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(54) **Safety device for actuating a nailer**

(57) A safety device for actuating a nailer of a type provided with a firing button (5) and safety means including a probe means (9) having an inner end (11) translating along its longitudinal axis approximately parallel to the nails ejection direction between a retracted condition (R) and a protruding condition (S) facing towards the shooting direction and towards which it is elastically pushed by elastic means.

Said device (1) comprises: a first trigger (15) rotating in a plane parallel to the button (5) actuation direction, about a first pin (17) perpendicular to the latter direction and fixed to the nailer; an arm means (19) having a first end (21), an end portion (23) opposite the first end and fit to slide against the inner end (11) of the probe means (9) and a central portion fit to act onto the button (5) for operating the latter (5); a second trigger (27) pivoted to the first trigger (15) by means of a second rotation pin (29) parallel to the first pin (17).

The first (15) and second (27) triggers are interconnected with the first end (21) of arm means (19), the latter (19) being moved by said triggers; the second trigger (27) assumes two positions with respect to the first (15) wherein respectively places the first end (21) of arm means (19) in a single shoot condition (C) wherein the respective end portion (23) disengages from the inner end (11) of the probe means (9) when the probe means (9) moves from the retracted condition (R) towards the protruding one (S) or when the first trigger (15) exceeds the actuating position of the button (5) towards its actuating extreme position and in an hammer shoots condition (M) wherein the end portion (23) of the arm means (19) always remains engaged to the inner end (11) of the probe means (9) in any position of the first trigger.

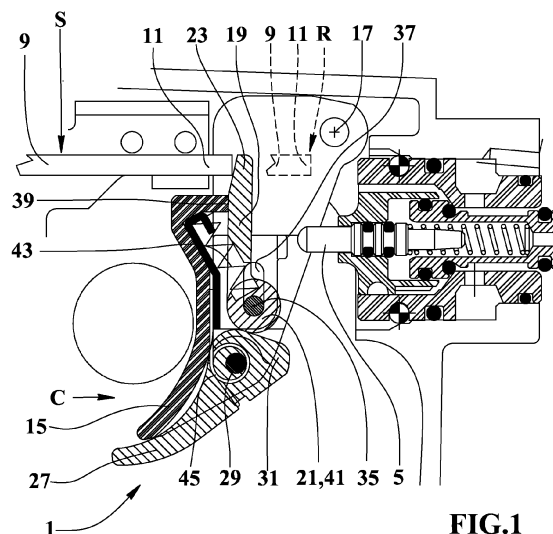


FIG.1

Description

[0001] The present invention concerns the safety device for nail application and in particular it relates to a safety device for actuating a nailer.

[0002] There are known nailers equipped with a trigger for expelling, or shouting, a nail and with a safety device comprising a probe placed near the output for the nail and movable between a normal position, or protruding, in which it prevents the nail ejection blocking or disabling the trigger and a retracted condition, reachable putting the output nail region of the nailer against the part to be nailed, in which the safe is disabled and the trigger is enabled for firing; the fire takes place each time a condition is reached in which the probe means is set back and the trigger is pressed.

[0003] In some fields, for example the packaging preparation, operators use the safe as a nail eject command, keeping the trigger pressed and putting the ejection portion of the nailer in rapid succession onto the areas to be nailed so as to apply nails with extreme speed.

[0004] To reduce the risks arising from this practice, nailer machines were introduced to be equipped with a selector lever for the operation, usually placed near the trigger, which allows to select two operation modes: repeat mode, also known as hammer mode, in which the nail ejection is controlled by the secure probe contact with the work piece while the operator keeps pressed the trigger, and a single-shot mode in which the trigger release is needed after a shot to prepare the nailer for the subsequent ejection that occurs only if first of all the probe is in contact position and then the trigger is pressed.

[0005] A disadvantage of this type of known drive mechanism consists in that the operators may handle the nailer without checking the position of the selection lever and, sometimes due to bridge lack, activating and keep pressing the trigger, if the selection lever was in firing hammer or repeat position, there is a dangerous condition because the safe probe could contact a body part of operator or onlooker so causing personal injury.

[0006] One object of the present invention is to propose a safety device for the actuation a nailer which requires active and conscious operation by the operator for nail ejection with hammer mode.

[0007] Another object is to propose a device switching off the repeat ejection mode as soon as the operator leaves the nailer.

