025] An anti-friction washer 14 can be interposed between the stem 3 and the operating portion 10.

[0026] The blocking device further comprises movement means for moving the stem 3, in particular for pushing the stem 3 out of the case 2. The movement means can comprise a piston 15 movable inside the case 2, the piston 15 being in particular coupled to the case 2 with a prismatic coupling. In other words the piston 15 shapingly engages with the case 2 such as to be able to slide along the longitudinal axis X with respect to the case 2. However, the piston 15 is not able to rotate about the longitudinal axis X with respect to the case 2.

[0027] In particular, as shown in Figure 1, the piston

15 is delimited by two guide faces 16, which can be flat, arranged for sliding along the guide surfaces 5 of the tubular element 4. The guide faces 16 extend along the longitudinal axis X and can be diametrically opposite. Portions of curved external surface, in particular cylindrical, can be interposed between the guide faces 16.

[0028] The piston 15 can be shaped as a cup body provided with an internal cavity 49, shown in Figures 4 to 6. The internal cavity 49 is suitable for receiving the operating portion 10.

[0029] The piston 15 has a transverse wall 19, arranged transversely to the longitudinal axis X, facing the second closing element 7. A chamber 27 is defined inside the tubular element 4, between the second closing element 7 and the transverse wall 19, the chamber 27 being suitable for receiving an operating fluid, for example a fluid such as compressed air or another compressed gas.

[0030] At the side opposite to the transverse wall 19, the piston 15 is delimited by a front surface 22, shown in Figures 4 and 5, facing the first closing element 6. The front surface 22 is arranged transversely, in particular perpendicularly, to the longitudinal axis X. The front surface 22 has an annular shape.

[0031] An elastic member 23 is interposed between the piston 15 and the first closing element 6. The elastic member 23 can comprise a helical spring which extends about the operating portion 10. The elastic member 23 has an end in contact with the first closing element 6 and a further end in contact with the front surface 22 of the piston 15. The elastic member 23 is so positioned as to push the piston 15 away from the first closing element 6.

[0032] Between the piston 15 and the operating portion 10 there is interposed an elastic element 17, for example a helical spring, which partially extends into the internal cavity 49 of the piston 15 and partially extends inside the hollow body 11 of the operating portion 10. The elastic element 17 is arranged along the longitudinal axis X. The elastic element 17 can have an end housed in a seat 18 obtained in the transverse wall 19 of the piston 15, such as to be in a centred position with respect to the piston 15.

[0033] The elastic element 17 has a stiffness greater than the stiffness of the elastic member 23. The elastic element 17 is positioned such as to push the piston 15 and the operating portion 10 one away from the other.

[0034] Along the elastic element 17 an anti-friction pad 20 can be provided, the anti-friction pad 20 having an external diameter that is substantially equal to the diameter of the internal recess 21. When the elastic element 17 is shortened or lengthened, the anti-friction pad 20 slides along a surface of the internal recess 21. Thus, the anti-friction pad 20 maintains the elastic element 17 guided with respect to the internal recess 21 without generating high friction levels.

[0035] The piston 15 is provided with at least one pin 24 that projects towards the inside of the piston 15 transversely to the longitudinal axis X. In particular, the pin 24 can extend perpendicularly to the longitudinal axis X. The pin 24 is fixed relative to the piston 15 and can be mount-

ed in a region of the piston 15 arranged near the front surface 22.

[0036] The pin 24 supports a roller 25 freely rotatable about the pin 24. The roller 25 is arranged in the internal cavity 49 of the piston 15 and engages in a helical groove 12 of the operating portion 10.

[0037] In the illustrated embodiment, the piston 15 is provided with a pair of pins 24, arranged in diametrically opposite positions and having respective rollers 25.

[0038] A seal element 26 is fixed to the piston 15 near the transverse wall 19. The seal element 26 engages with an internal surface of the tubular element 4 such as to prevent leakage of operating fluid contained in the chamber 27.

[0039] The first closing element 6 is provided with a passage hole through which the stem 3 can pass.

[0040] The blocking device 1 further comprises a supply device for sending an operating fluid, for example compressed air or another pressurized gas, inside the chamber 27. The supply device can comprise an inlet hole 28, shown in Figures 5 to 7, opening into the chamber 27, the inlet hole 28 being for example made in the second closing element 7. A valve 29 can be associated to the inlet hole 28, for example a check-valve suitable for being opened in order to enable the operating fluid to exit the chamber 27. The valve 29 can be housed in the second closing element 7, in which case the blocking device 1 has a particularly compact structure.

[0041] Stop means are arranged inside the case 2 in order to prevent the stem 3 from exiting further from the case 2 when a portion of the stem 3 having a predetermined length is already outside the case 2. The stop means can comprise a stop surface 30, obtained for example on a protruding element 31 which projects from the first closing element 6 towards the inside of the case 2, as shown in Figure 5. The protruding element 31 can have a tubular shape and can define the passage hole through which the stem 3 exits the case 2.

[0042] An abutment surface 32 is associated to the stem 3, shown in Figure 5, the abutment surface 32 being suitable for abutting against the stop surface 30 in order to stop the stem 3. In the illustrated example, the abutment surface 32 is obtained on the anti-friction washer 14. If the anti-friction washer 14 were not present, the abutment surface 32 might be obtained on the shoulder 33.

[0043] As shown in Figure 8, the stem 3 can support a presser element 34 arranged for abutting against a surface of the work-piece such as to apply a blocking force to said surface.

[0044] The presser element 34 can be shaped as a roller that is freely rotatable about a rotation axis R. The rotation axis R can be substantially parallel to the longitudinal axis X.

[0045] The presser element 34 can be supported by an arm 35, fixed to the stem 3. The arm 35 can extend transversely, in particular perpendicularly, to the stem 3. The arm 35 enables the presser element 34 to be posi-

tioned at a certain distance from the longitudinal axis X.

[0046] During working, the stem 3 is initially in a retracted position, shown in Figure 5, in which the stem 3 is almost completely received internally of the case 2. The elastic member 23 is arranged in an elongate configuration and pushes the piston 15 towards the second closing element 7. Also the elastic element 17 is in an extended configuration and pushes the piston 15 away from the operating portion 10.

