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Dal Negro

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[54] **CUTTING IMPLEMENT FOR FLAT-BED SEWING MACHINE**

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[52] **U.S. Cl.** **112/130,** 156/510, 156/580

[51] **Int. Cl.** **D05b 37/04,** B23k 27/00

[58] **Field of Search** 112/129, 130, 122, 252; 156/580, 510, 73

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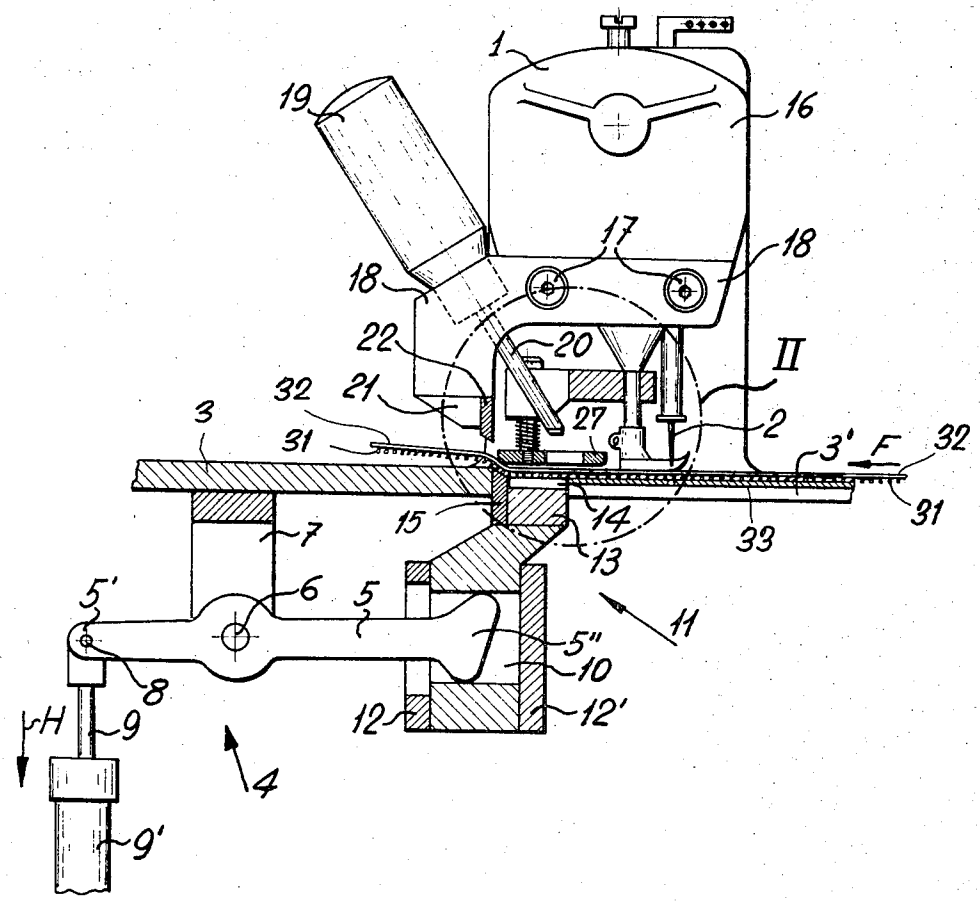
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[57] **ABSTRACT**

A sewing machine, used for stitching slide fasteners to garments or other pieces of fabric, has a fixed cutter blade spacedly positioned above the machine bed downstream of a pair of stitching needles and a coacting movable cutter blade carried on a vertically reciprocable slider normally withdrawn below the bed surface. The slider, upon being elevated during the cutting step, intercepts an overlying fastener section and clamps it against a spring-loaded shoe overhanging the bed. The clamped section, immediately after being severed from an adjoining section, is contacted by a welding tool fusing some of its links into a bottom stop.

