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⑯ **A screw positioning and feeding device.**

⑯ A screw feeder attachment to a power screwdriver operates by pushing a power screwdriver against a surface whereby a slide assembly (4) is retracted against a spring force (7) into a slide housing (2) securely attached to the power screwdriver (9). The screw bit (96) passes centrally

through a guide hole in a non-rotating axle (6) for twin sprocket wheels (56), which, by means of a pawl mechanism (5), advance a feed tape (16) holding screws one step on the return extension stroke of the slide assembly (4).

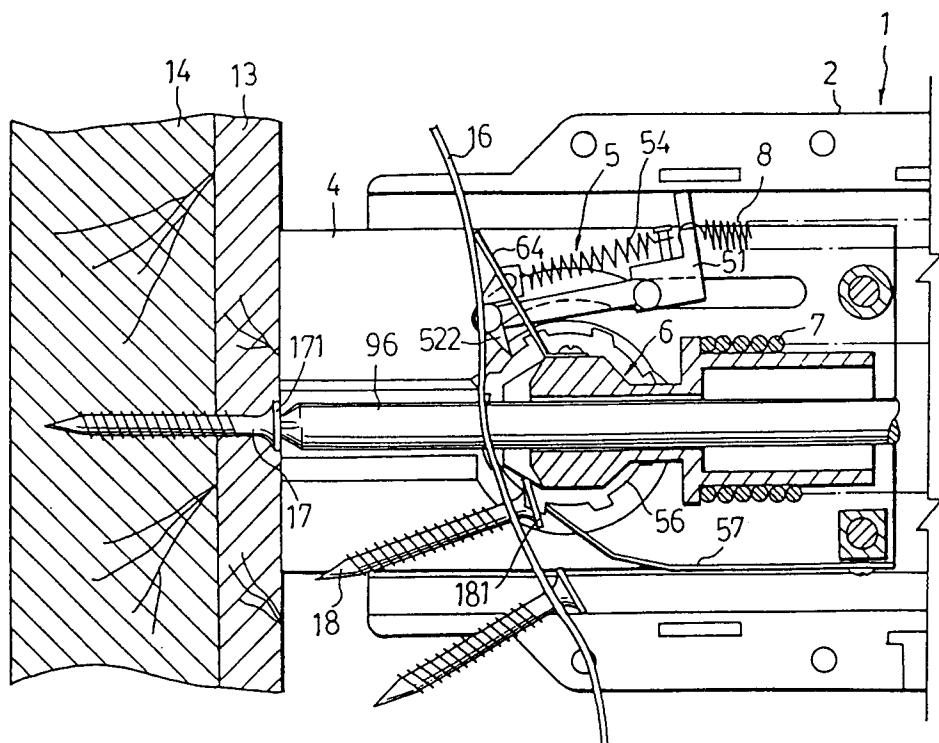


FIG. 7

The present invention relates to a screw positioning and feeding device comprising a slide assembly engaging a tape or belt holding a plurality of screws, for feeding by relative movement between the slide assembly and a slide housing, said screws one-by-one to a position to be driven in by a screwdriver bit in a power screwdriver coupled to said device.

Such devices are securely fixed to a power screwdriver. A plastic tape or belt is used, the screws being pre-mounted in a series of holes along the tape or band. To position screws one-by-one for screwing, the tape or belt is fed through the device, said tape being aligned normal to the rotational axis of the screw bit of the power screwdriver when each screw is brought into position for screwing in. Especially designed perforations in the tape, surrounding each screw shank, allow the tape to rupture and the screw head to pass through the enlarged hole as the screw bit screws in the screw. In this type of feeder attachment, a sprocket wheel engages notches in the tape or belt and advances the same one screw for every screw that is screwed in.

One example of a previously known device of this type is described in DE 2 541 046, where the screwdriver bit passes above the axle of the sprocket wheel. A grooved holder is necessary above the sprocket wheel to hold the tape in place as the screw is screwed in by the screw bit. This adds weight to the attachment at its forward end. A heavy, particularly a front-heavy, device such as that described in DE 2 541 046 cannot be operated with one hand, nor for extended periods without frequent pauses. Furthermore, due to the placement of the sprocket wheel below the axis of the screw bit, the very last screw of the tape length cannot be held properly for screwing, resulting in unnecessary waste.

These problems are remedied by a device of the type described by way of introduction which is characterized in that said slide assembly comprises a pair of sprocket wheels for advancing said screw tape, which are arranged on either side of the longitudinal axis of the screw bit and have a common rotational axis which intersects at essentially right angles said longitudinal axis of the screw bit.

The invention, as claimed in the main claim, eliminates the need for a grooved holder, the sprocket wheels themselves serving as a holder with the common non-rotating axle of the sprocket wheels being provided with a guide hole for the screw bit. Thus in addition to making the device lighter at its forward end, the forces exerted as the screw bit is advanced, are directed centrally instead of eccentrically.