[0047] Consequently, the piston 15 is in a backward position in which the transverse wall 19 is close to the second closing element 7, such that the chamber 27 has a volume of almost nil. The abutment surface 32 associated to the operating portion 10 is at a distance from the stop surface 30.

[0048] In this situation, the presser element 34 is distanced from the work-piece and the blocking device 1 is inoperative.

[0049] When it is required to block a work-piece, the operating fluid is sent inside the case 2 through a conduit, not illustrated, the conduit being connected to the valve 29. The valve 29 is opened and the operating fluid is sent into the chamber 27 through the inlet hole 28. The operating fluid acts as a movement means, in particular pneumatic, which exerts on the transverse wall 19 of the piston 15 a force directed parallel to the longitudinal axis X towards the first closing element 6. By effect of the force applied by the operating fluid, the piston 15 moves in an advancement direction F towards the first closing element 6, compressing the elastic member 23, which has a relatively low stiffness. As the elastic element 17 is stiffer than the elastic element 23, the elastic element 17 remains substantially undeformed during this step, or in any case is compressed much less than the elastic member 23. Consequently, the operating portion 10, pushed by the elastic element 17 which in turn is moved by the piston 15, is displaced towards the first closing element 6. The stem 3 fixed to the operating portion 10 thus exits more and more from the case 2. This enables the presser element 34 to be neared to the work-piece.

[0050] By continuing to send pressurized operating fluid inside the chamber 27, the operating portion 10 continues to move towards the second closing element 6, and consequently the stem 3 exits more and more from the case 2, up to when the stop means block the movement of the operating portion 10 towards the closing element 6. This occurs when the abutment surface 32, obtained for example on the anti-friction washer 14, abuts against the stop surface 30 of the protruding element 31. This situation is shown in Figures 4 and 6. The stem 3 is now in an extended position, in which a portion of the stem 3 having a predetermined length L projects outside the case 2.

[0051] After the extended position has been reached, the stop means prevent the stem 3 from advancing further in the advancement direction F, i.e. from further exiting from the case 2. If the operating fluid continues to be sent into the chamber 27, the piston 15 is further pushed to-

wards the first closing element 6 and starts to compress the elastic element 17 too. The rollers 25, supported by the piston 15, move internally of the respective helical grooves 12. As the prismatic coupling between the piston 15 and the tubular element 4 prevents the piston 15 from rotating about the longitudinal axis X, when the rollers 25 advance in the helical grooves 12, the operating portion 10, blocked by the stop means along the advancement direction F, is rotated about the longitudinal axis X. The stem 3 fixed to the operating portion 10 is also consequently rotated about the longitudinal axis X. Consequently, the presser element 34 is rotated about the longitudinal axis X as denoted by the arrow R2 of Figure 8, such as to be brought into contact with the work-piece.

[0052] This situation is illustrated also in Figure 7, from which it can be noted that the piston 15 has neared the first closing element 6, compressing the elastic element 17 and the elastic member 23, while the stem 3 has not further exited from the case 2 with respect to the situation of Figure 6.

[0053] The rollers 25 supported by the pins 24, together with the helical grooves 12 obtained on the operating portion 10, therefore act as rotating means for rotating the stem 3 about the longitudinal axis X. The rotating means are activated only in the extended position such that the rotation of the stem 3 which brings the presser element into contact with the work-piece occurs when the stem 3 is no more capable of advancing parallel to the longitudinal axis X.

[0054] The rotating means are interposed between the piston 15 and the operating portion 10. In the illustrated example, the rotating means enable the piston 15 to be coupled to the operating portion 10.

[0055] In this way, the rotation movement which brings the presser element 34 into contact with the work-piece occurs when the presser element 34 has already been positioned in the desired position along the longitudinal axis X, which prevents the presser element 34 from sliding in contact with the surface of the work-piece.

[0056] When the presser element 34 is to be disengaged from the already-worked work-piece, the operating fluid is discharged from the chamber 27, for example by opening the valve 29. The elastic element 17 returns into the elongate position, while the elastic member 23, which is less stiff than the elastic element 17, still remains for a few moments in the compressed position. When the elastic element 17 returns into the extended configuration, the piston 15 is pushed backwards towards the second closing element 7 and causes the operating portion 10 to rotate in a direction opposite to the rotating direction R2 indicated in Figure 8, such as to disengage the presser element 34 from the surface of the worked work-piece. The stem 3 is for the moment still in the extended position.

[0057] Subsequently, the elastic member 23 too reaches the elongate configuration, thereby pushing the operating portion 10 towards the second closing element 7. The stem 3, pushed by the elastic member 23, thus returns inside the case 2 and the presser element 34 is

moved further away from the worked work-piece.

[0058] In order to disengage from the worked work-piece, the presser element 34 thus moves with a sequence of movements opposite to the sequence followed in order to block the work-piece. In particular, the presser element 34 detaches from the worked work-piece by rotating about the longitudinal axis X, without translating along said axis. The presser element 34 moves linearly along the longitudinal axis X only after having detached from the worked work-piece. This prevents the presser element 34 from sliding in contact with the worked work-piece also during the detachment step.

[0059] In order to mount the blocking device 1 on a cutting-off machine, a support bracket 41 can be used, of the type shown in Figure 8. The support bracket 41 comprises a fastening end 42 by means of which the support bracket 41 can be fixed to the blocking device 1. The fastening end 42 can be shaped as a clamp suitable for being clamped about the case 2. The support bracket 41 further comprises a body 43 suitable for being received in a seat provided on the cutting-off machine. The body 43 is provided with adjusting means, comprising for example a plurality of fastening holes 44, which enable the blocking device 1 to be positioned at a height that can be selected by the operator.

[0060] The blocking device 1 can further comprise a longitudinal position adjusting element which, on the cutting-off machine, enables the position of the blocking device 1 in a direction parallel to the longitudinal axis X to be adjusted. The longitudinal position adjusting element can comprise a rack 45 fixed to an external surface of the case 2 and arranged parallel to the longitudinal axis X.