9 Claims, 2 Drawing Figures



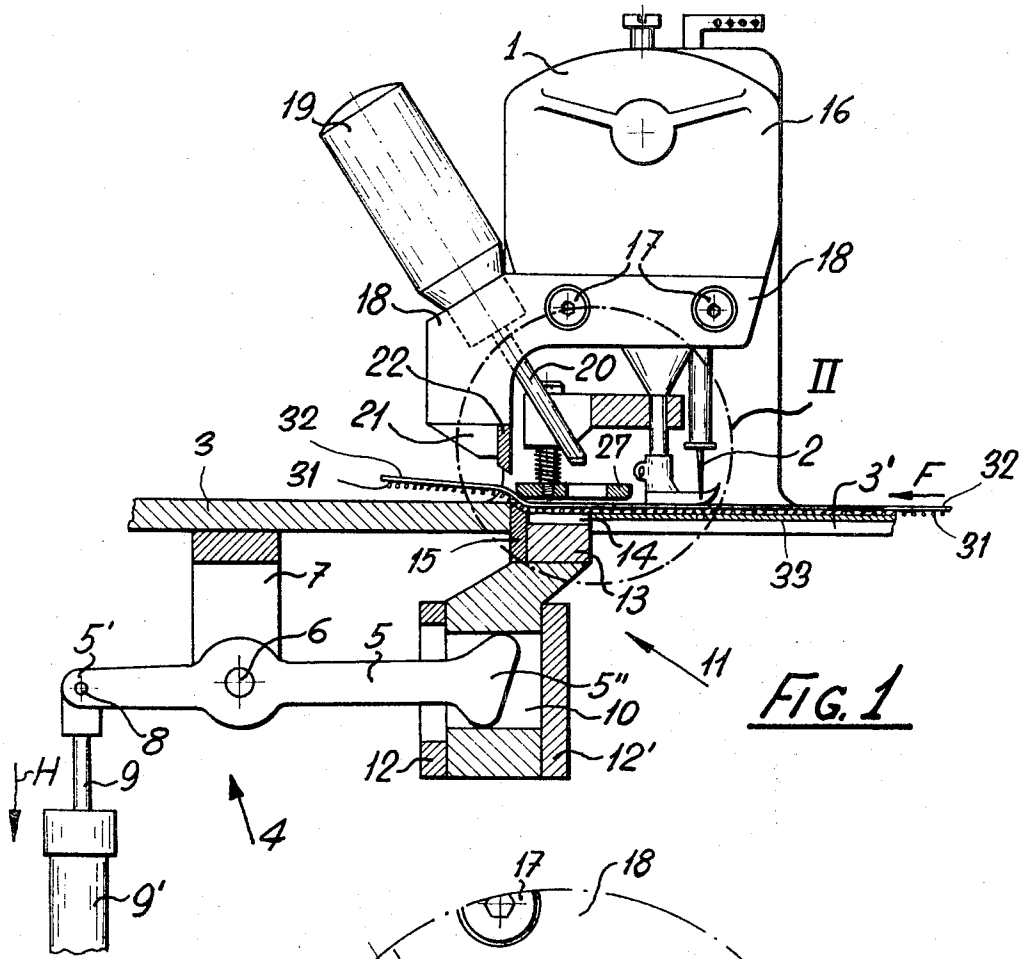

1
19
16
17
18
18
22
20
II
32
21
27
2
3
31
3'
F
32
31
15
14
33
13
7
5'
6
5
11
5"
10
8
12
12'
H
9
4
9'