[0008] The characteristics of the invention are highlighted in the following with particular reference to the accompanying drawings, in which:

- figure 1 shows a partially sectioned view of the safety device for actuating a nailer, object of the present invention, associated with a firing button of said nailer, of which is represented a small portion, comprising the inner portion of a probe means represented in continuous and dashed lines, respectively, in its protruding and retracted condition, where a ring be-

fore a first trigger is a finger of an operator before acting on the trigger itself;

- figure 2 shows a partial and rear view of the safety device of figure 1;
- figure 3 shows a view of the device and parts of figure 1 in which the probe means is in its retracted condition in which the ejection of the nail is enabled;
- figure 4 shows a reduced view of the device and parts of figure 3 in a condition immediately subsequent to the nail firing as a result of the first trigger activation, and subsequent to removal of the device from the nail application area;
- figure 5 shows a reduced view of the device and parts of figure 1 from which it differs because a finger of an operator has actuated a second trigger enabling the hammer operation; another finger is placed in contact with the first trigger without activate this latter and the probe means represented in continuous lines is in its protruding or shot disabling condition;
- figure 6 shows a view of the device and parts of figure 5 from which differs because the probe means, represented in continuous line, is in its retracted condition enabling the shot;
- figure 7 shows a view of the device and parts of figure 5 from which it differs for the fact that the fingers have operated both triggers so causing the shot that can be repeated due to the probe by the hammer operation until the triggers release.

[0009] With reference to figures 1 - 7, numeral 1 indicates the safety device for actuating a nailer, object of the present invention.

[0010] The nailer, for example of pneumatic type for nails, staples or the like, is provided with a firing button 5, of known type, and safety means comprising a probe means 9, of which the figures illustrate only the inner end portion, having the inner end 11 lying in the device 1 or close to nailer controls.

[0011] The probe means 9 and the respective inner end 11 translate along their longitudinal axis, which is approximately parallel to the direction of nails ejection, between a retracted condition R, facing the interior of the nailer, and a protruding condition S, toward the shot direction.

[0012] The probe means 9 is elastically pushed by elastic means, not shown, towards outside, along the nails shooting direction, or towards the protruding condition S.

[0013] The device 1 also comprises a first trigger 15 rotating around a first pin 17 for connecting the nailer, on a plane parallel to the motion direction of the firing button 5 and approximately coincident with the symmetry median plane of the nailer.

[0014] The rotating first trigger 15 may be of the type obtained by die-cutting and bending of a metal plate and, as in the example of the figures, can be constituted by two shaped plates parallel and joined in correspondence

of the finger action area of an operator. The first trigger 15 is provided with a spring, not shown, which elastically pushes this latter outwards or towards the shooting direction in order to keep it in the normal rest condition without the actuation of the operator's finger.

[0015] The first pin 17, for example fixed or housed in seats carried out at the ends of the two plates of the first trigger opposite to the finger zone, is perpendicular to the actuation motion of the firing button 5 and to the rotation plane of the first trigger for example coincident with the geometric median plane between the two plates.

[0016] The device 1 is also equipped with an arm means 19, approximately shaped as tuning fork or two teeth fork, and a second trigger 27 plate shaped and swivelling connected to the first trigger 15 by a second rotation pin 29, parallel to the first pin 17.

[0017] The arm means 19 includes a first end 21, an end portion 23 opposite the first end and fit to abut slidably with the inner end 11 of the probe means 9 and a central portion fit to act onto the button 5 for operating the latter.

[0018] The first end 21 of the arm means 19 is interconnected to the first 15 and second 27 triggers for moving it.

[0019] The terminal portion 23 may be tapered or otherwise shaped to facilitate the sliding against the inner end 11 of the probe means 9.

[0020] The second trigger 27, at outer and inner ends of its rotation arc with respect to the first trigger 15, has two opposite operating and releasing conditions respectively corresponding to the single shoot condition C and the hammer shoots condition M.

[0021] In the first release position, in which the operator does not act onto the second trigger and corresponding to the single shot condition C, the second trigger 27 leaves the first end 21 of the arm means 19 in a position for which the opposite end portion 23 of arm means 19 disengages from the inner end 11 of the probe means 9 when the latter 9 moves from the retracted condition R towards the protruding condition S, with the first trigger maintained in the firing position, so preventing the firing of a second shot until the first trigger release.

[0022] Alternatively, the invention provides that the arm means 19 is slightly shorter to disengage from the inner end 11 of the probe means 9 when the first trigger 15 exceeds the actuation position of the button 5 towards its end operating position, in this way is inhibited the ability to shoot more nails at the same point while always keeping the probe means 9 in the retracted condition R and acting more times onto the first trigger.

[0023] In said second operating position, in which the operator acts onto the second trigger and keeping it in the operating condition corresponding to hammer shoots condition M, the end portion 23 of the arm means 19 remains engaged to the inner end 11 of the probe means 9 in each position of the latter and of the first trigger, since the activation of the second trigger moves the arm 19 toward the translation direction of the probe means 9.

[0024] In particular, the first end 21 of the arm means 19 is swivelling and translating connected to the first trigger 15 and the second trigger 27 has a displacement means 31 acting onto the first end 21 of the arm means 19 translating it towards the probe means 9. The first end 21 of the arm means 19 carries a third pin 35 parallel to the first pivot 17 and engaged, in a freely rotating and slidingly, with a slot means 37 formed in the first trigger 15 and having a longitudinal geometric axis preferably perpendicular or inclined with respect to the translation direction of the probe means 9. Preferably the slot means 37 involves both the parallel plates of the first trigger, so both end portions of the third pin 35 slide into respective seats of the slot means 37 carried out in the faced portions of the plates.

