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DESCRIPTION

[0001] The present invention refers to the field concerning manual tools for the application of nails or similar fasteners and refers to a safety device for a nailer assigned to prevent the single-shot or repeat actuation without a voluntary enable by the user carried out before the actuation.

[0002] They are known pneumatic tools, called nailers, for the application of nails, "U" shaped points and similar able to fix these nails into wood and in other materials and utilised in building, in furniture, in packaging, in the pallets manufacture, in the wood industry in general and in various fields.

[0003] Such known nailers are equipped with safety means, for example of the contact kind, which prevent the operation of the nailer if its output part for the nails is not pressed against the object to be nailed. Such contact safety means comprise a slide translating parallel to the shot direction of the nails between a protruding position with respect to the exit mouth of the nails and a retracted position in correspondence of which such mouth is adjacent to the piece to be nailed and the nailer is enabled to the shot by the manual actuation of a trigger of the nailer. Such contact safety is used by operators also for the fast repetition application of the nails: the trigger they cause the shot of the nail by pressing the security slide against the part to nail.

[0004] One disadvantage of such contact slide safety means consists in that if the operator holds, even inadvertently, the trigger held down, the nailer will shoot the nail as soon as the slide is retracted from contact with any object including limbs or other portions of the body of the same operator or bystanders.

[0005] Prior art documents N. US4405071A, N. US3606128A, N. US4211353A, and N. FR2825422A disclose a safety device for a nailer having the features of the preamble of the following claim 1.

[0006] One purpose of the present invention is to propose a safety device for a nailer that allows the actuation of the nailer by the trigger only after of a specific action on a command of said safety device actuated only by a direct manual intervention of the operator or only after having manually and consciously armed the nailer by said device. Another purpose is to propose a device able to inhibit the operation of the nailer after a predetermined time span spent by the actuation of the safety device itself or from the last actuation of the nailer or rather the last shot.

[0007] Further purpose is that to propose a device that allows to perform the fast repetition nailing by the safety slide.

[0008] Another purpose is to propose a safety device for arming the nailer by manual direct action on the drive of the safety device.

[0009] Further purpose is to propose a safety device for arming the nailer by a direct servoassisted action on the command of the safety device.

[0010] Another purpose is that to propose a safety device also applicable to not prearranged nailers or old type nailers.

[0011] The characteristics of the invention are below highlighted with particular reference to the accompanying drawings in which:

- Figure 1 shows a longitudinal section view of the safety device for a nailer, object of the present invention, when the nailer is shown only partially and in which the device is in a lock condition of the nailer;
- Figure 2 shows an enlarged view of an element of the device of figure 1;
- Figure 3 shows a longitudinal section view of the safety device for a nailer, when the nailer is shown only partially, and wherein the device is in an armed condition of the nailer;
- Figure 4 shows an enlarged view of an element of the device of Figure 3;
- Figures 5 and 6 show partial views of a first element of a variant device of figure 1 respectively in locking and armed conditions;
- Figure 7 shows a sectional view according to the plane VII - VII of Figure 5 of a second element of the variant of Figure 5;
- Figure 8 shows an enlarged view of the first element of figure 5;
- Figure 9 shows a view of the second element of Figure 7 in an activation condition of the armament of the device;
- Figure 10 shows an enlarged view of the first element of figure 6.

[0012] With reference to Figures 1 - 4, numeral 1 indicates the safety device for a nailer object of the present invention.

[0013] The nailer 2 or similar machines, also indicated with the words stapler or pneumatic fastening or fasteners for nails or fasteners of other kinds, is of the type equipped with actuator means, preferably of pneumatic type, for the expulsion in a direction shot of a nail, clip or similar or the already mentioned fastener of other species.

[0014] Such nailer 2 is equipped with a movable element 4 consisting of a rod of the contact safety lock that allows the shot only when the exit mouth of the nailer is pressed against the object in which fix the nail.

