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54 **Mechanical device, to be installed on sewing machines, which does not alter the orientation of a pair of needles positioned side by side, but repeatedly inverts their position.**

57 This invention concerns a mechanical device for installation on automatic sewing machines, for repeatedly inverting the position, while leaving the direction unchanged, of a pair of needles fitted side by side, co-operating with a single "crochet" and capable of carrying out special, particularly decorative, sewing stitches, which are often used in the footwear sector and more generally in the leather industry.

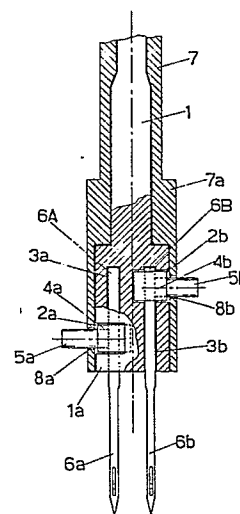


FIG. 6

Description

Mechanical device for installation on automatic sewing machines, for repeatedly inverting the position, while leaving the direction unchanged, of a pair of needles fitted side by side.

The subject of this patent application for an industrial invention concerns a mechanical device, for installation on automatic sewing machines, for repeatedly inverting the position, while leaving the direction unchanged, of a pair of needles fitted side by side, co-operating with a single "crochet" and capable of carrying out special, particularly decorative, sewing stitches, which are often used in the footwear sector and more generally in the leather industry.

Currently, to operate this pair of needles, a complicated system of levers is used, or a mechanism consisting of a pair of vertical rods supporting the needles by means of clamps housed and rotating in a tubular supporting element which is pulled repeatedly, by a suitable means of control, in alternating rotations of 180° around its own longitudinal axis and in alternating vertical strokes, at the same time.

At the top of this pair of rods, projecting from the upper end of this tubular supporting element, are fixed suitably profiled plates which are fitted to fixed structures of the sewing machine that keep the direction of the two above rods unaltered during their reciprocal exchange of position after the rotation of half a turn of the above tubular element.

Considering the complexity and therefore the high production costs of the above mechanical devices currently known and used for operating the above pair of needles fitted side by side, an effort was made to find an alternative technical solution to the problem, characterized by structural and practical simplicity of the mechanism on which the resolving concept is based, and from which lower production costs will obviously result, as well as major operating reliability and faster, more economic and easier maintenance operations.

The mechanism according to the invention consists of a vertical driving shaft perfectly housed inside a non-rotating tubular supporting element, with the possibility of rotating around its longitudinal axis.

This driving shaft ends at the base with a cylindrical head on whose side surfaces, two grooves are cut in diametrically opposite position but staggered, and suitable for housing two collars in which the two needles, fitted side by side, are respectively inserted and fixed by means of a small radial grub screw and inserted from the bottom into two appropriate small holes, in axial position and in diametrically opposite position on the bottom base of the above cylindrical head and which respectively open into the two above grooves.

The cylindrical head houses perfectly in a non-rotating sleeve, with which the tubular element ends at the bottom and where the driving shaft can rotate together with the cylindrical head.

On the side walls of the cylindrical sleeve, two passing transverse slots are cut in a diametrically opposite, but staggered position, through which

there is access to the grooves at the back on the above cylindrical head, so much so that the small fixing grub screws of the needles in the respective supporting collars are inserted from the outside through these slots and are then screwed in the radial, threaded holes on the above collars, previously fitted in the respective housing grooves.

The length of these small grub screws is such that they project slightly, once they have been fully screwed in, from the above transverse slots, with whose edges they therefore inevitably interfere when they are pulled in rotation, together with the collars and the needles, by the cylindrical head which turns together with the driving shaft, on which systems capable of exercising a motor torque moment, intervene.

As already mentioned in the introduction, this driving shaft is pulled repeatedly in alternating rotations of half a turn, which result in a mutual exchange of the positions of the needles, which, being inserted in the above cylindrical head, are rotated by the same around the longitudinal axis of the driving shaft.

During each rotation of 180°, the small fixing grub screws in the relative supporting collars interfere and stop against the edges of the slots, cut on the above sleeve, which have such a transverse extension, that after every half turn of the driving shaft, the above collars and with them the needles to which they are fixed, rotate 180°, in the opposite direction to that of the driving shaft, around its own pivoting axis, coinciding with the longitudinal axis of the needles which act as a pin in the turning pair which results in each needle being inserted and rotating in the hole cut for this purpose on the above cylindrical head.

The consequence of this simultaneous rotation of the needles, of the same angle, but purposely reverse with respect to the simultaneous rotation of the cylindrical head, driven by the driving shaft, is to obtain a mutual exchange of position of the needles with respect to the underlying "crochet" while maintaining however unaltered their direction with respect to the "crochet" itself.