FIG. 1

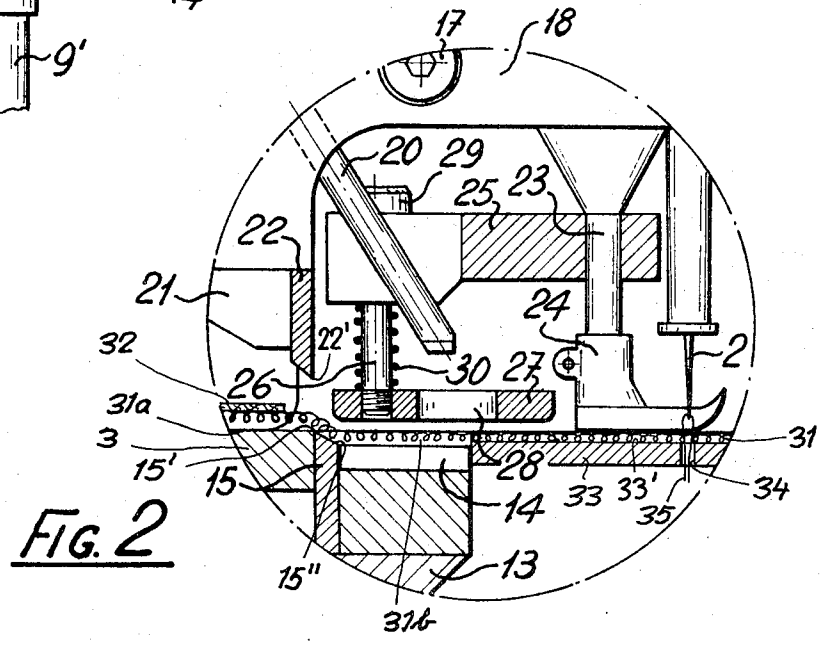

17
18
20
29
25
23
22
21
24
32
22'
30
27
2
26
31a
3
31
15'
28
15
33
33'
34
14
35
13
15"
31b

FIG. 2

CUTTING IMPLEMENT FOR FLAT-BED SEWING MACHINE

FIELD OF THE INVENTION

My present invention relates to a cutting implement for a sewing machine of the flat-bed type, more particularly a machine used to stitch slide fasteners to garments or other pieces of fabric.

BACKGROUND OF THE INVENTION

Machines for directly stitching interlinked slide-fastener halves to a garment or other workpiece having a slit to be closed by the fastener, e.g., a skirt, have a flat bed provided with a gap to receive the usual needle plate, a pair of parallel needles being aligned with that gap for straddling the interlinked fastener halves by stitching same onto the workpiece moving along the bed. The fastener halves, which may be coils of monofilamentary plastic material (e.g., nylon), are of indefinite length and are continuously drawn from supply reels, being then cut into sections whose length substantially matches that of the slit or edge along which the fastener is attached to the workpiece. Conventional shear-type cutters used for this purpose, with relatively movable upper and lower blades, produce a neat cut but are difficult to install on such a machine without interfering with either the advance of the workpiece and the fastener in the stitching direction or the operative positioning of each new workpiece preparatorily to the sewing of a fastener section thereto. The alternative solution of a chopping cut, in which a single blade strikes from above against an underlying anvil, entails a less clean severance of the fastener sections and also necessitates frequent replacements of the cutter blade because of rapid wear.

OBJECTS OF THE INVENTION

The general object of my present invention, therefore, is to provide in such a machine a shear-type cutting implement which, while idle, allows the workpiece and the slide fastener to travel along a virtually unobstructed path over the upper surface of the machine bed.

Another object is to provide means associated with such a cutting implement for forming an end stop in an oncoming fastener section simultaneously with the severance of the preceding section therefrom.

SUMMARY OF THE INVENTION

In accordance with my present invention, the cutting implement comprises a fixed cutter blade specedly disposed above the gap of the bed downstream of the needles and a movable cutter blade confronting the fixed blade in operative alignment therewith, this movable blade being mounted on a support which is normally withdrawn below the bed surface. A preferably fluidic actuator is operable to elevate the support together with the movable blade for coaction with the fixed blade at the end of a stitching operation, thereby severing a fastener section previously sewn onto a workpiece from an adjoining section overlying the gap.

Advantageously, pursuant to a further feature of my invention, a spring-loaded shoe overhangs the gap above the elevatable support between the fixed blade and the needles, the bottom surface of this shoe being normally disposed below the level of the cutting edge of the fixed blade for upward entrainment by the rising

support. Thus, the overlying fastener section is clamped between the shoe and the support even as the immediately preceding section is being severed therefrom. A welding tool, preferably a supersonic vibrator, is fixedly disposed above the bed for contact with the clamped fastener section, this tool having a fastener-engaging point which lies above the level of the cutting edge of the fixed upper blade and contacts the clamped section in order to form an end stop thereon by a fusion of some of its links as is well known per se.