[0015] Such movable element is movable between a locking condition B in which the nailer is inhibited from operation and a release condition S, corresponding to the contact and pressure condition of the mouth with the object, wherein the movable element does not lock the nailer and in which it is possible the shot of the nail by actuation of a trigger 6 of said nailer 2.

[0016] Alternatively the invention provides that the movable element 4 may consist of a rod, a transmission element, valve command or other drive parts, for example associated to the shot element, which, if locked in its sliding, preventing the shot.

[0017] The device 1 comprises at least one locking means 3 having a stopping end 5 movable between a stop condition R and an armed condition A and vice versa.

[0018] In the stop condition R, the stopping end 5 interferes with an abutment means 7 fixed to, or formed into the movable element 4 stopping it 4 in said locking condition B thus preventing it 4 to assume the release condition S and thus preventing the shot.

[0019] In the armed condition A, the stopping end 5 is moved away from the abutment means 7 or at least does not interfere with its 7 movement allowing the translation of the abutment means 7 itself until the reaching of the release condition S in which it is possible the shooting. Preferably the locking means 3 consist of a stem 3.

[0020] The locking means 3 is provided with elastic means 9, for example consisting of a compressed helical spring acting on a piston 17 or on an extension 25 of the stem 3 opposite to the stopping end 5, in the direction of the stop condition R. The device 1 also comprises arming means 11 intended to act on the extension 25 of the stem 3 or on the piston 17 in contrast to the elastic means 9 and to translate the piston 17, the locking means 3 and the respective stopping end 5 in the armed condition A.

[0021] The operator, to put the nailer in the armed A and release S conditions and then to be able to use the nailer in firing, he must act on the arming means 11 making free the abutment means 7 by the stopping end 5 and he must put the movable element 4 in the release condition S in which the device can shoot the nail acting on the trigger 6. The invention provides that the abutment means 7 is fixed, or obtained into, the movable element 4, or rather at the end the rod opposite to the mouth of the contact safety lock.

[0022] In this way, the abutment means 7 translate together with the element 4 of the safety in a parallel direction to the shooting direction while the locking means 3 and the respective stopping end 5 translate along a perpendicular or inclined direction with respect to said shot direction.

[0023] More in detail, the device 1 comprises a cylinder means 15 in which cavity slides in a pneumatic sealed manner the piston 17 fixed to the locking means 3 which serves as a cylindrical stem of said piston 17.

[0024] The stem, or rather the locking means 3 slides in pneumatic sealed manner through a passing hole 19 obtained through an end wall of the cylinder means 15 or rather through the head of such cylinder means.

[0025] The cylinder liner or inner wall of the cylinder means can be made of steel, aluminum or other suitable material and the piston can be of aluminum or zamak and can be equipped with bands or rings of O-ring type for reaching the pneumatic sealing. Even the passing hole 19 may be provided with bands or rings for the pneumatic sealing with the stem 3 made of steel or other durable material, preferably metallic material.

[0026] The chamber 21 of the cylinder means 15 containing the stem 3 of the piston or rather limited between the piston 17 itself and the end head wall having the passing hole 19, is equipped with a vent hole 23 passing through the side wall of the cylinder and obtained near of said terminal head having the passing hole 19; alternatively it is provided that the vent hole is carried out

through the wall of the terminal head or through the stem 3 until connecting the chamber 21 in flow communication with the outside.

[0027] The vent hole 23 is calibrated or adjustable so that the elastic means 9, in pushing the piston 17 or the extension 25 of the stem 3 and translating it until the locking condition, spend a certain time span inversely proportional to the force of the spring and to the vent hole 23 diameter.

[0028] The abutment means 7 comprises an end, a shoulder or a protrusion assigned to abut with the stopping end 5 in the stopping condition R and comprises at least one inclined plane surface 27 which extends from said end or other and assigned to slidingly abut with the stopping end 5 bringing it back in the extreme armed condition A, or in proximity of it, when the abutment means 7 passes from the locking condition B to the release S until the stopping end 5 reaches the stopping condition R intercepting the abutment means 7 and it locking any possibility of firing up to restore of the armed condition by arming means 11.