According to a preferred embodiment of the present invention, the twin sprocket wheels advance the screw to its centered position for driving as the slide assembly returns to its original extended, spring-biased position. By utilizing the return stroke in this manner to advance the screw to its portion for driving instead of an initial position of the forward stroke as in the prior art, it is possible to make the device significantly shorter and thus less front-heavy. This feature also enables the user to place the screw tip of the screw exactly where it is to be screwed in before beginning to push the screwdriver forward to screw in the screw.

One way of carrying out the invention is described in detail below with reference to drawings which illustrate only one specific embodiment in which:

- Fig 1 shows the device according to the invention in longitudinal section with the slide assembly in its fully extended position,
- Fig 2 shows a longitudinal sectional view from above of the forward (lefthand) portion of the device in Fig 1,
- Fig 3 shows an exploded view of the pawl carriage assembly,
- Fig 4 shows an exploded view of the sprocket axle assembly,
- Fig 5 shows a rear view of the slide housing,
- Fig 6 shows a side view of the rear of the slide housing, a threaded adapter pipe and an automatic screwdriver,
- Fig 7 shows a side view in longitudinal section of the forward portion of the device with the slide assembly in its maximum retracted position, the screw bit having just screwed in the screw,
- Fig 8 is a view in longitudinal section from above corresponding to Fig 7,
- Fig 9 shows without screws a typical tape which can be used in the device according to the invention,
- Fig 10 shows a sectional side view of the tape with screws inserted.

Referring to Fig 1, a slide assembly 4 is displaceable within a slide housing 1 against the force of a helical spring 7. The slide assembly 4 is provided with twin sprocket wheels 56 rotatably journaled on an axle assembly permanently fixed in the slide assembly 1. As can be seen in Figs 1, 2 and 4, the non-rotating axle assembly 6 of the twin sprocket wheels 56 is provided with a through-hole 61 through which a screwdriver bit 96 (see Figs 7,8) penetrates for driving the screw into a surface. Said screw bit 96 extends centrally to said helical spring 7 which is at one end slipped onto a cylindrical portion 60 and is held within a cylindrical bracket 32 at its other end. As can be seen in Fig 2, the slide assembly is provided with shoul-

ders 48 in grooves 21 in the slide housing 2, the sprocket wheel axle assembly 6 is held securely in the slide assembly 4 by cylindrical portions 62,63 which rest in cylindrical cavities 4,21 in the slide assembly 4. Two sprocket wheels 56 are rotatably journaled on shoulders adjacent the central portion of the sprocket wheel axle assembly 6. A screw 152 screwed into said axle assembly holds a slide limiting plate 15 in place, the functioning of which will be explained below. The slide assembly is also provided with a pawl mechanism 52 (see in particular Fig 3), comprising twin pawls 522 which are spring 54 mounted on a carriage 51. The carriage 51 is biassed against an abutment in the slide housing by means of compression springs 8 (see Fig 1). The pawl carriage assembly is slidable in slots 41 in either side of the slide assembly 4 via screws 511,512 with heads 510,513. Said twin pawls 522 are held spaced apart by a spacer bar 521 and can rock about said screws 511 which pass through holes 523 in each pawl. The forward end 411 of the slot 41 curves downwards to enable the twin pawls 522 to follow the circumference of the sprocket wheels as the pawl mechanism 52 advances and snaps over one sprocket as the slide assembly is pushed into the slide housing 2. During continued forward movement of the screwdriver, the carriage abuts against a guide plate 64, mounted on the pawl carriage 5 by means of a screw 55, which guide plate is made of spring steel and stops the forward movement of the pawl carriage assembly 5 once the twin pawls 522 have snapped in behind the next sprocket. As the screwdriver is pushed further forward to screw in the screw, the pawl mechanism remains stationary and the slide housing 2 continues its forward movement, now against the force of the pawl carriage springs 8, as well as the central spring 7, arranged on either side of the housing 2.

Said sprocket wheels 56 advance, by one screw at a time, a tape or belt 16 in which screws have usually been preinserted by machine before delivery to the user. Such tapes or belts 16 are known in the art and one example is shown in Fig 9 without screws inserted, however, to reveal the tear-shaped perforations 163 surrounding each screw collar 164, which perforations enable the screw being screwed in to rupture the collar 164 and allow the screw head 171 to pass through the tape 16. Notches 162 on either side of the tape 16 engage the twin sprocket wheels 56. Fig 10 shows a series of screws 17,18 mounted in such a tape 16.

