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(54) Screw positioning and feeding device.

(57) A screw positioning and feeding attachment to a power screwdriver advances screws in a tape one-by-one as the preceding screw in a screw tape is screwed in by pushing a slide assembly (2), in contact with a board or sheet for example, into a slide housing (1). Different lengths of screws are accomodated by an adjustable extension (25) of the slide assembly (2). The proximal end (9) of the extension (25), at the end of its inward stroke, strikes against a spirally curved abutment disc (8) which can be rotated for fine adjustment of the final depth of the screw head. Since the extension (25) travelling in a groove in the slide housing (1) is directed towards the axis of rotation of the spirally curved disc, which always presents a nearly perpendicular striking surface, the disc will not be rotated out of adjustment by the repeated impact of the extension (25).

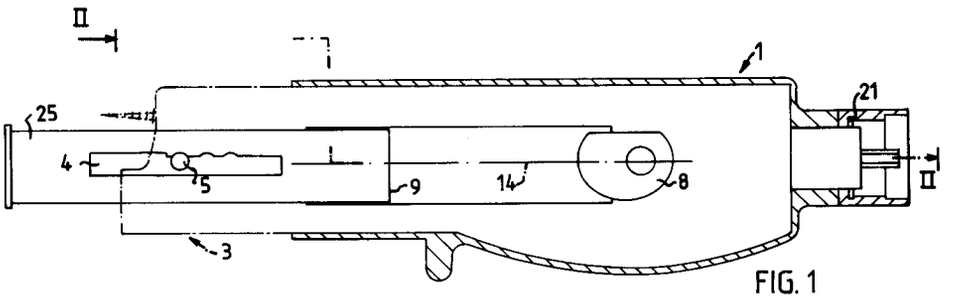

FIG. 1

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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 reciprocal 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

Devices of the above described type, in the form of a unit which can be mounted on a power screwdriver or power drill with a screwdriver bit, have been available for some fifteen years now, to make the job of setting up gypsum board or plywood with screws go much more quickly and easily. Screws can be sold premounted in plastic tape for easy handling. To position screws one-by-one for screwing, the tape or belt is fed through the device, said tape being aligned to successively bring each screw into position for screwing in. Specially 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, sprocket wheels engage notches in the tape or belt and advance 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 (Helfer). A ratchet wheel 17 cooperates with a sprocket wheel unit 9 to advance a screw tape one screw for each forward movement of the slide housing (see Figs. 1 and 2 in said specification). The ratchet wheel is rotated by a pin 18 following a slot 19 in the slide housing 3. (See Fig. 3). Adjustments for different lengths of screws are made in this prior art device by a screw ring 30 mounted on the power screwdriver mounting, against which ring stop pins abut to limit the stroke. This makes the device longer and more front-heavy than is necessary. These problems are overcome by a screw positioning and feeding device of the type described by way of introduction which is characterized in that different lengths of screws are accommodated by an extension adjustably fixed to the slide assembly, the distal end of said extension abutting, during use, against the surface of the material to be screwed into and the proximal end of said extension striking against a rotatable abutment disc securely fixed in said slide housing, when the slide assembly reaches the end of its reciprocal inward stroke into the slide housing, said abutment disc having a spirally curved peripheral abutment surface presenting, in each rotational position, a tangential striking surface approximately perpendicular to a radial line extending from the axis of rotation of said abutment disc through the point of abutment with the proximal end of said extension which moves along said radial line during its reciprocal movement. The extension is set for the nominal dimension of the screw whereafter a fine adjustment is made by rotating the abutment disc to make sure the screw head is driven to the proper depth, i.e. sunken, flush with the surface, etc. The spiral shaped disc presents a striking surface to the proximal end of the extension so that the striking force of the extension is directed towards the axis of rotation of the abutment disc. The striking surface is also approximately perpendicular to the direction of mmovement of the extension. These two features prevent the abutment disc from being rotated out of adjustment by the blows to which it is subjected.

A detailed description of one preferred embodiment of the invention will now be given with reference to the accompanying drawings of which:
Fig. 1 shows a longitudinal section through a screw positioning and feeding device according to the invention for mounting on a power screwdriver, with the slide assembly removed to reveal the spiral disc. Fig. 2 shows a sectional view (II-II in Fig.1) from above of the device shown in Fig. 1 without the screwdriver bit, but with the slide assembly in place.