[0029] Such arming means 11 consist of a manually actuable knob 29 and fixed to the extension 25 of the stem 3 opposite to the stopping end 5.

[0030] The device 1 may comprise an optional duct that puts in flow communication the cavity of the cylinder means 15 with the outside, such optional duct leads into the end of the chamber 21 opposite to the passing hole 19 for the stem and connects such chamber 21 with the outside only when the piston 17 is in the armed condition A or in proximity of the latter condition A. Said optional duct, can be made by means of the opening of a hole through the cylinder means wall or by an open and goblet shaped flaring in said wall in the area occupied by the piston when it is at the maximum distance, or almost at said distance, from the passing hole 19 through the stem 3. The optional duct has the purpose of quickly put the chamber 21 to the external ambient pressure in the armed condition A.

[0031] The operation of the device provides that an operator, starting from the locking B and of stopping R conditions, acts on the knob 29 turning it away, placing the device in the armed condition A, and supports and presses the mouth of the nailer against the piece to nail so translating the movable element 4 and the abutment means 7, placing the nailer in the release condition S; at this point pressing the trigger 6, the operator causes the nail expulsion and the insertion of the same in the piece. This done, the operator can release the trigger and within a time span established by the safety device 1, carry out other nails or, he may, without releasing the trigger, carry out rapid sequences of nailing each caused by the activation of the movable element 4 of the contact safety against the portions to nail. In both cases, after a period of time necessary to the vent hole 23 to evacuate the air in the chamber 21 compressed by the piston 17 by means of the elastic means 9, the device returns to the stopping condition R in which the nailer is in complete safety.

[0032] The variant of the device 1 illustrated in Figures 5 to 14 differs from the previous embodiment in that the arming means 11 comprise a valve means 33 controlled by a button 35 to put in flow communication a compressed gas source 37 with the chamber 21 of the cylinder means 15 limited between the piston 17 and the end wall having the passing hole 19 through a connecting duct 39.

[0033] The connecting duct 39 comprises input and output connections respectively of the opening of the valve means 33 and the cylinder means 15 and a set of joints and rigid or flexible pipes and optionally gas filters, control valve and other pneumatic elements.

[0034] The valve means 33 comprises a cylindrical cavity whose wall is provided with an opening connected to the compressed gas source 37 and comprises a drawer equipped with radial and axial holes in mutual communication. The seals between the drawer and the wall of the valve cavity are realised through gaskets, for example of O-ring type. A spring elastically maintains the drawer in a position in which the radial hole is spaced from said opening while a pressure on the button, such as to overcome the spring, causes the drawer translation until to the correspondence of the radial hole with the opening. In this condition, the compressed gas is free to flow through the opening, the radial and axial holes and through the connecting duct 39 to the chamber 21.

[0035] Therefore the actuation of the button 35 causes the pressure increase in the chamber 21, the translation of the piston 17 and the achievement of the armed condition A.

[0036] The valve means 33 is associated with the shot organs of the trigger 6 comprising the compressed gas source 37 when the button 35 is of with spring return type and placed on one side of the handle bearing said trigger 6.

[0037] The stem 3 and the piston 17 are provided with respective longitudinal through cavity and the vent hole 23 is radially oriented through the side wall of the stem 3 until reaching said pass through longitudinal cavity and placing the chamber 21 in flow communication with the outside.

[0038] The through cavity of the stem has a passing pin means 41 whose peak is directed toward a shoulder or bottleneck 43 of the vent hole; the base of such pin means 41 is supported by a threaded body 45 engaged in a nut screw obtained in the cavity portion of the stem 3 adjacent to the stopping end 5. The shoulder or bottleneck 43, the pin means 41, the threaded body, the nut screw and the stem 3 are coaxials. The rotation of the threaded body 45 allows to modifying the opening of the vent hole and then to adjust the time span for returning to the stopping condition R.

[0039] The operation of the variant in object differs from the one described before, for the mere fact that the armed condition A is obtainable by exerting pressure on button 35.