[0061] Figure 9 shows an example of how the blocking device 1 can be mounted on a cutting-off machine. The cutting-off machine comprises a cutting head 36 including a blade (not illustrated) arranged for cutting a work-piece 37, for example a section bar, in a desired position. The cutting-off machine further comprises a first abutment surface 38 for supporting the work-piece 37, configured for example as a horizontal rest plane on which a lower face of the work-piece 37 can be rested. The cutting-off machine further comprises a second abutment surface 39 against which a lateral face of the work-piece 37 can abut. A slit 40 can be made on the second abutment surface 39. When a cut is to be made, the blade exits from the slit 40.

[0062] In a frontal region of the cutting-off machine, i.e. in front of the cutting head 36, a plurality of seats 46 are provided, the seats 46 being arranged for receiving the support brackets 41 which support the blocking devices for blocking the work-piece 37 during the work operation.

[0063] In the illustrated example, the work-piece 37 is kept stationary by a blocking device 1 like the one shown in Figures 1 to 8. The blocking device 1 is positioned such that the longitudinal axis X is horizontal and the end of the stem 3 exiting from the case 2 faces a free lateral face of the work-piece 37, the free lateral face being opposite the lateral face of the work-piece 37 which engag-

es with the second abutment surface 39. The presser element 34, owing to the arm 35, is in contact with an upper face of the work-piece 37.

[0064] During working, in a preliminary positioning step, the stem 3 is advanced along an advancement direction that is parallel to the longitudinal axis X such as to exit from the case 2. The stem 3 thus moves towards the free lateral face of the work-piece 37, while the presser element 34 is positioned above the upper face of the work-piece 37, but is still distanced from said face. When the stem 3 has reached the extended position, the stop means prevent the stem 3 from further exiting from the case 2.

[0065] The preliminary positioning step is followed by a blocking step, in which the rotating means rotate the stem 3, and with it the presser element 34, about the longitudinal axis X, in the rotation direction R1. The presser element 34 is thus brought into contact with the work-piece 37 and pushes the work-piece 37 against the first abutment surface 38, thereby applying a vertically-directed blocking force on the work-piece 37. During the blocking step, the points of the presser element 34 move along respective paths contained in planes that are perpendicular to the face of the work-piece 37 with which the presser element 34 will engage, i.e., in the illustrated example, along respective paths contained in vertical planes. In this step the presser element 34 does not have movement components parallel to the face of the work-piece with which the presser element 34 is about to engage, which prevents the presser element 34 from sliding. The force applied by the blocking device 1 can therefore be entirely used to block the work-piece 37 against the first abutment surface 38.

[0066] Although in the example of Figure 9 the blocking device 1 is mounted such as to come into contact with the work-piece 37 by rotating the stem 3 in a rotation direction R1 opposite the rotation direction R2 illustrated in Figure 8, it is understood that the working principle of the blocking device 1 shown in Figure 9 is equal to that of the blocking device 1 shown in Figures 1 to 8.

[0067] A further blocking device 47, of a traditional type, can be provided on the cutting-off machine, the further blocking device 47 being suitable for engaging with the free lateral face of the work-piece 37 in order to push the work-piece 37 against the second abutment surface 39, by exerting a horizontal blocking force. For this purpose, the further blocking device 47 comprise a stem housed in a case, the stem being slidable in a direction parallel to a longitudinal axis of the stem. A presser member 48 is fixed to an end of the stem which exits from the case, the presser member 48 being for example shaped as a disc and being arranged to be brought into contact with the free lateral face of the work-piece 37. The blocking device 1 and the further blocking device 47 enable the work-piece 37 to be blocked both vertically and horizontally, such that the blade of the cutting head 36 can perform the cut precisely. It is noted that the blocking device 1 and the further blocking device 47 are distanced

from the blade, such as not to interfere with the blade during cutting. In particular, as far as the blocking device 1 is concerned, the number of components positioned above the work-piece 37 which might interfere with the blade during cutting is minimized. Only the presser element 34 is actually arranged above the work-piece 37, while the case 2, which has a much greater volume than the presser element 34, is positioned by a side of the work-piece 37, in a position far from the cutting head 36.

[0068] The blocking device 1 can be adjusted such as to engage with work-pieces of different dimensions and shapes. In particular, by appropriately selecting the fastening hole 44 by means of which the support bracket 41 is fixed to the cutting-off machine, it is possible to vary the distance between the presser element 34 and the first abutment surface 38, such as to work work-pieces in which the distance between the upper face and the lower face is different.

[0069] Further, by varying the position of the fastening end 42 of the support bracket 41 along the case 2, the blocking device 1 can block work-pieces of differing widths, i.e. work-pieces having distances between the lateral faces which differ from one work-piece to another. This adjustment can be made partially automatically, by using a toothed element which engages with the rack 45 after disengaging the fastening end 42 from the case 2.

[0070] In order to modify, in a direction parallel to the longitudinal axis X, the position in which the presser element 34 engages with the work-piece, it is also possible to appropriately select the length of the stem 3 when designing the blocking device 1. The blocking device 1 is thus extremely efficient and versatile.

[0071] Furthermore, as the operating fluid sent into the chamber 27 via the inlet hole 28 causes both the translating and rotation movement of the stem 3, the blocking device 1 is particularly simple to control.