According to another feature of my invention, the cutting edge of the movable lower blade is normally (i.e., in the withdrawn position thereof) about flush with the upper bed surface so as to minimize the length of its cutting stroke. This movable cutter blade is preferably chamfered in such a manner that a land adjoining its cutting edges slopes downwardly from that edge toward the needles so as to act as a temporary support for the free end of the clamped fastener section, guiding this free end onto the upper bed surface upon unclamping.

BRIEF DESCRIPTION OF THE DRAWING

The above and other features of my invention will now be described in detail with reference to the accompanying drawing in which:

FIG. **1** is an elevational view, partly in section, of an otherwise conventional twin-needle sewing machine equipped with a cutting implement according to my invention; and

FIG. **2** is an enlarged view of the area II in FIG. **1**.

SPECIFIC DESCRIPTION

In the drawing I have shown a sewing machine **1** with a frame **16** rising from a bed **3**, the machine being provided with a pair of laterally juxtaposed needles **2** (only one shown) which are aligned with a longitudinal gap **3'** in the bed **3**. The gap **3'**, which need not be continuous as shown but could also be longitudinally subdivided, is partly occupied by a conventional needle plate **33** having openings **34** for passage of the needles **2**. Plate **33** also has a longitudinal groove **33'** (FIG. **2**) for positive lateral guidance of a slide fastener **31** to be stitched onto an overlying workpiece **32** such as a slitted skirt. The machine also includes such nonillustrated conventional elements as an underthread-handling mechanism and a feeder for the advancement of the cloth in the direction of arrow F, i.e., from right to left, along with ancillary equipment such as a tension regulator for threads **35** passing through the needle tips and an alarm device designed to signal a thread rupture.

A presser foot **24** is mounted on the lower end of a vertically movable, conventionally spring-loaded stem **23** which projects downwardly from the frame **16** and can be manually raised or lowered in the usual manner. A lug **25** secured to that stem is traversed by a pair of parallel vertical pins **26** (only one shown) which are surrounded by springs **30** and have heads **29** limiting their descent relative to the lug **25**. A shoe **27** is screwed onto the lower ends of the pins **26** and normally lies slightly above the upper surface of bed **3** so as to give passage to a fastener **31** and an overlying workpiece **32** advancing during a stitching operation between the bed and the presser foot **24**. Shoe **27** has a hole **28** aligned with the tip of a welding tool **20** which is actuatable by a supersonic vibrator **19** carried on an extension **18** of frame **16**, this extension being secured

to the frame by screws **17.** The tool **20** is flanked by bifurcations of plug **25** carrying the pins **26** and is inclined downwardly and forwardly, i.e. toward an operator sitting at the right of the machine **1,** so that its tip normally clears the shoe **27.** Frame extension **18** also carries a mounting **21** for a cutter blade **22** whose cutting edge **22'** lies at a fixed distance above the bed **3,** at a level below the tip of tool **20** but above the underside of shoe **27** in the illustrated normal position thereof.

Shoe **27** confronts a slider **13** which supports a movable cutter blade **15** co-operating with the fixed blade **22.** Blade **15** has a cutting edge **15'** adjoining a beveled land **15''** which slopes downwardly from that edge toward the right, i.e., in the direction of the needles **2** and the machine operator. Land **15''** terminates at the level of the upper surface of slider **13** which has a recess **14** accommodating the shoe **27** when the slider is raised, together with blade **15,** above the bed surface in order to sever the fastener **31** between blades **15** and **22.** The vertical reciprocation of slider **13,** which forms part of a movable blade support **11,** is controlled by an actuating mechanism **4** comprising a double-acting pneumatic jack **9'** whose piston rod **9** is articulated at **8** to an extremity **5'** of a lever **5** having its other extremity **5''** received in a cutout **10** of slider **13** which is guided in a stationary casing **12** secured to the machine frame. Lever **5** is fulcrumed at **6** on a bracket **7** depending from bed **3.**