As can be seen in Fig 8, the screw bit 96 is held in the chuck of a power screwdriver 9 of conventional type. To screw in a screw, the tip of the screw held centrally in the front end of the slide assembly by the tape 16 and the sprocket wheels

56, is positioned at the precise surface position where the screw is to be screwed in. The power screwdriver then presses forward manually in the user's hand so as to advance the screwdriver bit 96 to engagement with the head of the screw. As the slide assembly 4 is pressed into the slide housing 2, the screw 17 is screwed into the intended material, e.g. gypsum board 13 on a substrate 14 of wood, whereby the screw head 171 ruptures the tape collar 164 and passes through the tape 16. After the screw has been screwed in completely and the operator releases the manual pressure on the screwdriver, the slide assembly 4 begins its return to its original extended position shown in Fig 1. In doing so, the twin pawls 522 engage sprockets on the sprocket wheels 56 turning the wheel clockwise as viewed in Fig 1 until a spring 57 snaps in behind the next sprocket.

20 Due to the fact that the next screw is advanced on the return stroke instead of on the forward stroke, the entire mechanism can be made shorter and thus less front-heavy, which is a distinct ergonomic advantage. Since the screw to be screwed in is already in place before the user begins to push the screw driver gun forward, the tip of the screw can be placed at its exact position before the screwing operation is initiated.

25 Figs 5, 6 and 8 show the arrangements 4 securely and adjustably mounting the device according to the invention on an automatic screwdriver. As can be seen in Fig 5, which is a rear view of the slide housing 2, the rear of the slide housing has a hole 31 for accommodating the end of a threaded adapter pipe 91 (see Fig 6), said end can be clamped securely in place by means of a slot 30 which is closed by a screw 32 countersunk 22 in the slide housing 2. A screw collar 92 is used to provide an adjustable abutment for rear end surfaces 151,152 of the adjustment plate 15 which extend from the rear of the slide housing. This limits the extent of retraction of the slide assembly into the slide housing 2. A threaded collar 93 can be used to adjust the spacing between the device according to the invention and the power screw driver so as to provide for optimum screw depths.

Claims

50 1. Screw positioning and feeding device, comprising a slide assembly (4) engaging a tape or belt (16) holding a plurality of screws, for feeding, by relative movement between the slide assembly (4) and a slide housing (2), said screws one-by-one to a position to be driven in by a screwdriver bit in a power screwdriver coupled to said device, **characterized** in that said slide assembly (4) comprises a pair of

sprocket wheels (56), for advancing said screw tape (16), which are arranged on either side of the longitudinal axis of the screw bit (96) and have a common rotational axis which intersects at essentially right angles said longitudinal axis of the screw bit (96).

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2. Device according to Claim 1, **characterized** in that said pair of sprocket wheels (56) are journaled on a common non-rotating axle (6) which is provided with a guide hole (61) through which the screwdriver bit (96) passes.

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3. Device according to Claim 1 or 2, wherein said screw is driven during retraction of said slide assembly (4) into said slide housing (2), **characterized** in that said screw tape (16) is advanced during the return extension stroke of the slide assembly relative to the slide housing (2).

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4. Device according to Claim 3, **characterized** in that the screw tape (16) is advanced by a pawl mechanism (5).