Claims

1. A blocking device for blocking a work-piece (37) on a cutting-off machine, comprising a case (2), a stem (3) having a longitudinal axis (X), a presser element (34) associated to the stem (3), movement means for pushing the stem (3) out of the case (2), the blocking device (1) further comprising stop means (30, 32) for preventing the stem (3) from further exiting from the case (2) when the stem (3) has reached an extended position in which a portion of stem having a predetermined length (L) is out of the case (2), **characterized in that** the case (2) houses rotating means (12, 24, 25) which are active only in the extended position for rotating the stem (3) about the longitudinal axis (X), such as to bring the presser element (34) into contact with the work-piece (37).
2. A device according to claim 1, wherein the movement means comprise a piston (15) suitable for engaging with an operating portion (10) which is fixed relative to the stem (3).
3. A device according to claim 2, wherein the piston (15) is coupled to the operating portion (10) by the rotating means (12, 24, 25).
4. A device according to claim 2 or 3, wherein the rotating means comprise at least one helical guide (12) and at least one engaging element (24, 25) which engages with the helical guide (12), the helical guide (12) being provided in a component selected from between the piston (15) and the operating portion (10), the engaging element (24, 25) being mounted on a further component selected from between the operating portion (10) and the piston (15).
5. A device according to claim 4, wherein the helical guide is defined by a groove (12) obtained on an external surface of the operating portion (10) and the engaging element comprises a pin (24) which projects from an internal surface of the piston (15), the pin (24) being preferably provided with a roller (25).
6. A device according to any one of claims 2 to 5, wherein the piston (15) is coupled to the operating portion (10) by an elastic element (17), the elastic element (17) being so dimensioned that the piston (15) displaces the stem (3) along the longitudinal axis (X) via the elastic element (17) during an initial stroke of the piston (15).
7. A device according to claim 6, and further comprising an elastic member (23) interposed between the piston (15) and an end of the case (2) from which the stem (3) exits, the elastic member (23) being arranged for pushing the piston (15) away from said end, the elastic member (23) being less stiff than the elastic element (17).
8. A device according to any one of claims 2 to 7, and further comprising guide means (5, 16) for enabling the piston (15) to slide internally of the case (2) without rotating about the longitudinal axis (X).
9. A device according to any one of claims 2 to 8, and further comprising a supply device for sending internally of the case (2) an operating fluid suitable for moving the piston (15).
10. A device according to any preceding claim, wherein the stop means comprise a stop surface (30) obtained on a protruding element (31) which projects towards the inside of the case (2) about a passage hole from which the stem (3) exits, an abutting surface (32) being associated to the stem (3) for abutting on the stop surface (30).

11. A cutting-off machine comprising a cutting head (36), an abutment surface (38), a blocking device (1) according to any one of claims 1 to 10 for blocking a work-piece (37) against the abutment surface (38).
12. A cutting-off machine according to claim 11, wherein the longitudinal axis (X) of the stem (3) is arranged horizontally and the presser element (34) is connected to the stem (3) by an arm (35), such that the presser element (34) engages with an upper surface of the work-piece (37) for applying a substantially vertical blocking force to said work-piece (37).

Patentansprüche

1. Sperrvorrichtung zum Festspannen eines Werkstücks (37) auf einer Schneidmaschine, umfassend ein Gehäuse (2), einen Schaft (3), aufweisend eine Längsachse (X), ein Andruckelement (34), verbunden mit dem Schaft (3), Bewegungsmittel, um den Schaft (3) aus dem Gehäuse (2) zu schieben, wobei die Sperrvorrichtung (1) zudem Stoppmittel (30, 32) umfasst, um zu verhindern, dass der Schaft (3) weiter aus dem Gehäuse (2) austritt, wenn der Schaft (3) eine ausgefahrene Position erreicht hat, in der ein Abschnitt des Schafts, aufweisend eine vorgegebene Länge (L) aus dem Gehäuse (2) herausgetreten ist, **dadurch gekennzeichnet, dass** das Gehäuse (2) Drehmittel (12, 24, 25) beherbergt, die nur auf den ausgefahrenen Abschnitt wirken, um den Schaft (3) um die Längsachse (X) zu drehen, sodass das Andruckelement (34) in Kontakt mit dem Werkstück (37) gebracht wird.
2. Vorrichtung nach Anspruch 1, wobei die Bewegungsmittel einen Kolben (15) umfassen, der geeignet ist, um mit einem Betriebsabschnitt (10) in Eingriff zu gelangen, der relativ zum Schaft (3) fixiert ist.
3. Vorrichtung nach Anspruch 2, wobei der Kolben (15) mittels der Drehmittel (12, 24, 25) mit dem Betriebsabschnitt (10) verbunden ist.
4. Vorrichtung nach Anspruch 2 oder 3, wobei die Drehmittel mindestens eine spiralförmige Führung (12) und mindestens ein Eingriffelement (24, 25) aufweisen, das mit der spiralförmigen Führung (12) in Eingriff gelangt, wobei die spiralförmige Führung (12) in einer Komponente ausgebildet ist, bei der es sich wahlweise entweder um den Kolben (15) oder den Betriebsabschnitt (10) handelt, und das Eingriffelement (24, 25) auf einer weiteren Komponente montiert ist, bei der es sich wahlweise um den Betriebsabschnitt (10) oder den Kolben (15) handelt.
5. Vorrichtung nach Anspruch 4, wobei die spiralförmige Führung durch eine Rille (12) definiert ist, die an einer äußeren Oberfläche des Betriebsabschnitts (10) ausgebildet ist, und das Eingriffelement einen Stift (24) umfasst, der aus einer inneren Oberfläche des Kolbens (15) herausragt, wobei der Stift (24) vorzugsweise mit einer Rolle (25) versehen ist.
6. Vorrichtung nach einem der Ansprüche 2 bis 5, wobei der Kolben (15) mittels eines elastischen Elements (17) mit dem Betriebsabschnitt (10) verbunden ist und das elastische Element (17) so dimensioniert ist, dass der Kolben (15) den Schaft (3) entlang der Längsachse (X) mittels des elastischen Elements (17) während eines anfänglichen Hubs des Kolbens (15) verschiebt.
7. Vorrichtung nach Anspruch 6, zudem umfassend ein elastisches Element (23), das zwischen dem Kolben (15) und einem Ende des Gehäuses (2), aus dem der Schaft (3) austritt, positioniert ist, wobei das elastische Element (23) angeordnet ist, um den Kolben (15) von diesem Ende wegzuschieben und das elastische Element (23) weniger steif als das elastische Element (17) ist.
8. Vorrichtung nach einem der Ansprüche 2 bis 7, zudem umfassend Führungsmittel (5, 16), um dem Kolben (15) zu ermöglichen, im Gehäuse (2) zu gleiten, ohne sich um die Längsachse (X) zu drehen.
9. Vorrichtung nach einem der Ansprüche 2 bis 8, zudem umfassend eine Zuführvorrichtung, um eine Prozessflüssigkeit in das Gehäuse (2) einzuleiten, die geeignet ist, um den Kolben (15) zu bewegen.
10. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei die Stoppmittel eine Stoppfläche (30) umfassen, die auf einem hervorspringenden Element (31) ausgebildet ist, das in Richtung der Innenseite des Gehäuses (2) um ein Durchgangsloch herausragt, aus dem der Schaft (3) austritt, sowie eine Anschlagfläche (32), die mit dem Schaft (3) verbunden ist, um an der Stoppfläche (30) anzuschlagen.
11. Schneidmaschine, umfassend einen Schneidekopf (36), eine Anschlagfläche (38) sowie eine Sperrvorrichtung (1) nach einem der Ansprüche 1 bis 10, um ein Werkstück (37) gegen die Anschlagfläche (38) festzuspannen.
12. Schneidmaschine nach Anspruch 11, wobei die Längsachse (X) des Schafts (3) waagrecht angeordnet und das Andruckelement (34) mittels eines Arms (35) mit dem Schaft (3) verbunden ist, sodass das Andruckelement (34) mit einer oberen Oberfläche des Werkstücks (37) in Eingriff gelangt, um eine im Wesentlichen senkrechte Einspannkraft auf das Werkstück (37) auszuüben.