[0025] The shifting means 31 of the second trigger 27 preferably has a cam protruding profile slidingly acting onto the first end 21 of the arm means 19 or onto the respective third pivot 35, or, alternatively, the shifting means 31 consists of a second slot means formed in a protrusion of the second trigger 27 and tilted compared to the first slot means 37 and slidingly engaged by said third pivot 35.

[0026] The invention also provides a further alternative embodiment of the interconnection between the first end 21 of the arm means 19 and the triggers first 15 and second 27, not shown in the figures because of its easy understanding. In this different interconnection embodiment, the first end 21 of the arm means 19 is connected, as connecting rod, via a rotating pin to a protrusion of the second trigger 27, which actuation moves the first end 21 of the arm mean 19 toward the probe means 9.

[0027] Returning now to the interconnection shown in figures, the first trigger 15 is equipped with a stop means 39 fit to abut with the arm means 19, defining the position, at least when the triggers 15, 27 are not actuated. The device 1 is also provided with first spring means fit to elastically push the arm means 19 towards said abutment position with the stop means.

[0028] The third pin 35 is movable into the slot means 37, is engaged to the first end 21 (preferably fork shaped as previously indicated) of the arm means 19 and is engaged in a freely rotatable way to a seat means 41, preferably housed in the cavity between the teeth of the first fork end 21.

[0029] The seat means 41 can be wheel shaped with radial cavity designed to accommodate an end of a first spring means 43, of compressed helical type, whose remaining end is fixed to the first trigger 15 for example by a mount displaced in a finger portion closest to the probe means 9. The first spring means 43 acts elastically onto the seat means 41 and the first end 21 in the removal direction of this latter from the probe means 9.

[0030] The second trigger 27, which is preferably placed between the parallel plates of the first trigger, is provided with a second spring means 45 which pushes elastically towards a contact position with a first finger position of the trigger 15.

[0031] The length of the arm 19, or the distance between the rotation axis of the first end 21 of the arm means and the end of the respective opposite end portion 23, is between the distances from the inner end 11, of the probe means 9, to opposite end of this latter 9 of the slot means 37, to which the third pin 35 radius is subtracted, in the single shoot condition C and protruding condition S of probe means 9 when the first trigger 15 is respectively released and activated in the firing position.

[0032] The longitudinal dimension of the slot means 37 and the difference between the minimum and maximum radii of the protruding cam profile of the displacement means 31 of the second trigger 27 are such that in the hammer shoots condition M, the end portion 23 of the arm means 19 opposite to respective first end 21 is always in abutment with the inner end 11 of the probe means 9 in any position of the first trigger 27.

[0033] The operation of the single-shot device requires that the operator puts the nail output at the point to be nailed, thereby placing the probe means 9 in retracted condition R, and that said operator acts, with the finger, onto the first trigger causing the nail firing; the subsequent device removal from the nailed point, with consequent return of probe means 9 into protruding condition S and the first trigger release places the nailer and the device in a start firing condition.

[0034] The operation of the hammer or repeating device provides that the operator puts the nail output of the device in correspondence of the nailing point, thus putting the probe means 9 in the retracted condition R, and acting with a finger onto the second trigger and that with another finger on the first trigger is caused the nail firing. The subsequent device removal from the nailed point, with consequent return of the probe means 9 into the protruding condition S maintaining operated the triggers, places the device in a further firing condition obtainable simply by positioning the nail output in correspondence with another point to be nailed.

[0035] An advantage of the present invention is to provide a safety device for operating a nailer that requires an active operation by the operator for the nail ejection in hammer mode.

[0036] Another advantage is to provide a device which will switch off the repetition ejection mode of the nailer when the operator leaves the nailer.

Claims

1. Safety device for actuating a nailer of a type provided with a firing button (5) and safety means including a probe means (9) having an inner end (11) translating along its longitudinal axis approximately parallel to the nails ejection direction between a retracted condition (R) and a protruding condition (S) facing towards the shooting direction and towards which it is elastically pushed by elastic means; said device (1) comprises:

- a first trigger (15) rotating on a plane parallel to the button (5) actuation direction, around a first pin (17) perpendicular to the latter direction and fixed to the nailer;

- an arm means (19) having a first end (21), an end portion (23) opposite the first end and designed to slide against the inner end (11) of the probe means (9) and a central portion designed to act on the button (5) for operating the latter (5);

- a second trigger (27) pivoted to the first trigger (15) by means of a second rotation pin (29) parallel to the first pin (17);

where the first (15) and second (27) triggers are interconnected with the first end (21) of arm means (19), the latter (19) being moved by said triggers; the second trigger (27) assumes two positions with respect to the first (15) wherein respectively places the first end (21) of arm means (19) in a single shoot condition (C) wherein the respective end portion (23) disengages from the inner end (11) of the probe means (9) when the probe means (9) moves from the retracted condition (R) towards the protruding one (S) or when the first trigger (15) exceeds the actuating position of the button (5) towards its actuating end position and in an hammer shoots condition (M) wherein the end portion (23) of the arm means (19) always remains engaged to the inner end (11) of the probe means (9); said device (1) being **characterized in that** the second trigger (27) is provided with a second spring means (45) that elastically pushes it towards a position of contact with a finger portion of the first trigger (15).