For major clarity the description of the invention continues with reference to the enclosed drawings, indicated only for illustrative but not limiting purposes and in which:

- Fig. 1 is a schematic view of the end section of the tubular element base ending with the above sleeve in which the driving shaft and cylindrical base head are housed and can rotate respectively;

- Fig. 2 is the same view as fig. 1 with respect to which the hypothesis was made that the needles have inverted their position, while maintaining constant their direction, after a 180° C rotation of the driving shaft;

- Fig. 3 is an orthographic projection of fig. 1 in which the cylindrical head and sleeve are

viewed from the bottom to the top;

- Fig. 4 is the orthographic projection of fig. 2;
- Fig. 5 illustrates the cylindrical head in intermediate position during a rotation in clockwise direction of the driving shaft;
- Fig. 6 is the section of fig. 5 with VI-VI section of fig. 5.

With reference to the above figures, the mechanical device according to the invention consists of a driving shaft (1), with vertical axis ending at the base with a cylindrical head (1a), on whose side walls, two grooves (2a and 2b) are cut in a diametrically opposite position, but staggered, into which two holes open (3a and 3b), realized in axial direction from the bottom of the base of this cylindrical head (1a), opening into the grooves (2a and 2b) and terminating at the top of the latter into which two collars (4a and 4b) are inserted where the end upper sections (6A and 6B) of the needles fitted side by side (6a and 6b) are inserted and fixed, by means of small radial grub screws (5a and 5b), which are free to rotate around their own longitudinal axes, should they be pulled by the respective supporting collar (4a and 4b).

The driving shaft (1) is now inserted and free to turn in a tubular supporting element (7) ending at the base with a sleeve (7a) in which the cylindrical head (1a) can turn. There are two transverse slots (8a and 8b) on the cylindrical wall of the sleeve (7a), in diametrically opposite position and corresponding exactly to the back grooves (2a and 2b) and having such a transverse extension so that the above fixing grub screws (5a and 5b), during a rotation of 180° of the cylindrical head (1a) in the non-rotating sleeve (7a), interfere with the edges of these slots so as to make the collars (4a and 4b) and with them the needles fitted side by side (6a and 6b) rotate half a turn, in an opposite direction to the head (1a), thereby keeping their direction unaltered with respect to the underlying "crochet", with which they co-operate for making the sewing stitches.

In the enclosed figures the supporting means of the tubular element (7) were not illustrated, which though not being able to rotate, must however carry out alternating vertical strokes, together with the driving shaft (1) which is housed in it, at the upper end of which there are appropriate and traditional means, as for example a rack-reel type turning pair, capable of impressing an alternating rotary movement to the shaft around its own longitudinal axis.

As far as the means of support of the tubular element (7) are concerned, these are the means traditionally used and fitted on sewing machines for supporting the supporting rod of the needles, which, must necessarily make repeated alternating vertical strokes to allow the needles to make the sewing stitches.

In view of the above and with reference to the enclosed drawings, the construction simplicity of the mechanism according to the invention, becomes immediately evident, with respect to the technical solutions mentioned in the introduction, and which are currently known and used, all characterized by the presence of rotating supporting clamps for the pair of needles and consequently by the presence