[0040] It is important to observe that the device 1 can be originally integrated in the nailer realizing a single apparatus of high security but said device can be separately made, in the form of an additional element to install onto old nailers or anyway nailers not equipped and not prearranged for the device application. This device feature allows also the nailers equipped only with the contact safety or however without the timer lock provided by the device to reach the highest standards of safety. Both embodiments of the device are fit to reach such safety improvements of nailers devoid of the device itself, for example by the adoption of simple mechanical attachment and, for the second embodiment, by a compressed air connection which allows to detach the valve means 33 from the shooting organs and placing where more comfortable the button 35.

[0041] An advantage of the present invention is to provide a safety device for a nailer that allows the nailer actuation by the trigger only after a specific action on a command of said safety device actuated only by a direct manual intervention of the operator or only after having manually and consciously armed nailer by said device.

[0042] Another advantage is to provide a device able to inhibit the nailer operation after a predetermined time interval spent after the actuation of the safety device itself or from the last actuation of the nailer or rather from the last shot.

[0043] Further advantage is to provide a device that allows to perform fast repetition nailing through the safety slide.

[0044] Another advantage is to provide a safety device for arming the nailer by direct manual action on the command of the safety device.

[0045] Further advantage is to provide a safety device for arming the nailer by direct servo assisted action on the command of the safety device.

[0046] Another advantage is to provide a safety device also applicable to not prearranged nailers and old type nailers.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- [US4405071A \[0005\]](#)
- [US3606123A \[0005\]](#)
- [US4211353A \[0005\]](#)
- [FR2825422A \[0005\]](#)