In operation, presser foot **24** is lifted together with lug **25** and shoe **27** to provide clearance for the workpiece **32,** such as a slitted skirt, which is placed atop the bed **3** above the fastener **31** with the open end of the slit facing toward the operator. Next, the workpiece is pulled by the operator against the direction of arrow F, i.e., to the right, until the closed end of the slit comes to lie against the threads **35** depending from the needles **2.** The presser foot **24** is now lowered so that the parts assume the position shown in FIG. **1.** With the aid of the feeding mechanism, or possibly under manual pressure, the garment **32** and the slide fastener **31** are moved to the left (arrow F) while being chain-stitched to each other through the turns of the coiled fastener halves as is well known per se; the fastener halves may be occupied for this purpose by respective cords substantially heavier than the threads **35.** When the garment **32** has cleared the cutting zone, as illustrated in FIG. **2,** a pushbutton or the like is operated to pressurize the jack **9'** so as to force the piston rod **9** downwardly, arrow H, whereby the lever **5** swings counterclockwise and elevates the slider **13** with its movable cutting blade **15** to sever a fastener section **31a,** previously stitched onto the garment **32,** from the remainder of the fastener **31.** During this upward movement another fastener section **31*b***, overlying the gap **3'** between the slider **13** and the shoe **27,** is firmly clamped between these two elements as the shoe **27** comes to rest within the recess **14** of slider **13.** Immediately after the severance, i.e., as the clamped fastener section **31*b***, rises above the level of cutting edge **22'** against the force of springs **30,** this section is contacted by the welding tool **20** which fuses a few of its links into an end stop, namely a bottom stop for the length of fastener to be sewn onto the next workpiece. Via spring **30,** acting upon lug **25,** the presser foot **24** may also be raised at this time (to a lesser extent than shoe **27**) against the force of its loading spring.

After the slider **13** has been held elevated for the time necessary to form this bottom stop, the operation of jack **9'** is reversed to restore the normal position of the parts. At this point the free end of fastener section **31*b*** rests on the land **15''** of cutter **15** so as to be deflected upwardly, onto the adjoining bed surface, immediately upon resumption of the leftward advance of the fastener after a new workpiece has been placed upon the same in the aforedescribed manner.

Naturally, the tool **20** is representative of a variety of welding devices that could be used for fusing the fastener links to form an end stop. The use of a supersonic vibrator, however, is preferred since it avoids the need for high temperatures which could be dangerous to the machine operator.

I claim:

1. In a sewing machine for slide fasteners comprising a flat bed provided with a gap and a pair of parallel needles aligned with said gap for straddling two interlinked slide-fastener halves while stitching same onto a workpiece moving along said bed, the combination therewith of:

a fixed cutter blade spacedly disposed above said gap downstream of said needles;

a movable cutter blade confronting said fixed blade in operative alignment therewith;

a support for said movable blade normally withdrawn below the upper surface of said bed;

actuating means operable to elevate said support together with said movable blade through said gap for coaction with said fixed blade to sever a slide-fastener section overlying said gap from an adjoining section; and a spring-loaded shoe overhanging said gap above said support between said fixed blade and said needles, said shoe having a bottom surface normally disposed below the level of a cutting edge of said fixed blade but elevatable above said level upon entrainment by said support whereby said overlying section is clamped between said shoe and said support.

2. The combination defined in claim **1** wherein said support has an upper face with a recess accommodating said shoe.

3. The combination defined in claim **1,** further comprising welding means fixedly disposed above said bed for contact with a slide-fastener section clamped between said support and said shoe upon elevation thereof to fuse part of the clamped section into an end stop, said welding means having a fastener-engaging point lying above the level of said cutting edge.

4. The combination defined in claim **1,** further comprising a spring-loaded presser foot disposed upstream of said shoe in the vicinity of said needles, further comprising a holder for said shoe secured to said presser foot and guide means mounting said shoe on said holder wit limited relative vertical mobility.

5. The combination defined in claim **1** wherein said shoe has a cutout penetrated by said fastener-engaging point upon elevation of said shoe.

6. The combination defined in claim **3** wherein said welding means comprises a supersonic vibrator.

7. The combination defined in claim **1** wherein said actuating means comprises a fluid-operated piston.

8. The combination defined in claim **1** wherein said movable blade has a cutting edge normally lying substantially at the level of said upper surface.

9. The combination defined in claim **8** wherein said movable blade is chamfered with a land sloping downwardly from the cutting edge thereof toward said needles.

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