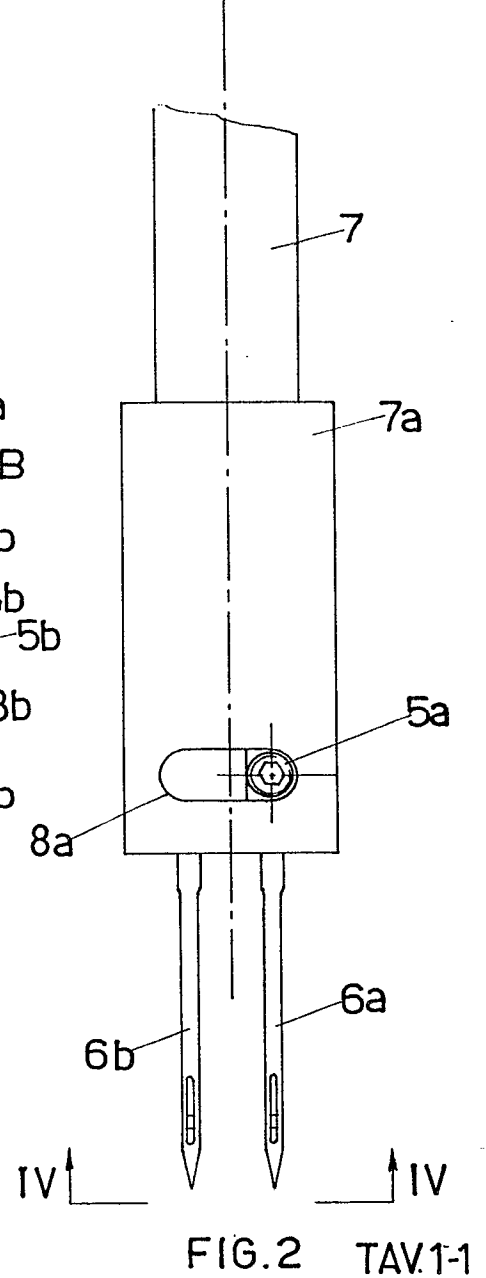
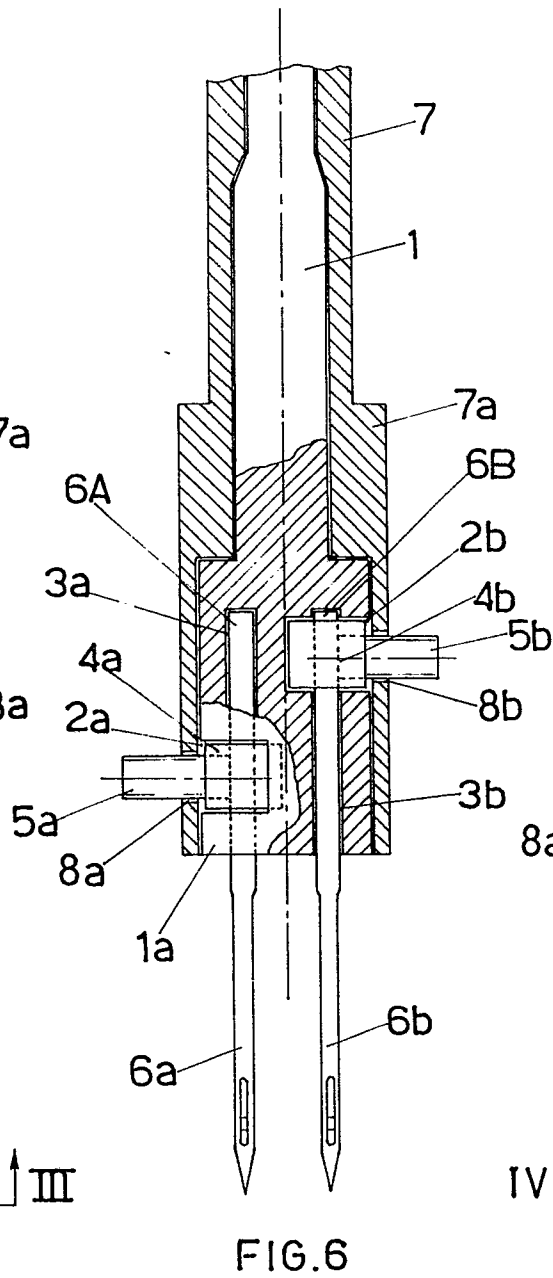
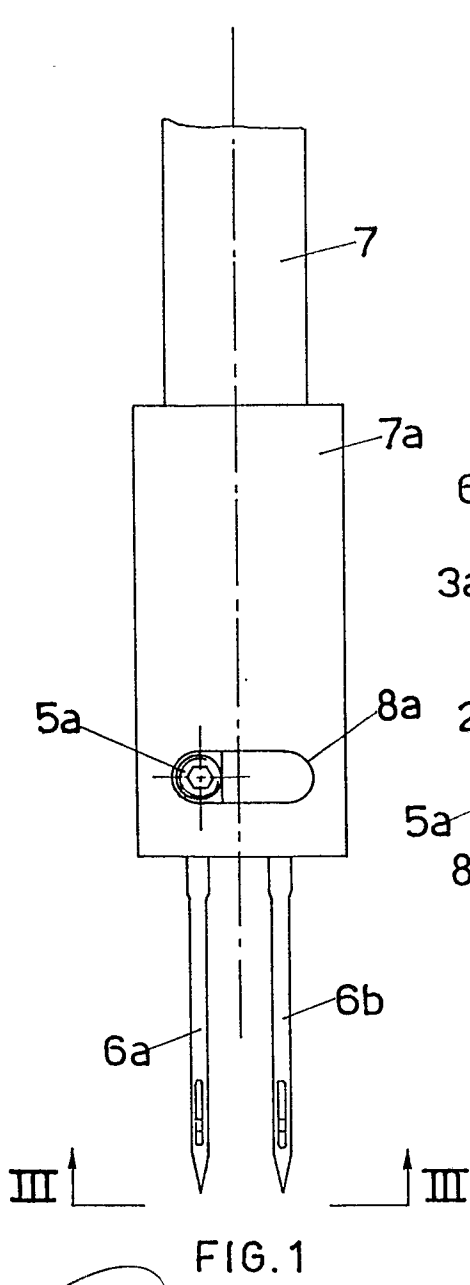
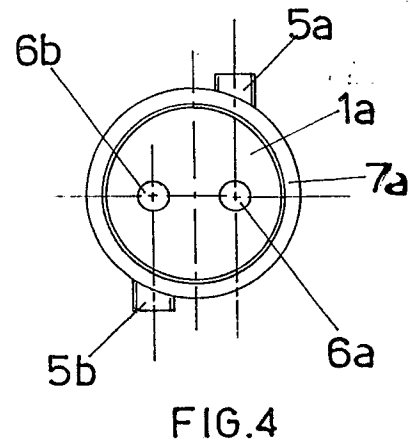
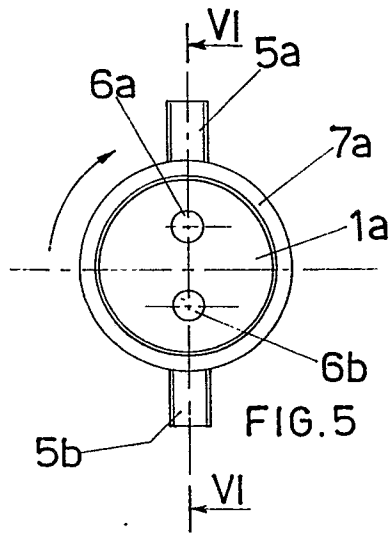
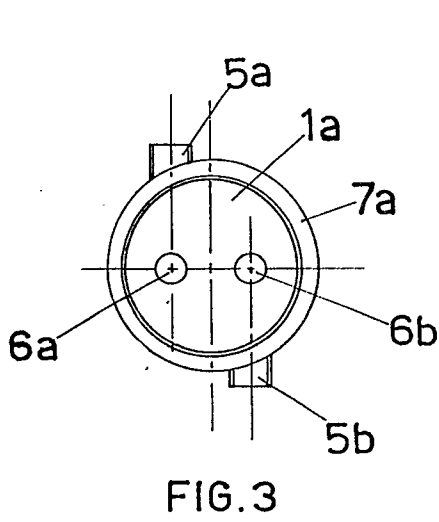
of, more or less complicated means, for driving the above rotating clamps, which are however not fitted on the mechanism in question, with obvious advantages in terms of simplicity and lower production costs.