Revendications

1. Dispositif de blocage de pièces d'usinage (37) sur une machine à tronçonner, comprenant un boîtier (2), une tige (3) ayant un axe longitudinal (X), un élément presseur (34) associé à la tige (3), un moyen de déplacement pour pousser la tige (3) à l'extérieur du boîtier (2), le dispositif de blocage (1) comprenant également un moyen d'arrêt (30, 32) pour empêcher que la tige (3) ne sorte davantage du boîtier (2) lorsque la tige (3) a atteint une position déployée dans laquelle une portion de tige ayant une longueur prédéterminée (L) est à l'extérieur du boîtier (2), **caractérisé en ce que** le boîtier (2) contient un moyen de rotation (12, 24, 25) uniquement actif dans la position déployée pour faire tourner la tige (3) autour de l'axe longitudinal (X), de sorte à amener l'élément presseur (34) au contact de la pièce d'usinage (37). 5
2. Dispositif selon la revendication 1, dans lequel le moyen de déplacement comprend un piston (15) indiqué pour s'engager dans la portion opérationnelle (10) fixé par rapport à la tige (3). 10
3. Dispositif selon la revendication 2, dans lequel le piston (15) est accouplé à la portion opérationnelle (10) par l'intermédiaire du moyen de rotation (12, 24, 25). 15
4. Dispositif selon la revendication 2 ou 3, dans lequel le moyen de rotation comprend au moins un guide hélicoïdal (12) et au moins un élément d'engagement (24, 25) qui s'engage dans le guide hélicoïdal (12), le guide hélicoïdal (12) étant prévu dans un composant sélectionné entre le piston (15) et la portion opérationnelle (10), l'élément d'engagement (24, 25) étant monté sur un composant supplémentaire sélectionné entre la portion opérationnelle (10) et le piston (15). 20
5. Dispositif selon la revendication 4, dans lequel le guide hélicoïdal est défini par une rainure (12) obtenue sur une surface externe de la portion opérationnelle (10) et où l'élément d'engagement comprend un goujon (24) qui dépasse d'une surface interne du piston (15), le goujon (24) étant de préférence muni d'un galet (25). 25
6. Dispositif selon l'une quelconque des revendications 2 à 5, dans lequel le piston (15) est accouplé à la portion opérationnelle (10) par un élément élastique (17), l'élément élastique (17) étant dimensionné de sorte que le piston (15) déplace la tige (3) le long d'un axe longitudinal (X) par le biais de l'élément élastique (17) durant une course initiale d'un piston (15). 30
7. Dispositif selon la revendication 6, et comprenant également un organe élastique (23) interposé entre le piston (15) et une extrémité du boîtier (2) par laquelle sort la tige (3), l'organe élastique (23) étant positionné pour pousser le piston (15) loin de ladite extrémité, l'organe élastique (23) étant moins rigide que l'organe élastique (17). 35
8. Dispositif selon l'une quelconque des revendications 2 à 7, et comprenant également un moyen de guidage (5, 16) pour permettre au piston (15) de coulisser à l'intérieur du boîtier (2) sans tourner autour de l'axe longitudinal (X). 40
9. Dispositif selon l'une quelconque des revendications 2 à 8, et comprenant également un moyen d'alimentation pour envoyer à l'intérieur du boîtier (2) un fluide de commande capable de déplacer le piston (15). 45
10. Dispositif selon l'une quelconque des revendications précédentes, dans lequel le moyen d'arrêt comprend une surface d'arrêt (30) réalisée sur un élément saillant (31) qui dépasse vers l'intérieur du boîtier (2) autour d'un trou de passage d'où sort la tige (3), une surface de butée (32) étant associée à la tige (3) pour se mettre en butée contre la surface d'arrêt (30). 50
11. Machine à tronçonner comprenant une tête de coupe (36), une surface de butée (38), un dispositif de blocage (1) selon l'une quelconque des revendications 1 à 10 pour bloquer une pièce d'usinage (37) contre la surface de butée (38). 55
12. Machine à tronçonner selon la revendication 11, où l'axe longitudinal (X) de la tige (3) est positionné horizontalement et où l'élément presseur (34) est relié à la tige (3) par un bras (35), de sorte que l'élément presseur (34) s'engage sur une surface de la pièce d'usinage (37) pour appliquer une force de blocage essentiellement verticale à ladite pièce d'usinage (37).