2. Device according to claim 1 **characterized in that** the first end (21) of the arm means (19) is swivelling and translating connected to the first trigger (15) and the second trigger (27) bears a shifting means (31) acting on the first end (21) of arm means (19) shifting the latter (21) towards the probe means (9).

3. Device according to claim 2 **characterized in that** the first end (21) of the arm means (19) carries a third pin (35) parallel to the first pin (17) and freely swivelling and sliding engaged in a slot means (37) carried out in the first trigger (15) and having a longitudinal geometric axis perpendicular or tilted with respect to the translation direction of the probe means (9).

4. Device according to claim 2 or 3 **characterized in that** the shifting means (31) of the second trigger (27) consists of a protruding cam profile acting in a sliding manner on the first end (21) of arm means (19) or on the respective third pin (35) or consists of a second slot means realized in a protrusion of the second trigger (27), tilted with respect to the first slot means (37) and slidably engaged by said third pin

(35).

5. Device according to any of the previous claims **characterized in that** the first trigger (15) is provided with a stop means (39) designed to abut with the arm means (19), determining the position of the latter, at least when the triggers (15, 27) are not actuated, said device (1) being provided with first spring means assigned to elastically push the arm mean (19) towards said abutment position with the stop means.

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6. Device according to any of the preceding claims **characterized in that** the third pin (35) movable into the slot means (37), in addition to be engaged to the first end (21), preferably fork shaped, of the arm means (19) is freely rotably engaged to a seat means (41), preferably housed into the cavity of the preferably fork shaped first end (21); said seat means (41) housing one end of a first spring means (43) whose remaining end is fixed to the first trigger (15) and acting elastically on the seat means (41) and on the first end (21) in removing direction of the latter from the probe means (9).

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7. Device according to any of the previous claims **characterized in that** the arm (19) length, being the distance between the rotation axis of the same arm means first end (21) and the respective opposite end portion (23) is ranging between the distances from the inner end (11) of the probe means (9) to the end of the slot means (37) opposite with respect to the probe means (9) subtracted by the third pin (35) radius in the conditions of single shoot (C) and protruding (S) of the probe means (9) when the first trigger (15) is respectively released and actuated in the firing position.

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8. Device according to claim 7 **characterized in that** the slot means (37) longitudinal dimension and the difference between the minimum and maximum radius of the cam profile protruding from the shifting means (31) of the second trigger (27) are such that in the hammer shoots condition (M), the end portion (23) of arm means (19) opposite to the respective first end (21) is always in abutment with the inner end (11) of the probe means (9) in every first trigger (27) position.

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9. Device according to claim 1 **characterized in that** the first end (21) of the arm means (19) is connected by means of a pivot pin to a protrusion of the second trigger (27) whose actuation moves the first end (21) of the arm means (19) towards the probe means (9).