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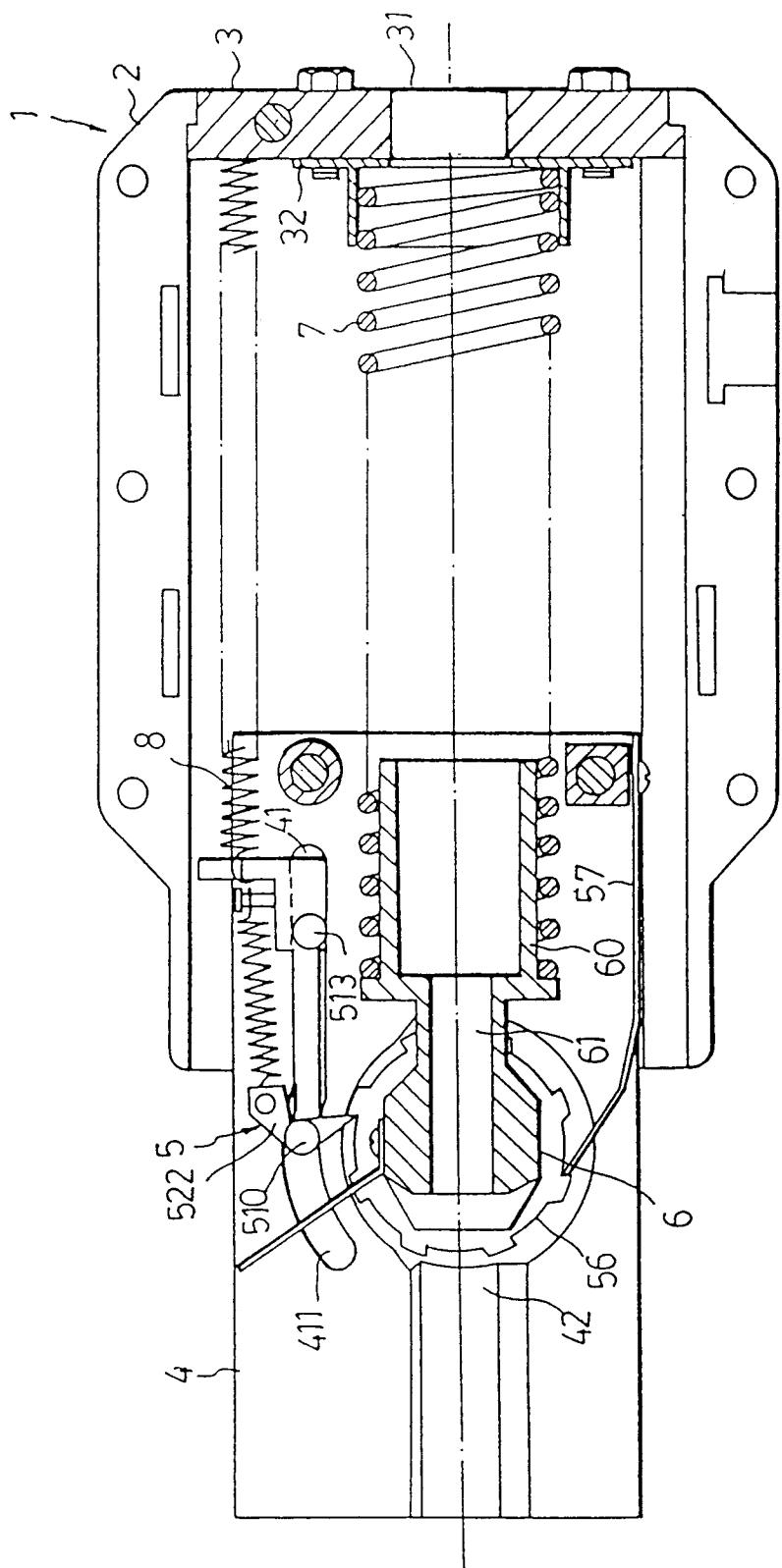