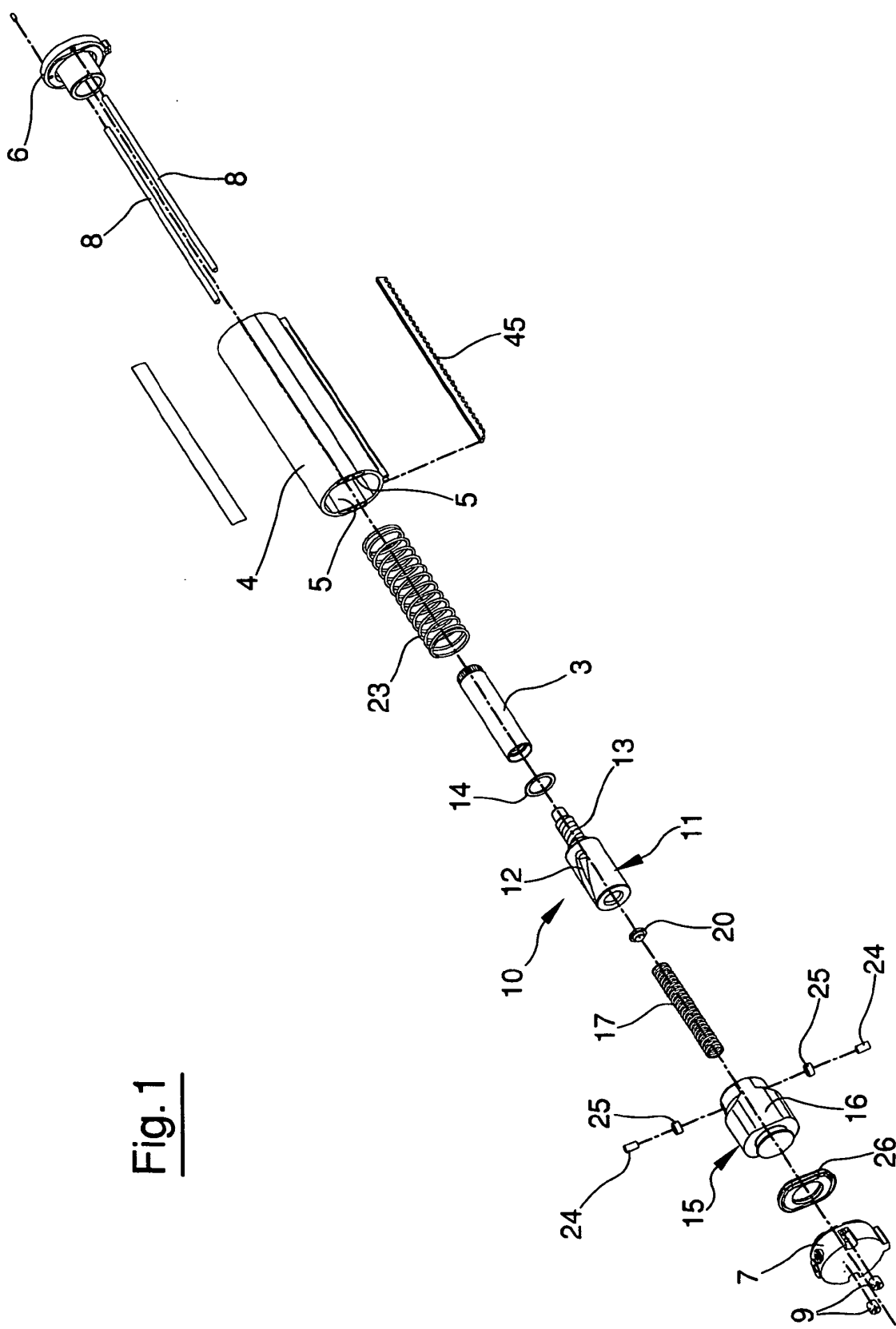


Fig. 1

Fig. 2

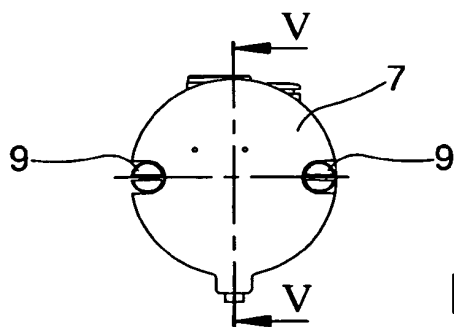
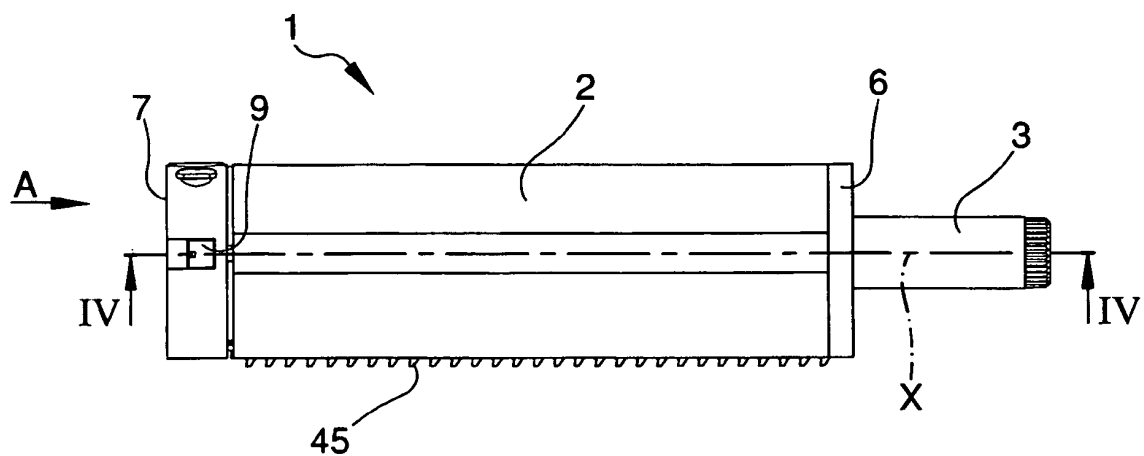