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FIG.2

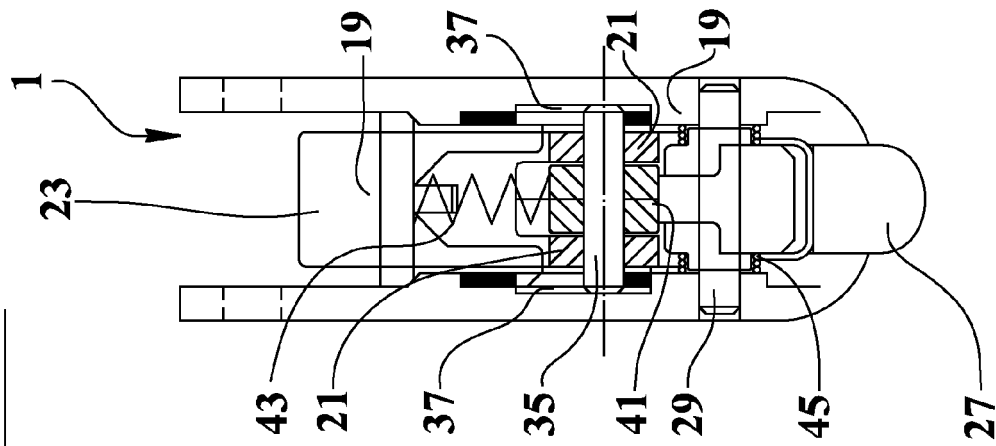
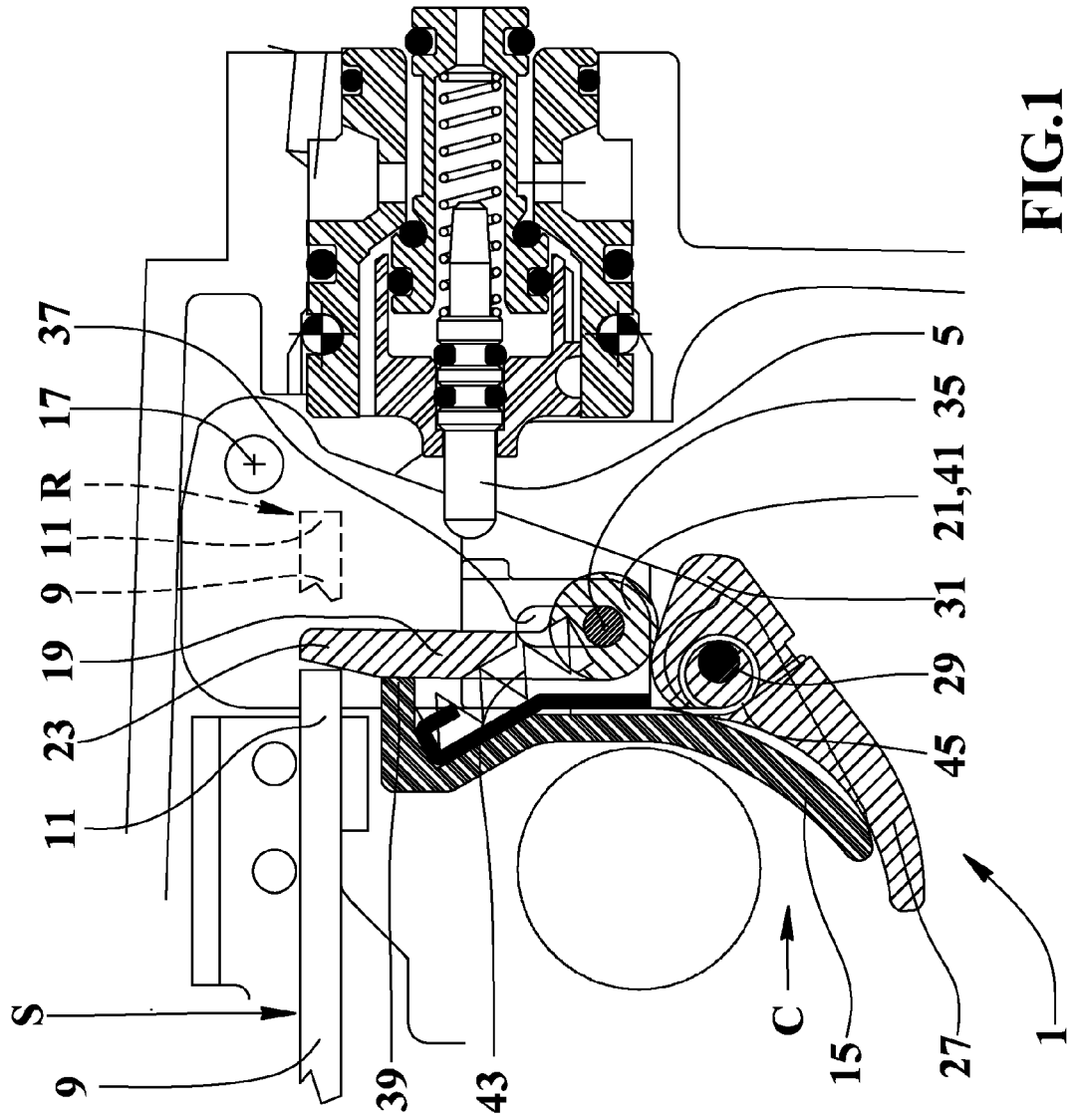