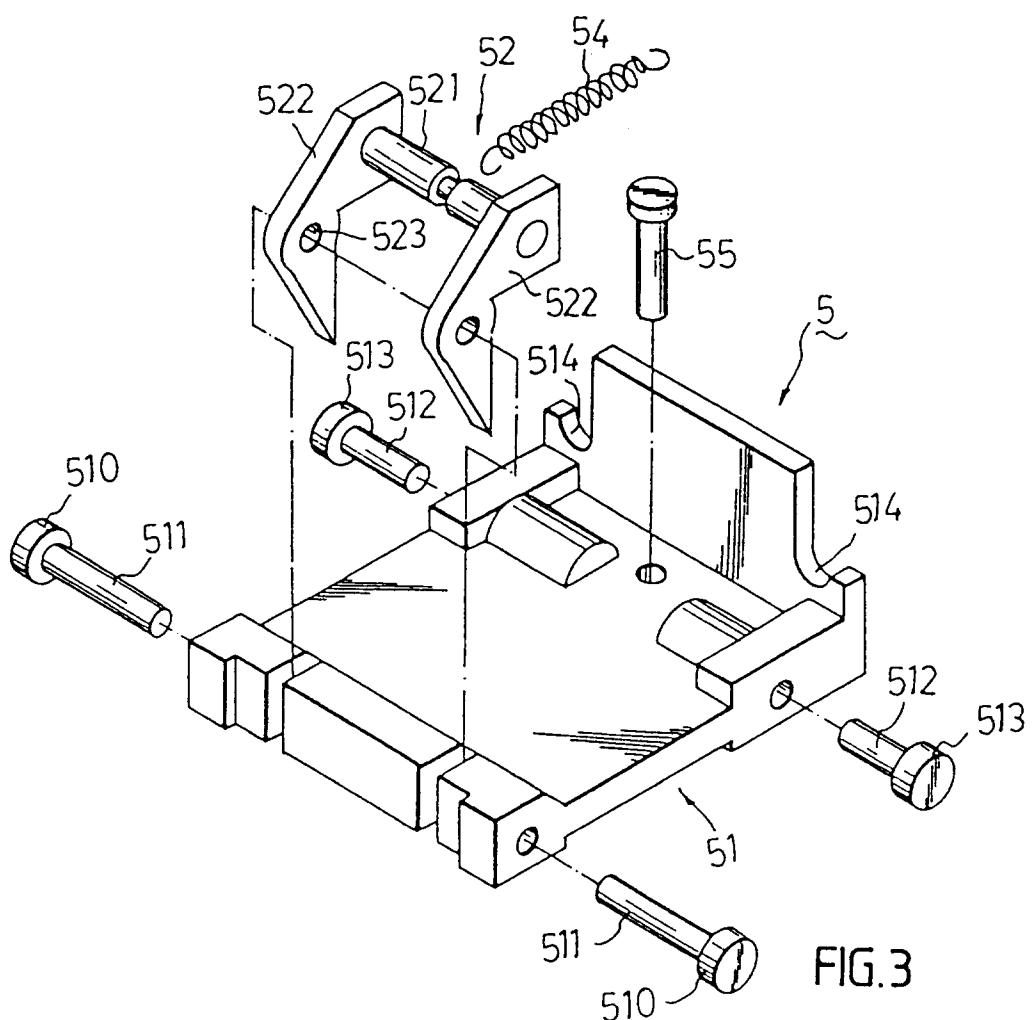
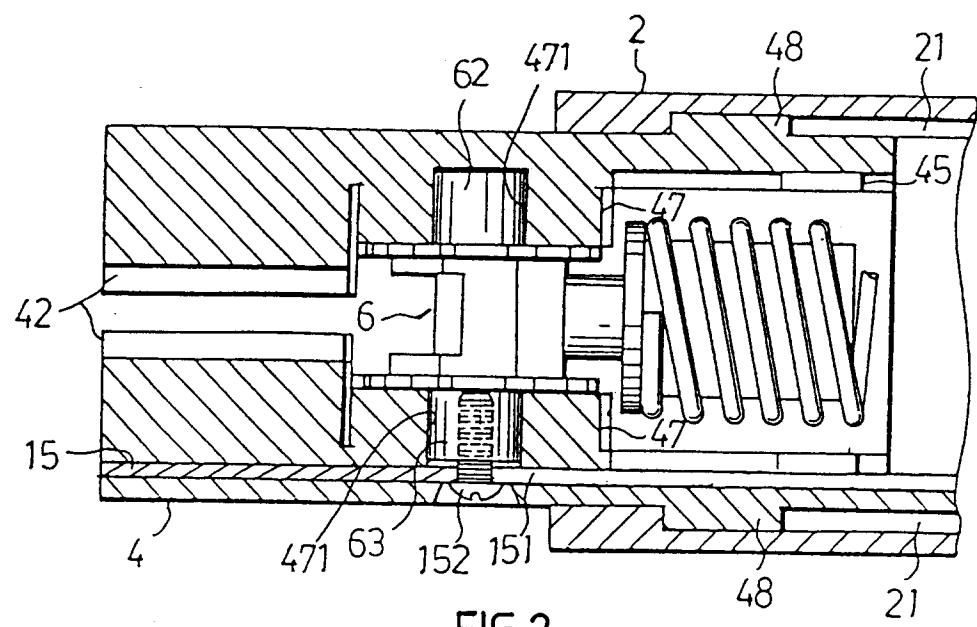