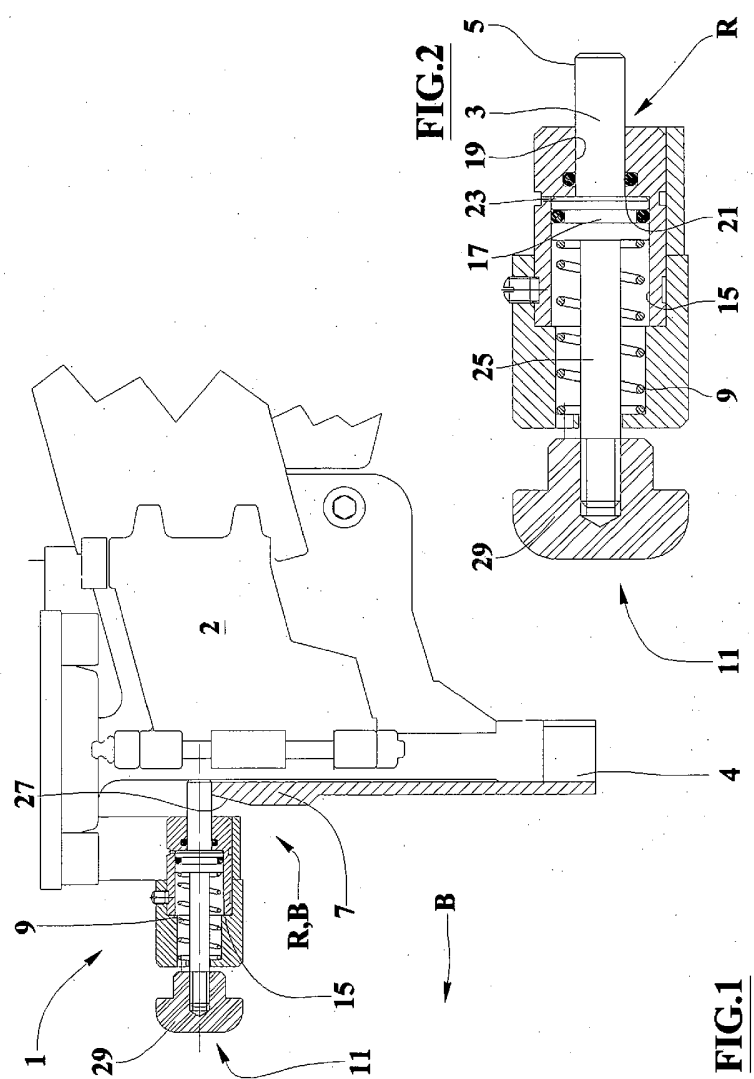
P A T E N T K R A V

1. Sikkerhedsindretning til sømpistol (2) af typen, som er forsynet med et aktive-
ringsmiddel til udstødelsen af et søm, krampe eller lignende i en skyderetning, og
5 som omfatter et bevægeligt element (4), der er bevægeligt mellem en låst tilstand
(B), hvor sømpistolen er hindret i drift, og en frigivet tilstand (S), hvor det bevæ-
gelige element (4) ikke blokerer sømpistolen, og hvor det er muligt at affyre søm-
met ved aktivering af en aftrækker (6) af sømpistolen (2); hvor indretningen (1)
10 omfatter mindst ét låsemiddel (3), der har en stoppende ende (5), der er bevæge-
lig mellem en stoppende tilstand (R), i hvilken den går i indgreb med et anslags-
middel (7), der er fastgjort til eller bæres ud på det bevægelige element (4), for at
stoppe den i den låste tilstand (B), og en væbnet tilstand (A), hvor den stoppende
ende (5) tillader forskydning af anslagsmidlet (7) for at tillade anslagsmidlet (7) at
15 nå den frigivne tilstand (S), hvor låsemidlet (3) også er forsynet med et elastisk
middel (9), der virker i retningen mod den stoppende tilstand (R), og et væb-
ningsmiddel (11) til at virke imod det elastiske middel (9) og til at skifte låsemidlet
(3) og den respektive stoppende ende (5) til den væbnede tilstand (A), hvor opera-
tøren, for at sætte sømpistolen i den væbnede og frigivne tilstand, skal påvirke
20 væbningsmidlet (11) for at frigive anslagsmidlet (7) fra den stoppende ende (5), og
han skal placere det bevægelige element (4) i den frigivne tilstand (S), hvor ind-
retningen kan affyre sømmet, ved at betjene aftrækkeren (6); hvor anslagsmidlet
(7) er fastgjort til eller udformet på det bevægelige element (4), består af en sik-
kerhedskontaktlås (7), og det bevæger sig sammen med det bevægelige element
(4) i en retning, der er parallel med affyringsretningen, og låsemidlet (3) og den
25 respektive stoppende ende (5) forskydes langs en retning, der er vinkelret eller
skrå i forhold til affyringsretningen; hvor indretningen (1) er k e n d e t e g n e t
ved at omfatte et cylindermiddel (15), hvor et stempel (17) glider på en pneuma-
tisk forseglede måde; hvor stemplet (17) er fastgjort til låsemidlet (3), som fungerer
som et stempelskaft af stemplet (17), og som glider på en pneumatisk forseglede
30 måde gennem et gennemgangshul (19), der er formet gennem en endevæg af cy-
lindermidlet (15); hvor kammeret (21) af cylindermidlet (15), der er afgrænset
mellem stemplet (17) og endevæggen, som har gennemgangshullet (19), er forsy-
net med et kalibreret eller justerbart ventilhul (23), der sætter kammeret (21) i
fluidisk forbindelse med ydersiden, nær endevæggen, som har gennemgangshullet
35 (19), eller igennem den eller stempelskaftet (3); hvor det elastiske middel (9) fun-
gerer i kompression på stemplet (17) eller på en forlængelse (25) af stempelskaftet
(3) modsat den stoppende ende (5).
2. Indretning ifølge krav 1, k e n d e t e g n e t ved at anslagsmidlet (7) omfatter én
ende, en skulder eller et fremspring, som er indrettet til at ligge an mod den stop-