Fig. 3

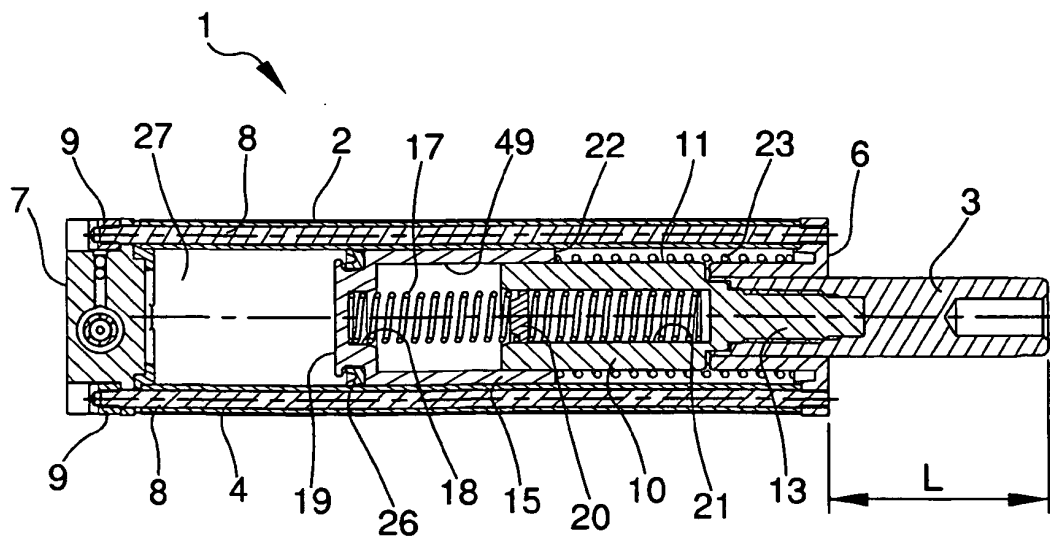


Fig. 4

Fig. 5

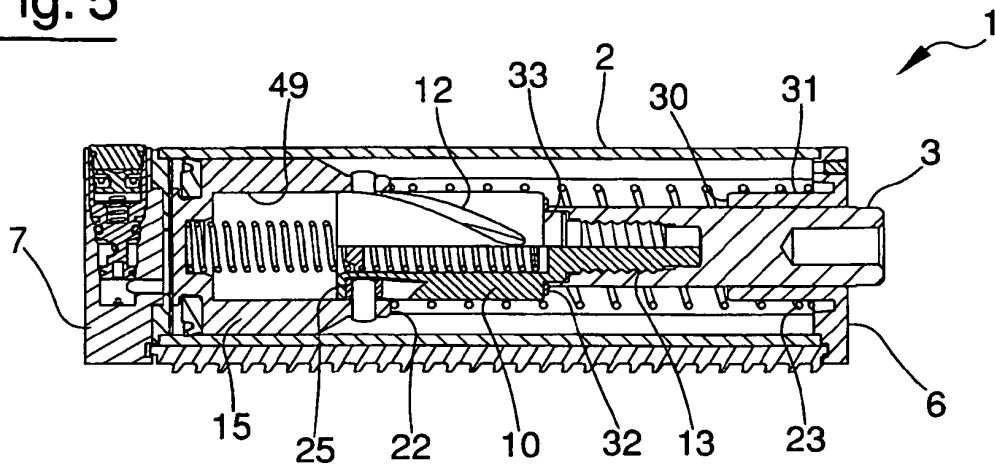


Fig. 6

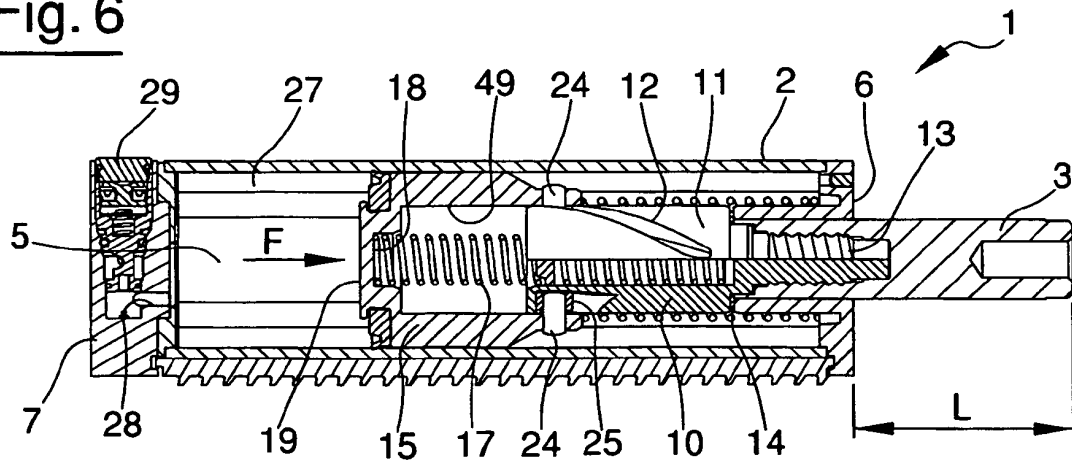
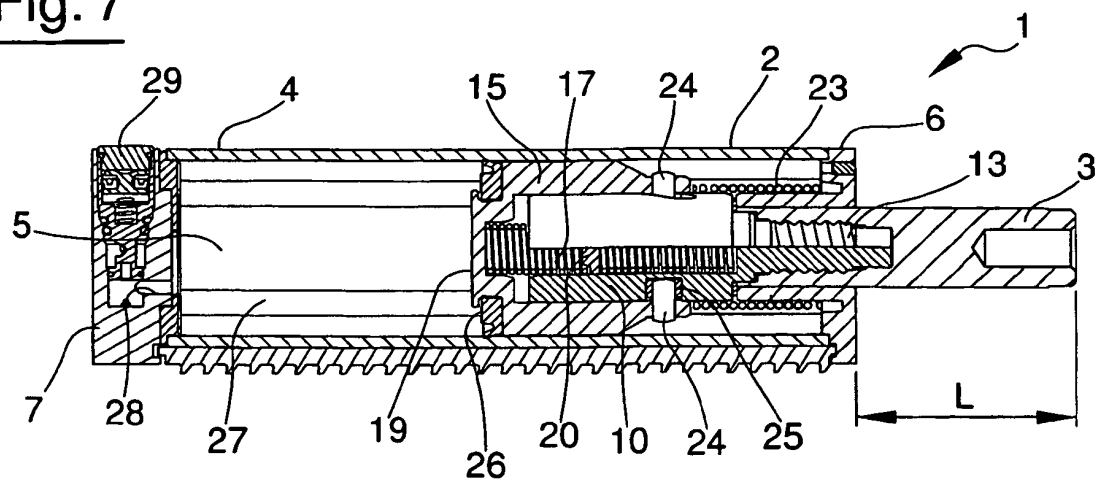


