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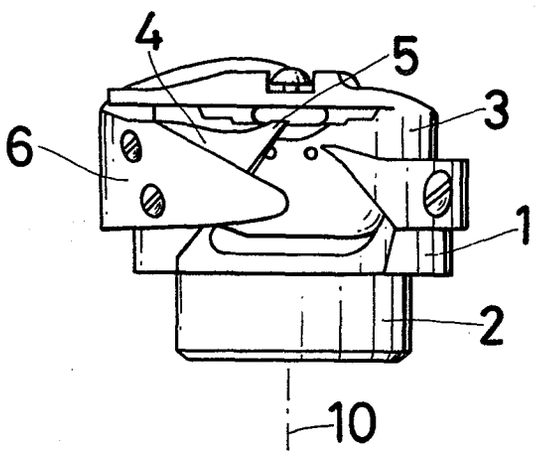
(54) An outer shuttle for a sewing machine and process of making same.

(57) A process for manufacturing an outer shuttle 1 in a sewing machine. The outer shuttle 1 is manufactured by the process of providing an outer shuttle main body, applying build up welding to the poriton of the outer shuttle main body where a cone point 5 is formed, and machining the build up welding portion 9 to form the cone point 5.



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DESCRIPTION

AN OUTER SHUTTLE FOR A SEWING MACHINE AND PROCESS OF MAKING SAME

The present invention relates to a process for manufacturing an outer shuttle, for a full rotary shuttle, for use in a sewing machine, and to an outer shuttle as such.

Generally, it is known that during regular operation of a sewing machine, the needle moves up and down and may contact the cone point provided on the outer shuttle for catching thread. When this happens, the cone point can be damaged or deformed, leading to stitches being missed and thread breakage troubles being induced. Previously, in order to solve the problem, the cone point, which is made of a piece of sintered hard alloy, was connected to a main body of the outer shuttle by brazing. One of the problems arising, however, is that the use of this additional part significantly increases the overall cost and complexity of machining, since the sintered alloy is extremely hard. It follows that, as a result of the connection by brazing, the reliability and strength of the contact face between the outer shuttle main body and the cone point decreases.

It is an aim of the present invention to improve this situation.

According to the present invention there is provided a process for manufacturing an outer shuttle for use in a sewing machine characterised by the steps of: providing an outer shuttle main body; building up a projection by welding, on a portion of the outer shuttle main body where a cone point is to be formed; and machining the welded built up projection to form the cone point.

The present invention also provides a shuttle

for use in a sewing machine having an outer main body, and a projection built up by welding on a portion thereof and machined to form a cone point.

The build up welding is preferably by plasma arc welding, and the outer shuttle main body can be made of case hardened steel.

Preferably, martensitic high chromium steel is used to build up the projection on an outer shuttle main body, whereon the built up welded portion is machined so as to form an accurate and hard cone point. The cone point has excellent impact resistance and abrasion resistance, and damage and deformation of the cone point caused by contact with a needle is generally avoided. Also, defects such as stitch skipping and thread breakage are less likely. Accordingly, with the invention, manufacturing is easy and gives a sufficient strength to the connection between the outer shuttle main body and the cone point.

In order that the invention may be more clearly understood, the following description is given by way of example only with reference to the accompanying drawings, in which:

Figure 1 is a side view of a shuttle of the present invention; and

Figure 2 is a schematic illustration showing the process of manufacturing the cone point of the outer shuttle thereof.

Fig. 1 shows a side view of a vertical full rotary shuttle embodying the present invention. On an outer shuttle 1, a boss 2 is provided which is driven rotatably about an axis 10. The outer shuttle 1 is provided with an inner shuttle 3. The outer shuttle 1 is also built up to have a crochet needle 4. At the tip of this crochet needle 4, a cone point 5 is formed. A spring 6 is screwed on the outer shuttle 1 and fixed firmly.

Referring now to Fig. 2, the manufacturing process of the cone point 5 is explained. The outer shuttle main body including the crochet needle 4, boss 2 and other small parts is made of a case hardened steel such as case hardened carbon steel or case hardened chrome molybdenum steel, and is formed by means of a precision casting, precision forging, machining or another suitable method. The outer shuttle main body may be fabricated using the same materials except for case hardened steel. Referring to Fig. 2(1), the tip of the crochet needle 4 on which the cone point 5 is to be provided is formed by means of machining or other process. As shown in Fig. 2(2), a strip of martensitic high chromium steel is used to perform build up welding by means of an electrode 8 at a portion where the cone point 5 is to be formed as a hardened cone point. This build up welding is carried out by means of a plasma arc welding process. According to this process, build up welding can be conducted successfully using a minimum amount of the martensitic high chromium steel welded to the case hardened steel which forms the outer shuttle main body.

The numeral 9 denotes the built up welded position formed by the welding procedure. The build up welding 9 is then machined and formed into a precise cone point 5 as shown in Fig. 2(3). The outer shuttle 1 thus formed together with the cone point 5 is then further hardened by means of a heat treatment such as a quench hardening.