Figs. 1 and 2 show the screw positioning and feeding device which can be snap mounted on a power screwdriver. The screwdriver bit is held in a chuck. A slide housing 1 holds a slide assembly 2. When a screw is screwed in, the slide assembly, which includes the nosepiece 3, is pushed into the slide housing 1 against the force of the spring 11, as the screwdriver bit rotates, forces the screw head through the tape and drives home the screw. The slide assembly 2 and the slide housing 1 then begin their extension stroke driven by the force of the spring 11. During this stroke the tape is advanced one screw by the sprocket wheels 4 which engage notches spaced on both sides of the tape.

Returning to Fig. 1, the device is easily snap mounted on the power screwdriver by means of a snapring mounted in a groove 21 at the proximal end of the slide housing 1. This makes the entire device much shorter than the prior art device. This is only possible because the adjustment screws for different lengths of screws can be eliminated from this portion of the device, such adjustment being effected according to the present invention by the adjustment plate 25 on the nosepiece. Additional length of stroke for accomodating shorter or longer screws can be achieved by disposing the driving element 6 for advancing the sprocket wheels on a rod 13, the opposite or proximal end of which is attached to a block (not shown) which is able to slide in a groove after the driving element has reached its forwardmost position.

The adjustment plate 25 can be moved to place the screw 6 in different notches for different

lengths of screws (24, 32, 38, 41, 51 and 55 mm in this case) whereafter the screw is tightened to fix the adjustment plate in place for the selected length of screw. The slide assembly, as was mentioned above, is pushed into the housing, as the screw is screwed into the material, until the proximal end 9 of the adjusment plate strikes the peripheral surface of a spiral disc 8. The adjustment plate 25 is guided in a groove in the inside wall of the housing 1. A fine adjustment of how far the screw is driven in is often necessary after the basic setting for the length of screw has been made as explained above.

This fine adjustment is done to adjust the depth of the screw head when screwed into the material. A sunken screw head is often necessary if the material is to be spackeled and painted or wallpapered later. Also different materials will have different requirements. Softer materials cannot tolerate excessive depth of the screw head for example.

In order to achieve this fine adjustment, according to the present invention, a spiral disc or cam is arranged on the inside wall of the housing to present an abutment surface for the adjusment plate to vary the length of stroke of the slide assembly 2. The spiral disc can be rotated by means of a knob mounted on the outside of the housing with a commmon axle passing through the disc and the knob. The rate of increase in radius of the spiral disc 8 is exaggerated in Fig. 1 for the sake of illustration. By virtue of the spiral shape, as opposed to an elliptical shape for example, it is possible to vary the length of travel of the slide assembly and always present an abutment surface for the end 9 of the adjustment plate 25 which is for all practical purposes not oblique. Since the adjustment plate during its inward movement is directed towards the rotational axis of the spiral disc, the disc will not have any tendency to be gradually knocked out of proper adjustment by the repeated impact of the adjustment plate against the disc.

The knob 10 and spiral disc 8 can be rotated to a plurality of discrete positions defined by spring snap means or can be infinitely variable.

Claims

1. Screw positioning and feeding device, comprising a slide assembly (2) engaging a tape or belt holding a plurality of screws, for feeding, by relative reciprocal movement between the slide assembly (2) and a slide housing (1), 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 different lengths of screws are accommodated by an extension adjustably fixed to the slide assembly (2), the distal end of said extension abutting, during use, against the surface of the material to be screwed into and the proximal end of said extension striking against a rotatable abutment disc (8) securely fixed in said slide housing (1), when the slide assembly (2) reaches the end of its reciprocal inward stroke into the slide housing (1), said abutment disc having a spirally curved peripheral abutment surface presenting, in each rotational position, a tangential striking surface approximately perpendicular to a radial line (14) extending from the axis of rotation of said abutment disc through the point of abutment with the proximal end of said extension which moves along said radial line during its reciprocal movement.

2. Device according to Claim 1, **characterized** in that the adjustment plate has a central longitudinal slot (4) provided with an individual notch for each nominal length of screw to be used in the device, a pin or tightening screw (5) engaging said notch to hold the adjustment plate in place relative to the slide assembly (2).