Fig. 7



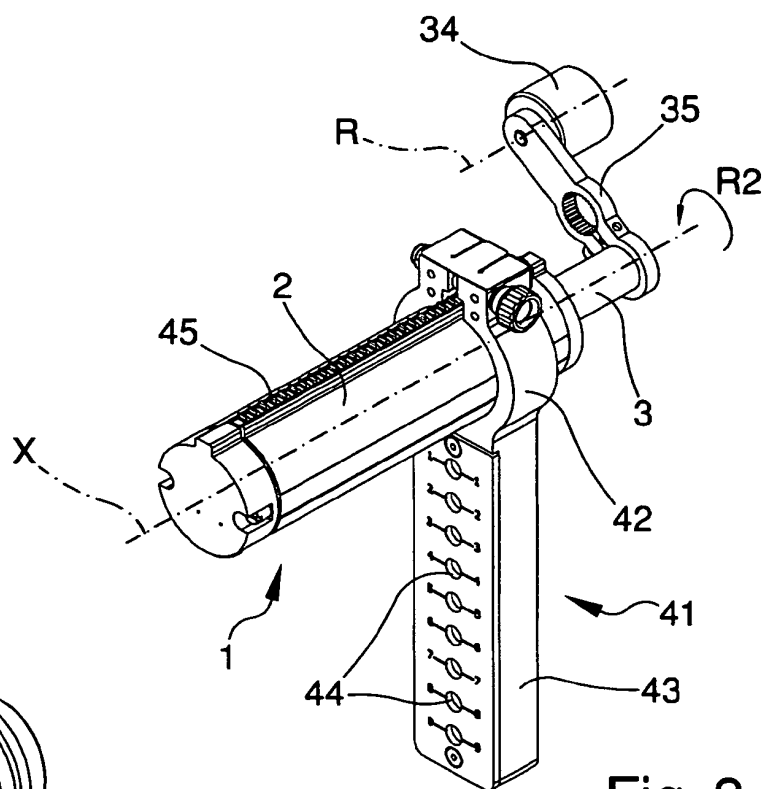


Fig. 8

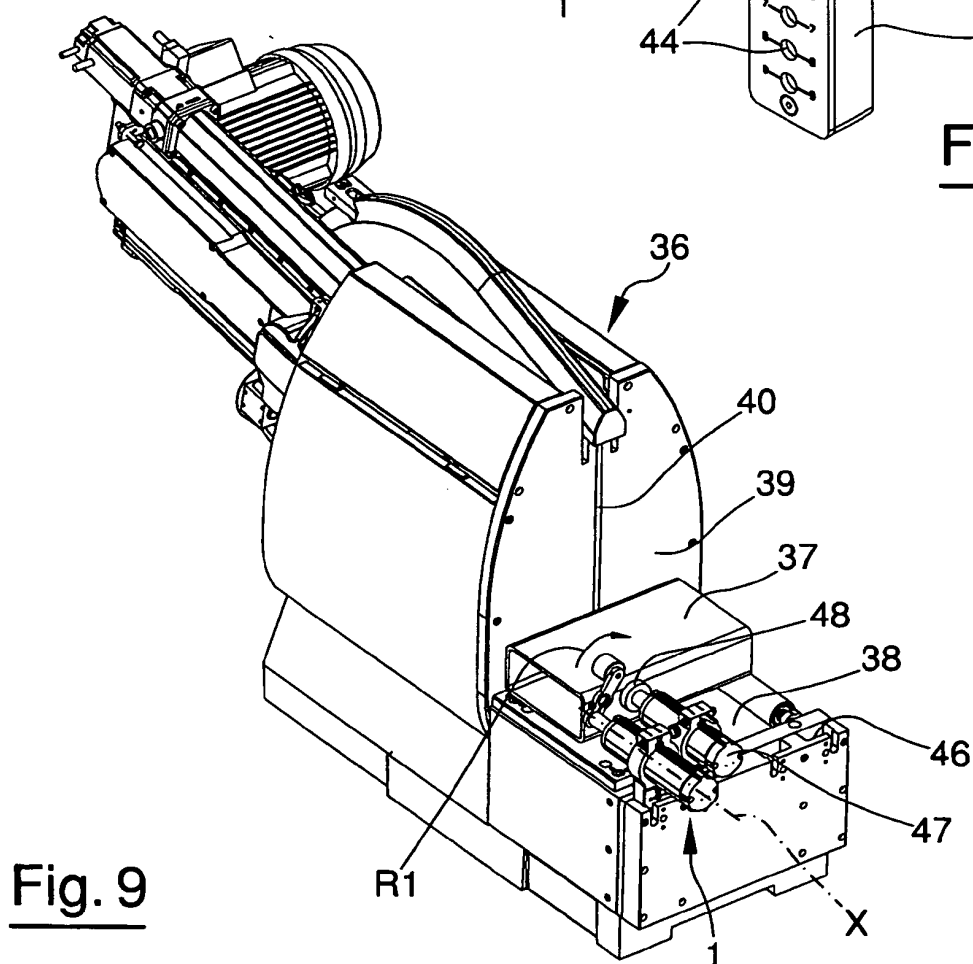


Fig. 9

REFERENCES CITED IN THE DESCRIPTION

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