FIG. 1



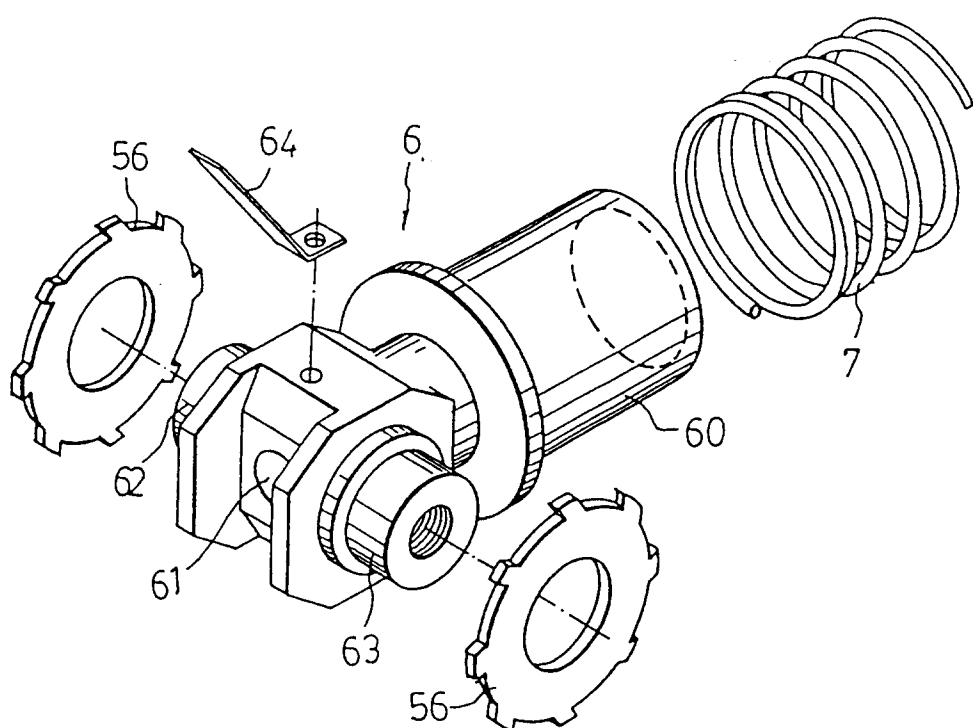


FIG. 4

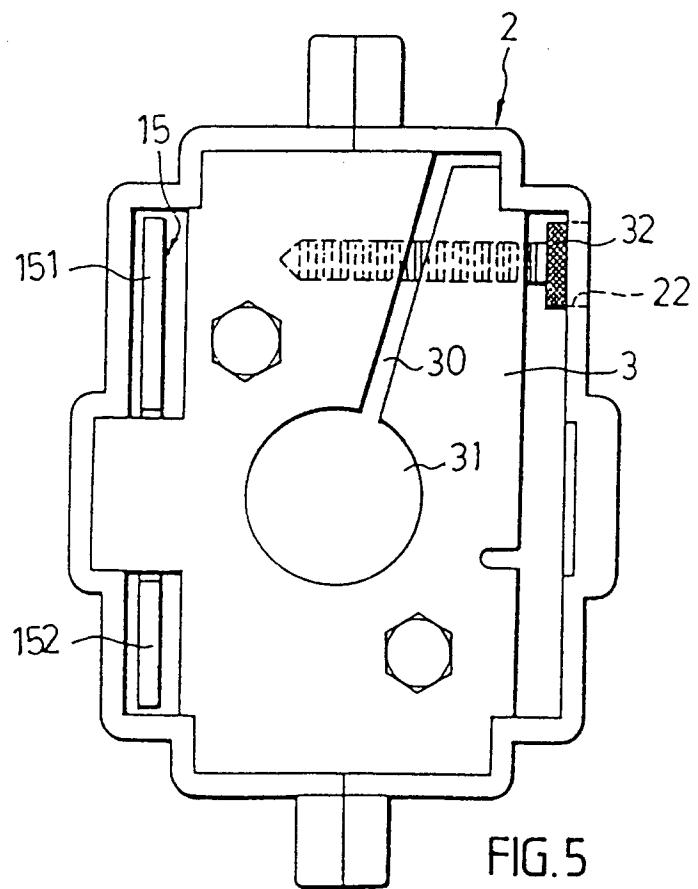


FIG. 5

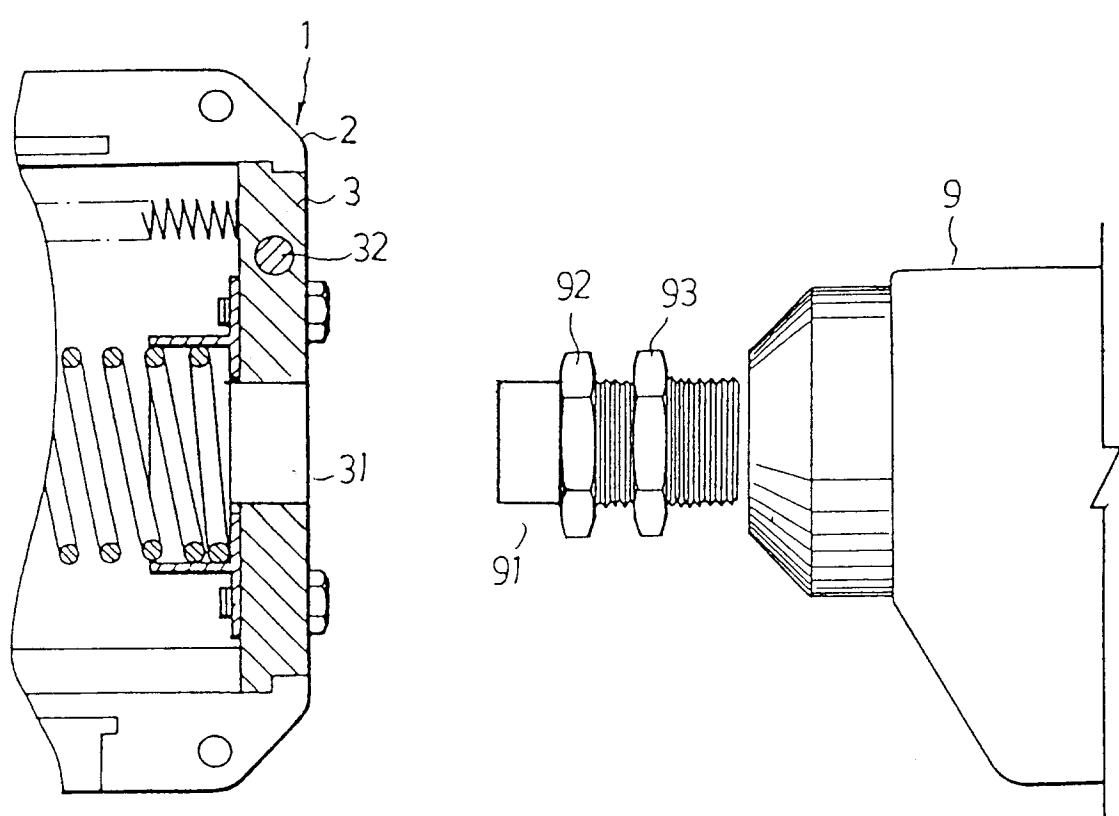


FIG. 6

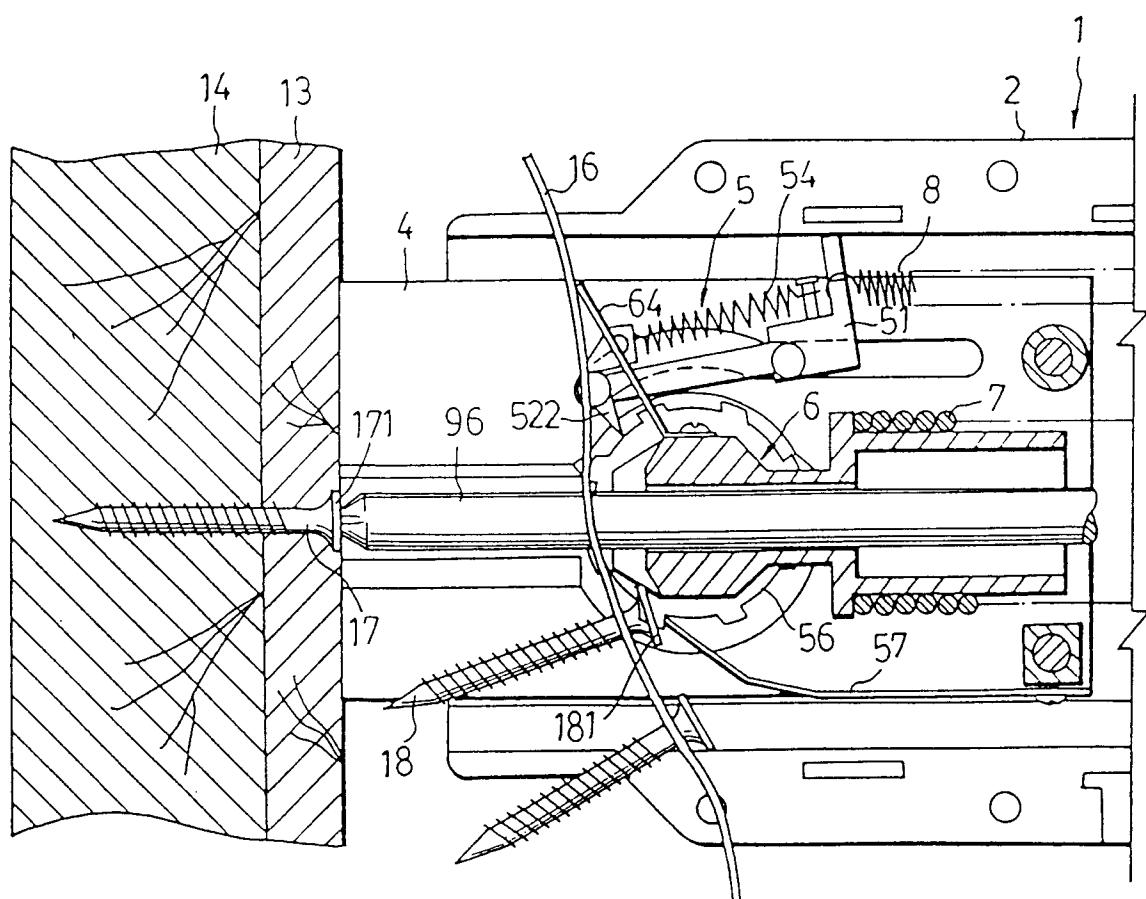


FIG. 7

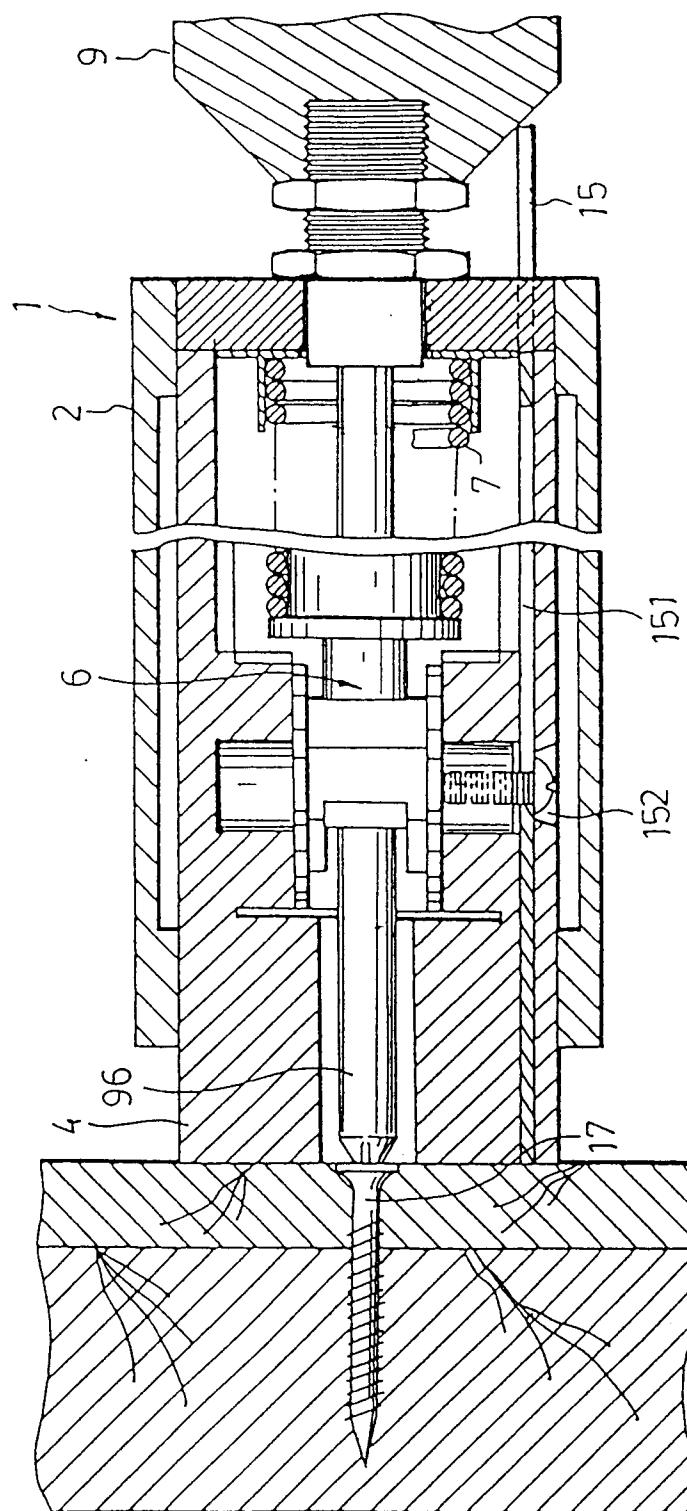


FIG. 8

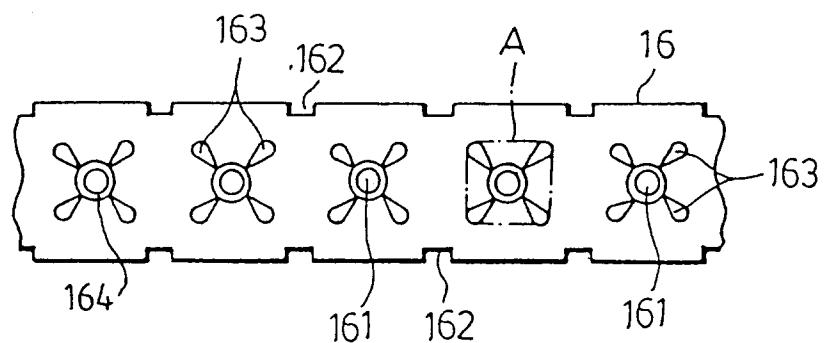


FIG. 9

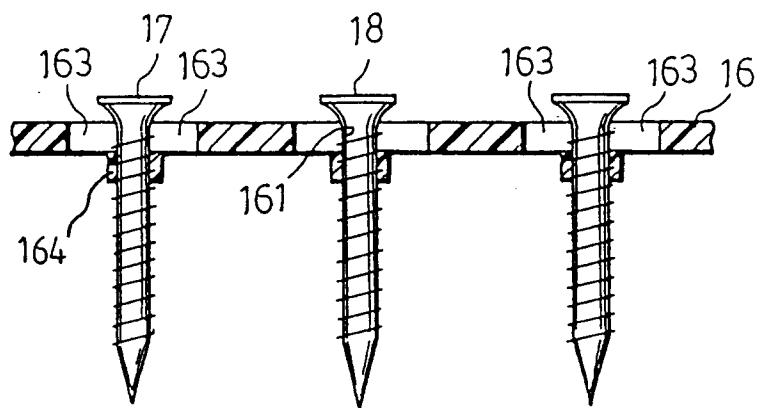


FIG. 10



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EUROPEAN SEARCH REPORT

Application Number

EP 91 85 0224

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
Y	EP-A-0 248 101 (SFS STADLER AG.) * column 5, line 37 - line 41; figures 3, 4 * ----	1-4	B25B23/04
Y	EP-A-0 058 986 (NISCO INC.) * page 11, line 18 - line 29; figures 2-4 * ----	1-4	
A	AU-B-556 811 (NIETEK PTY. LTD.) * page 6, line 2 - line 17; figures 2-5 * -----	1,2	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B25B B23P B25C
<p>The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search		Examiner
THE HAGUE	29 APRIL 1992		VIBERG S.O.
CATEGORY OF CITED DOCUMENTS		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	
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			