FIG.1



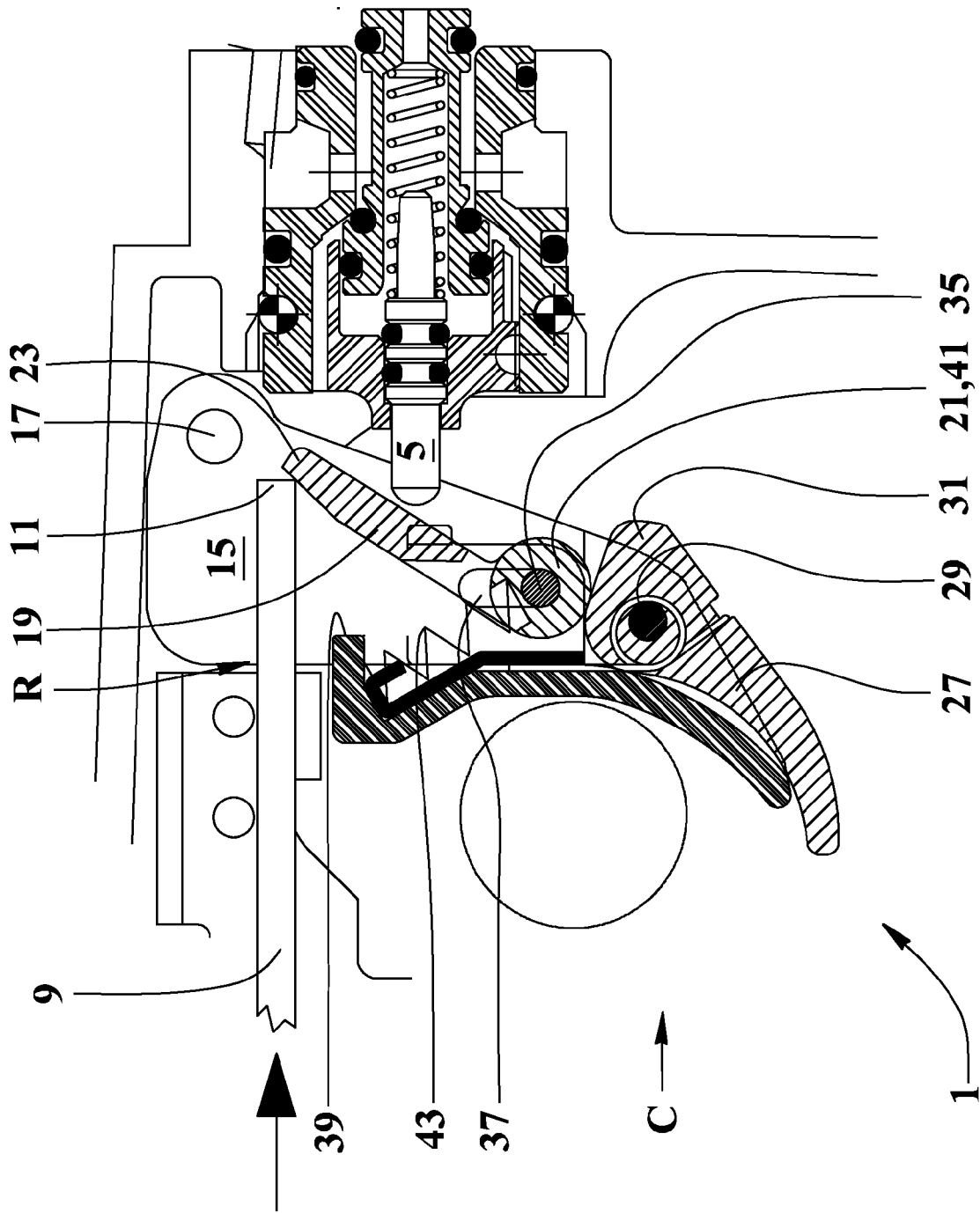


FIG.3

FIG.4