Claims

1) Mechanical device for installation on sewing machines, for repeatedly inverting the position, while leaving the direction unaltered, of a pair of needles fitted side by side, characterized by the fact that the invention includes a driving shaft (1), with a vertical axis, ending at the bottom with a cylindrical head (1a), on the side wall of which two grooves (2a and 2b) are cut, in a diametrically opposite position, but staggered, in which two holes (3a and 3b) open, realized from the bottom base of this head (1a) and opening on the top of the grooves (2a and 2b) in which two collars (4a and 4b) are respectively inserted, where the end upper sections (6A and 6B) of the needles fitted side by side (6a and 6b), are inserted and fixed by means of radial grub screws (5a and 5b), the driving shaft (1) being inserted and free to rotate in a tubular element (7), ending at the bottom with a sleeve (7a), in which the cylindrical head (1a) can turn and on whose side wall there are two transverse slots (8a and 8b), placed exactly at the same level as the back grooves (2a and 2b) and having such a transverse extension that the above fixing grub screws (5a and 5b), during a rotation of half a turn of the head (1a) in the sleeve (7a), interfere with the edges of these slots so as to make the collars (4a and 4b) and with them the needles fitted side by side (6a and 6b), rotate half a turn, in a direction opposite to the head (1a).

2) Mechanical device, according to claim 1), characterized by the fact that on the upper end of the shaft (1) there are driving systems capable of pulling the same shaft in alternating rotations of 180° around its own vertical axis.

3) Mechanical device, according to claim 1), characterized by the fact that the non-rotating tubular element (7) is supported by means capable of pulling it in alternating vertical strokes, suitably synchronized with the alternating rotations of the shaft (1).





European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 88 83 0496

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.4)
X,P	EP-A-259278 (CIUCANI) * the whole document *	1	D05B3/02
A	DE-C-258820 (HERRMANN) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			D05B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 9 FEBRUARY 1989	Examiner VUILLEMIN L.F.
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			