In general, when martensitic high chromium steel is rapidly cooled down from the austenitic state to a lower temperature, a martensitic hardening is produced in the internal steel structure, so that appropriate hardness can be given to the cone point 5. Furthermore, tempering the martensitic hardened portion mentioned above is preferred, which imparts toughness to it. As a result, the cone point 5 is provided with both excellent

impact resistance and abrasion resistance. In addition it is advantageous that the martensitic high chromium steel has good plasticity in cold forming processes, such as the machining process in which the built up welding portion 9 is machined and formed into the cone point 5. Further, the welding procedure in which the built up welding portion 9 will be made is also simplified.

The present invention is applicable not only to a vertical full rotary shuttle, but also to a horizontal full rotary shuttle.

CLAIMS

1. A process for manufacturing an outer shuttle 1 for use in a sewing machine characterised by the steps of: providing an outer shuttle main body; building up a projection by welding, on a portion of the outer shuttle main body where a cone point 5 is to be formed; and machining the welded built up projection 9 to form the cone point 5.

2. A process according to claim 1, characterised in that the method of welding is plasma arc welding.

3. A process according to claim 1 or 2, characterised in that the outer shuttle main body is made of case hardened steel.

4. A process according to claim 1, 2 or 3, characterised in that the projection is of martensitic high chrome steel.

5. A process according to claim 4, characterised in that the projection is tempered prior to machining.

6. A shuttle for use in a sewing machine having an outer main body, and a projection built up by welding on a portion thereof and machined to form a cone point.

7. A shuttle according to claim 6, characterised in that the outer shuttle main body is made of case hardened steel.

8. A shuttle according to claim 6 or 7, characterised in that the projection is of martensitic high chrome steel.

9. A shuttle according to claim 8, characterised in that the projection is tempered.

10. A sewing machine having a shuttle which is according to any one of claims 6 to 9 or is made by the method of any one of claims 1 to 5.

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Fig. 1

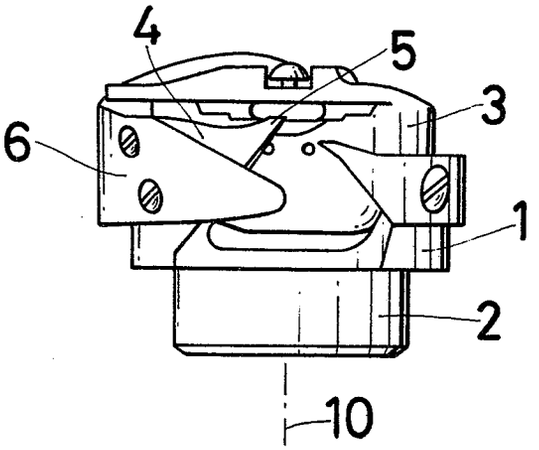
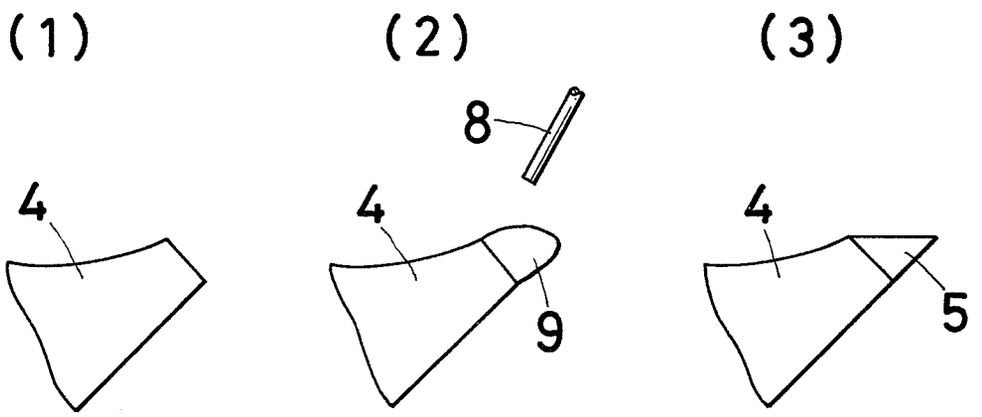


Fig. 2



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EUROPEAN SEARCH REPORT

0090544
Application number

EP 83 30 1425

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. ³)
A	WILHELM RENTERS: "Der Nähmaschinen Fachmann", 8th edition, vol. II, Verlag Bielefelder Verlagsanstalt zu Bielefeld * Page 83, point C,(7) *		D 05 B 57/00 B 23 K 31/04
A	FR-A-2 278 436 (SKF) * Page 1, line 24; page 2, line 17 *		
A	US-A-3 063 310 (CONNOY) * Column 2, lines 57-70 *		
A	FR-A- 851 261 (I.G. FARBEN) * Column 2, paragraph 1 *		TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
A	FR-A- 886 963 (SAUVAGEAU) * Page 1, paragraph 1, lines 52-55; page 2, lines 33-36 *		D 05 B B 23 K
A	FR-A-2 022 711 (LION OIL) * Claims 3,7 *		
A	FR-A-2 069 172 (FRY'S) * Whole document *		

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20-07-1983	VUILLEMIN L.F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A	FR-A-2 488 538 (JULLIARD) * Page 2, paragraph 3 * -----		

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

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