- pende ende (5) i den stoppende tilstand (R), og som omfatter mindst en skrå flad flade (27), der er indrettet til glidbart at gå i indgreb med den stoppende ende (5) for at bringe den tilbage i den ekstremt væbnede tilstand (A), når anslagsmidlet (7) skifter fra den låsende (B) til den frigivne (S) tilstand, indtil den stoppende ende (5) ikke når den stoppende tilstand (R).
- 5
3. Indretning ifølge krav 1, k e n d e t e g n e t ved at ventilhullet (23) er dannet nær endevæggen, som har gennemgangshullet (19), eller igennem den eller stempelskftet (3), og omfatter en valgfri passage, der sætter cylindermidlet (15) i fluidisk forbindelse med ydersiden, hvor denne valgfri passage fører til kammerets (21) ende modstående til gennemgangshullet (19) til stempelskftet og kun forbin-
- 10
- der dette kammer (21) med ydersiden, når stemplet (17) er i den væbnede tilstand (A) eller næsten i denne tilstand (A).
4. Indretning ifølge krav 1, k e n d e t e g n e t ved at væbningsmidlet (11) består af en knap (29), som manuelt kan betjenes, og som er fastgjort til forlængelsen (25)
- 15
- af stempelskftet (3) modsat den stoppende ende (5).
5. Indretning ifølge krav 1 eller 2, k e n d e t e g n e t ved at væbningsmidlet (11) omfatter et ventilmiddel (33), der er styret af en knap (35) til at sætte en kilde til komprimeret gas (37) i fluidisk forbindelse med kammeret (21) af cylindermidlet (15), der er begrænset mellem stemplet (17) og endevæggen, som har gennem-
- 20
- gangshullet (19), gennem en forbindelsesgang (39), hvor aktivering af knappen (35) forårsager trykforøgelse i kammeret (21), stemplets (17) forskydning og opnåelsen af den væbnede tilstand (A).
6. Indretning ifølge krav 5, k e n d e t e g n e t ved at ventilmidlet (33) er tilknyttet affyringselementerne af aftrækkeren (6), der omfatter en kilde til komprimeret gas (37), hvor knappen (35) er af den slags med returfjeder og er arrangeret på en
- 25
- side af håndtaget for at tilvejebringe aftrækkeren (6).
7. Indretning ifølge krav 5 eller 6, k e n d e t e g n e t ved at forbindelsesgangen (39) omfatter input- og output-forbindelser af henholdsvis ventilmidlet (33) og cylindermidlet (15) og mindst én blandt samlinger, fleksible rør, stive rør, gasfilter og styringsventiler.
- 30
8. Indretning ifølge et hvilket som helst af krav 5 til 7, k e n d e t e g n e t ved at stempelskftet (3) og stemplet (17) er tilvejebragt af respektive langsgående gennemgangsrum, og ventilhullet (23) udvikler sig langs en radial sektion gennem sidevæggen af stempelskftet (3), og gennemgangsrummene mellem kammeret (21) og ydersiden, hvor gennemgangsrummet af stempelskftet bærer et stiftmiddel (41), hvis spids er rettet mod en skulder eller en flaskehals (43) af ventilhullet og er støttet af legeme med gevind (45), der er i indgreb med en skruemøtrik, som er formet i hulrumsdelen af stempelskftet (3) tilstødende til den stoppende ende
- 35

(5), hvor rotationen af legemet med gevind (45) tillader indstilling af tiden det tager at vende tilbage til den stoppende tilstand (R).