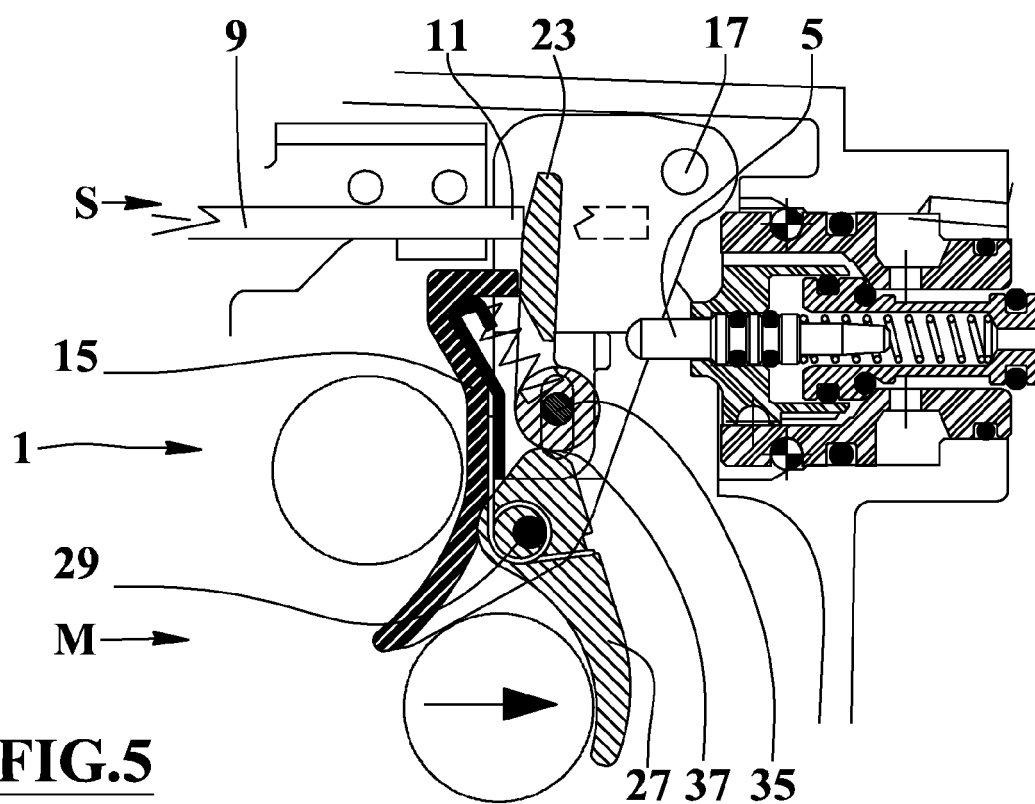
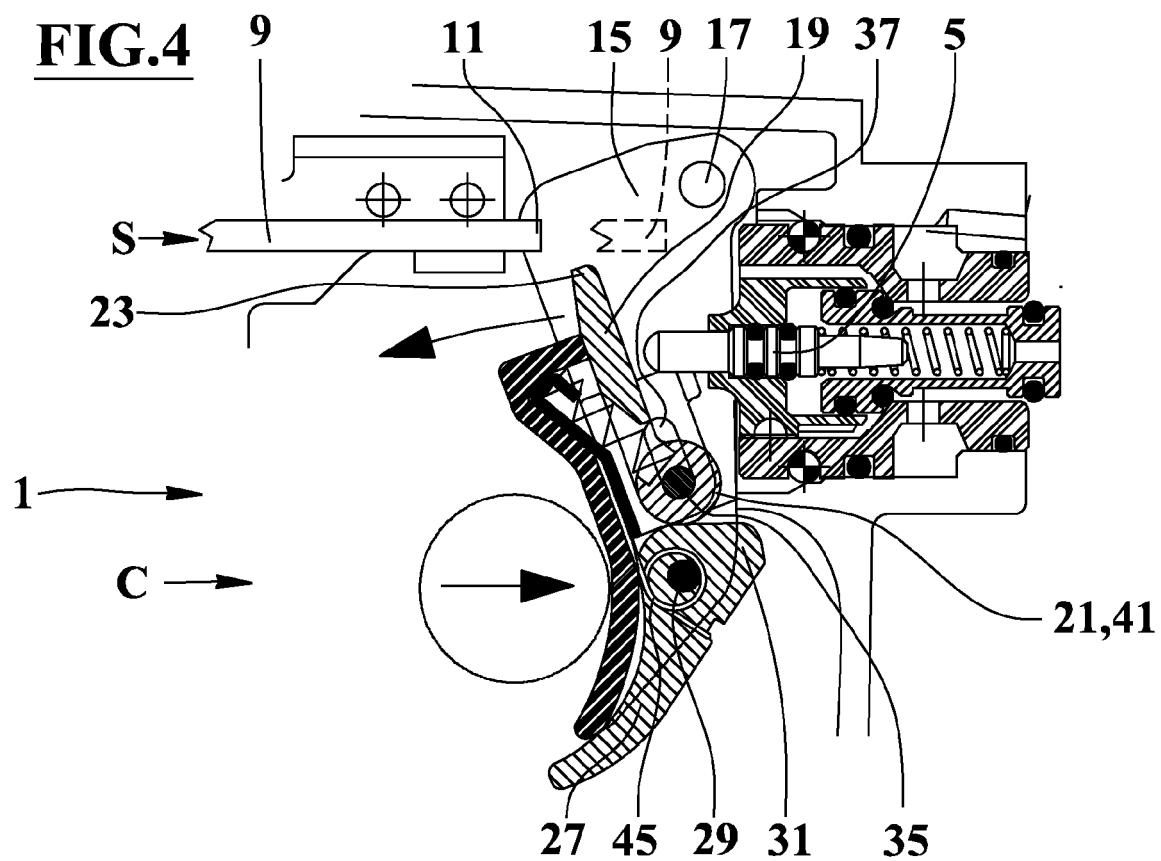