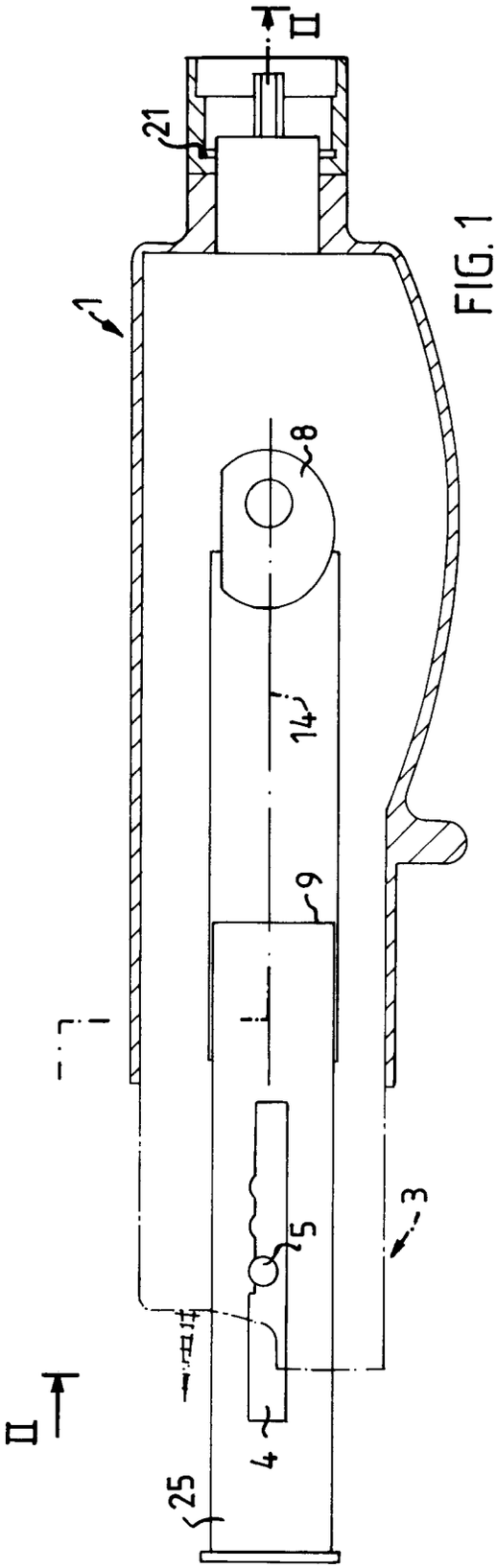

FIG. 1

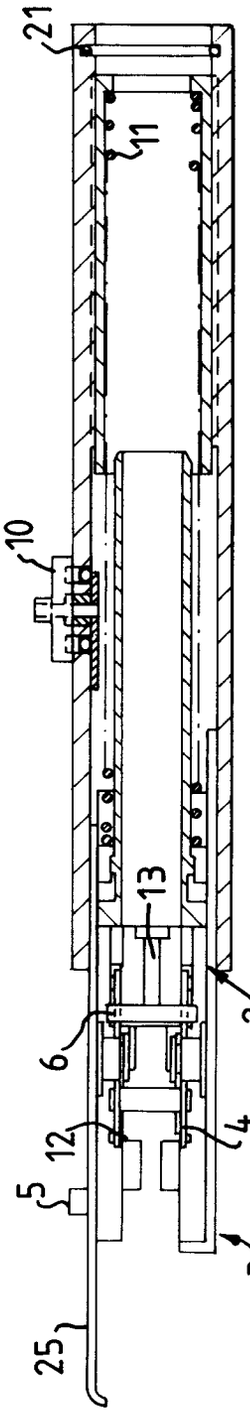

FIG.2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 85 0074

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	DE-A-4 208 715 (MAKITA CORP.) * the whole document * ---	1,2	B25B23/04
A	EP-A-0 058 986 (NISCO INC.) * page 13, line 17 - page 14, line 28; figure 17 * -----	2	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B25B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13 AUGUST 1993	MAJERUS H.M.P.

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

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