DRAWINGS



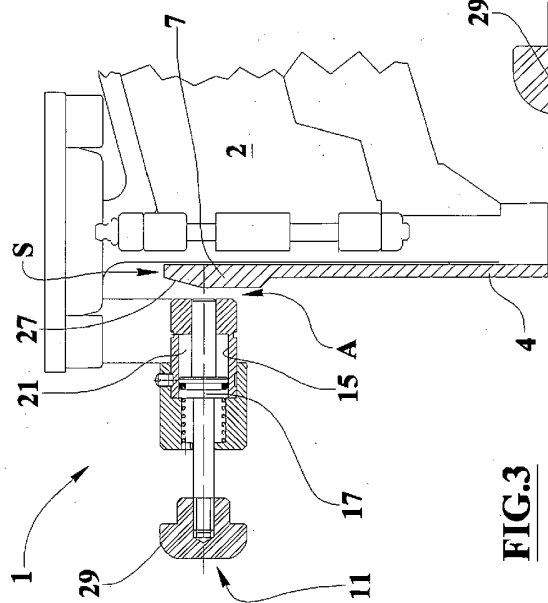


FIG. 3

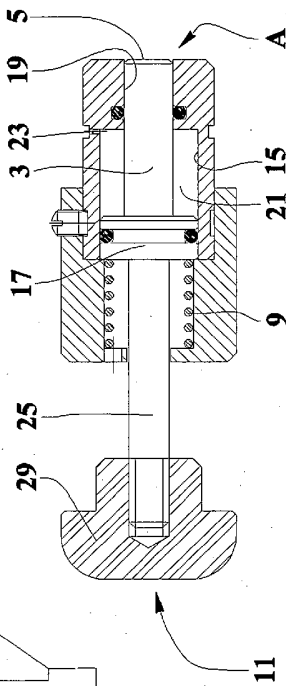


FIG. 4

FIG.5

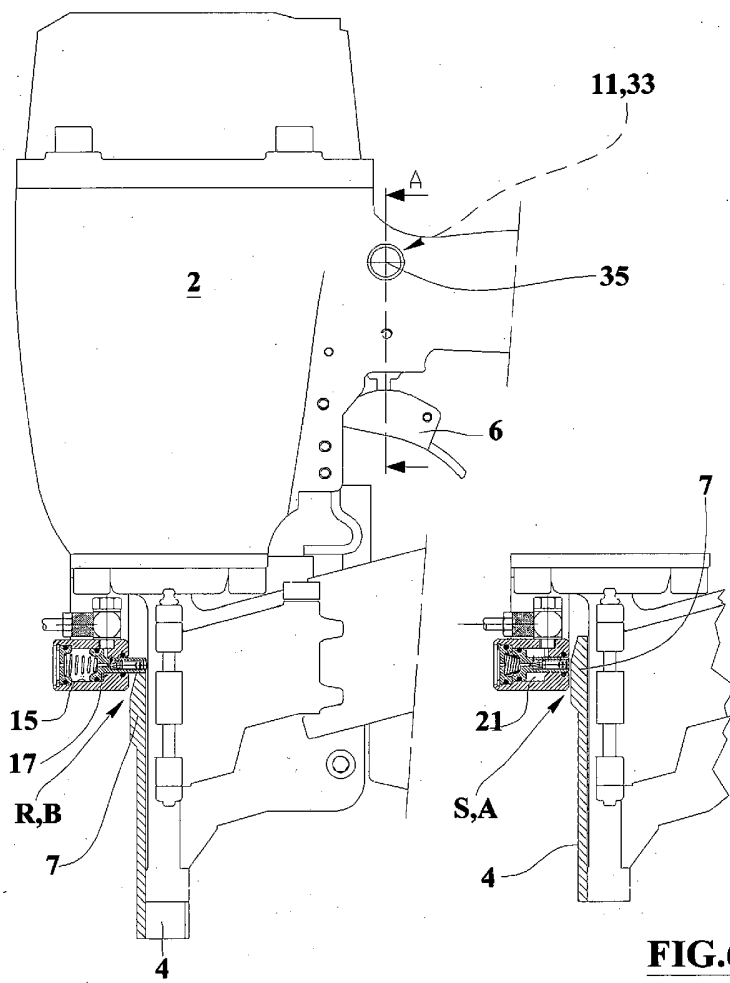


FIG.6

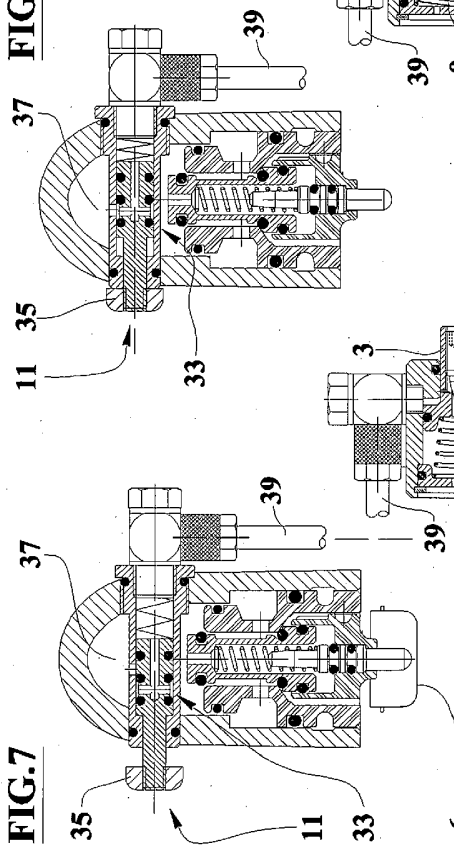


FIG. 7

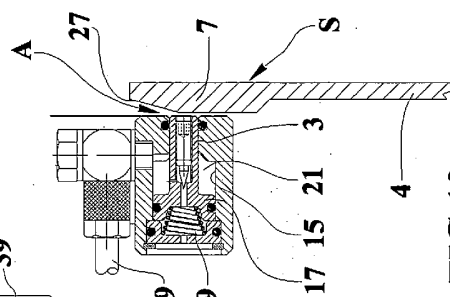