FIG.5

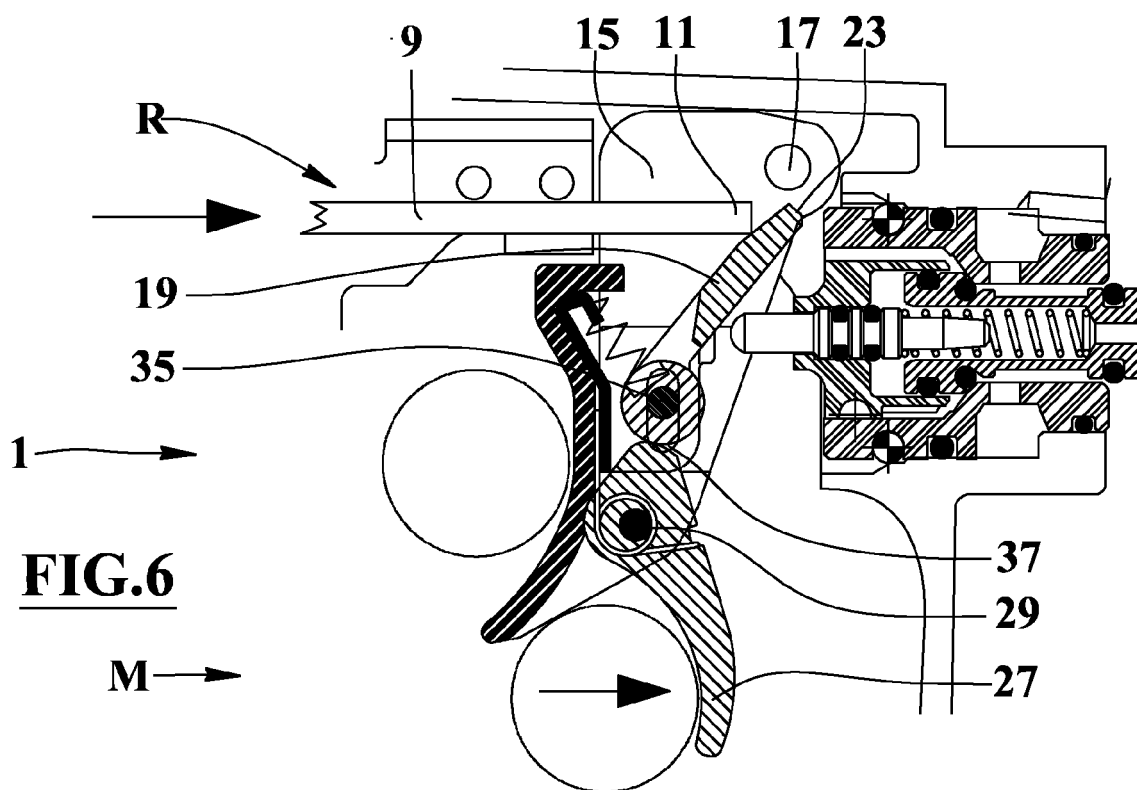


FIG. 6

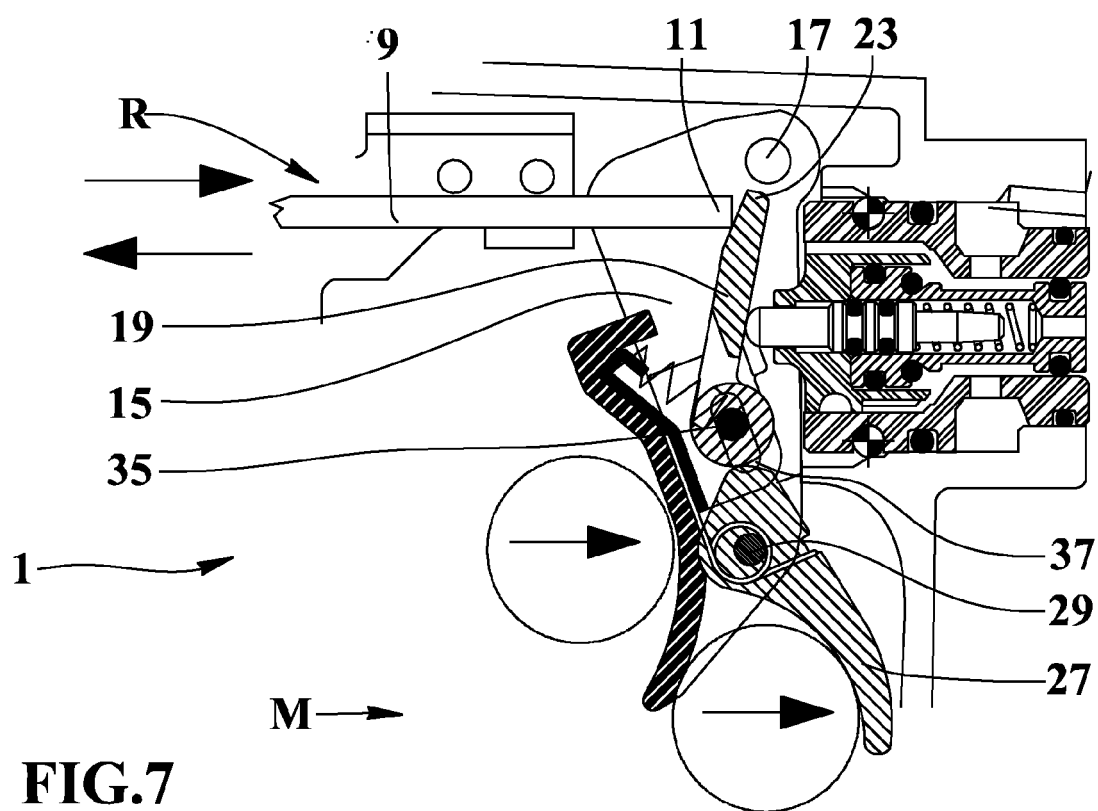


FIG. 7



EUROPEAN SEARCH REPORT

 Application Number
EP 14 16 1924

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 23 May 2014	Examiner Carmichael, Guy
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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