FIG.10

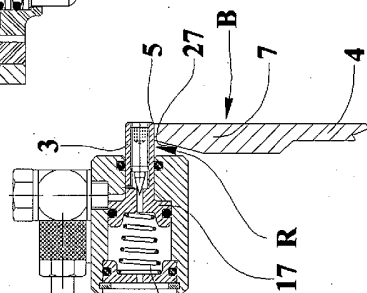


FIG. 8

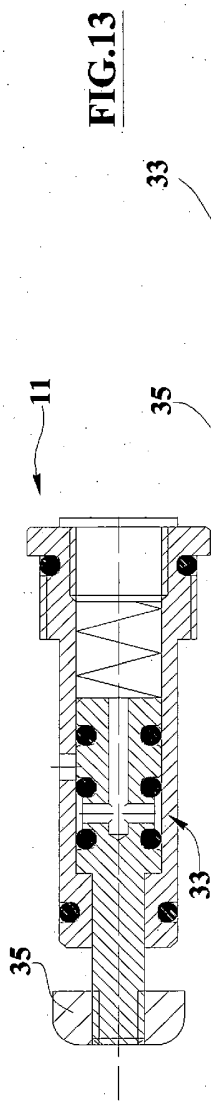


FIG. 11

FIG. 13

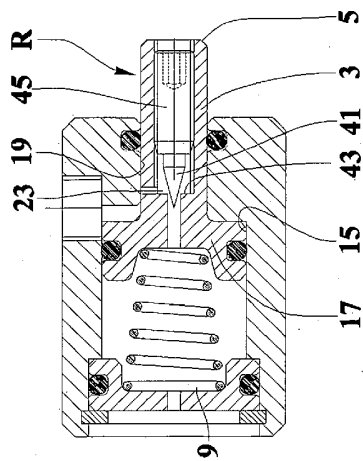
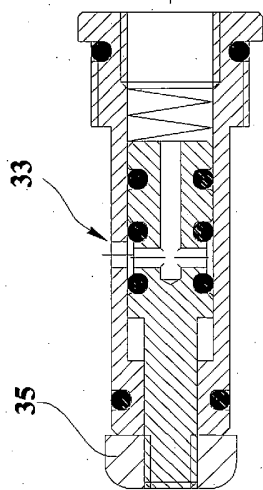


FIG. 12

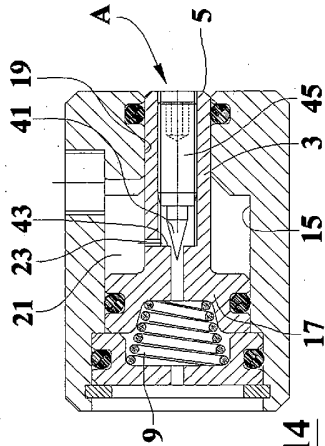


FIG. 14