

Warr. & Warren.

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to the Manufacture of Sliding Clasp Fasteners



We, NOVI PATENTVERWERTUNGS — G.M.B.H., a German body corporate, of Erichstrasse. 4, Wuppertal-Barmen, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a method for weaving the two portions of a sliding clasp fastener that are to be interengaged, at the same time on ribbon looms, employing at least two pairs of shuttles, in which weft threads of synthetic material which are to be included in the weave and which constitute the coupling members for the said portions, are wound around a common wire, guided by the shedding mechanism.

In this known method two pairs of shuttles, i.e. four spools are used on known four-shuttle ribbon looms, two spools receiving the weft threads for making the two stringer tapes and two spools each receiving a thread of synthetic material which is woven into a selected portion of the width of the two tapes in the form of a flattened helix or a U-shaped line having a wavy configuration or in any other form, and which specifically constitutes, on one tape edge, freely projecting loops with areas thread deposited to constitute interengagement surfaces, these interengagement surfaces constituting the fastener members. In the weaving operation the synthetic material weft threads are wound around a common wire, pin, or the like, said pin or wire being located centrally between the two tapes to be woven, and in this process the wire is raised and lowered by the shedding mechanism while the shuttles with the spools

are alternately shot into the ~~warp~~ thread sheds. When forming one of the tapes the warp thread sheds of the other tape should remain open and the formation of both halves of the fastener requires an alternate raising and lowering of the batten as is necessary in ribbon looms of known type, when using two shuttles and two weft threads.

It is an object of the invention to accelerate the weaving process for the manufacture of two engaging halves of a sliding clasp fastener, and at the same time eliminate the raising and lowering of the batten and thereby the movement of large masses.

A further object is to weave the rows of fastener members to be produced by the weaving process, from a monofilamentary synthetic material thread which is flat, round or polygonal in cross-section, and to produce the necessary coupling surfaces of the fastener member in the course of the weaving operation.

Accordingly, the invention consists in that the warp thread sheds for the simultaneous formation of both parts of the sliding clasp fastener are arranged other at different heights, and the shuttles with the weft threads for constituting each tape and the synthetic material thread for constituting the fastener members of each half, are shot into the mutually opposed warp thread sheds without varying the height of a batten.

The warp thread sheds for producing the two halves of the sliding clasp fastener are advantageously so constituted that for each shot to be made the lower warp threads of the upper shed is located at the same or approximately the same, height as the upper warp threads of the lower shed.

[Price 4s. 6d.]

40 Warp

45

50

55

60

65

70

75

The threads of synthetic material which are to be shot into the respective parts to be woven, may be provided with transverse deformations acting as interengagement surfaces before being woven into the band, said deformations being so arranged that they determine the turning over of the synthetic material threads, that is that one transverse deformation is located in the bend or crown of the free loop that the thread makes round the wire, and the next one is located at the turning point of the synthetic material threads in the tape.

Threads of synthetic material with a continuous flat, round or polygonal section may be used without previously effecting the transverse deformations referred to, in which case it is necessary, according to the invention, to strike these synthetic threads by the beater read after each shoot with such force that, where flat threads are used, they are bent at right angles and deformed, or where round or other sectioned threads are used, they must be so deformed on diametrically opposed points that interengagement surfaces are thus constituted. In order to effect this bending and deformation it is advantageous to cause those reed blades which come into contact in the area of the bendings or bends or deformations to be produced, to project, in relation to the other reed blades, towards the finished part of the woven fastener. These reed blades may be broader than the other reed blades and therefore protrude beyond them.

The deformation of the synthetic threads, the material of which consists of a thermo plastic synthetic material such as, for example, polyamide or polyurethane, can be assisted by softening them by the application of heat, for example, by high frequency heating, radiant heat or any similar locally applied heat.

In order that the invention may be more clearly understood, reference will now be made to the accompanying drawings, which illustrate a method and apparatus according thereto, and in which:—

Figure 1 shows a diagrammatic partial perspective view of a ribbon loom operating with four shuttles,

Figure 2 shows a diagram of the shedding means for the ribbon loom according to Figure 1, in side elevation,

Figure 3 shows a diagrammatic partial view of a sliding clasp fastener woven on the ribbon loom according to Figure 1,

Figure 4 shows a partial view of a woven sliding clasp fastener, the fastener members of which are produced from a synthetic material thread having a flat section, and

Figure 5 shows a partial view of a woven sliding clasp fastener, the fastener members of which are produced from a synthetic material thread having a circular section.

In order to simultaneously weave two halves of a sliding clasp fastener according to the invention and as shown in the drawings, the procedure is as follows:—

The ribbon loom to be used for the manufacture of the two parts of a sliding clasp fastener operates with four shuttles 1—4, of which shuttles 1 and 3 carry spools 1a and 3a with textile weft threads 5 and 6 and shuttles 2 and 4 carry spools with synthetic material weft threads 7 and 8. It is also possible to operate more than four shuttles if desired.

The four shuttles 1—4 always operate in a constant vertical position. In order to weave the two halves of a sliding clasp fastener, only two groups of warp thread sheds need be constituted, that is one group for each half of the sliding clasp fastener, one warp thread shed of each group serving to bind the textile warp thread 5, or 6, to constitute the stringer tape 9 or 10, and the other warp thread shed serving to bind the synthetic material weft thread 7 or 8.

In the embodiment shown, the warp threads 11 and 12 constitute the shed for forming stringer tape 9, and the warp threads 13 and 14 constitute the shed for binding the synthetic material weft thread 7, which in the embodiment is only shot over a partial width of the sliding clasp fastener half.

The warp threads 15 and 16 constitute the shed for forming the second tape 10 and the warp threads 17 and 18 constitute the shed for binding the synthetic material weft thread 8.

All warp thread sheds are at different heights according to the position of shuttles 1—4, the warp threads 14 and 18 being preferably in the same or similar vertical position on the central plane, i.e., on the plane of the tape, and the two shed groups being located one on each side of a longitudinal vertical plane.

Alongside the warp threads, a wire 19 is used as a guide pin, of limited length, which is held firm in front of the shafts of the loom and which is moved in the vertical longitudinal central plane between the two parts of the sliding clasp fastener in the vertical position, as will hereinafter be explained.

One of the warp threads of sheds 13, 14 and 17, 18 may be a cord 20 or 21 as shown in Figure 3, this cord determining the clasp spacing of the sliding clasp fastener member constituted by the synthetic material threads 7 and 8, on the plane of tapes 9 and 10. Instead of a cord 20 or 21, warp threads united together may also be used.

The formation of the sheds is carried out in the usual manner by the shafts and according to the diagram shown in Figure 2, the warp threads 11, 12, 15 and 16 are moved by the shafts 22 or their wires, the warp threads 13, 14, 17 and 18 are moved by shafts 23, additional (not shown), tying threads



for the further tying-in of the synthetic material weft threads 7, 8 are moved by shaft 24 and the wire 19 by shaft 25. It is possible to move warp threads of the sheds by common shafts and thus to reduce the number of shafts and also the mass to be moved. Upon each move the warp threads 11 or 15, assume the position of warp threads 12 or 16 and vice versa and the warp threads 13 or 17 assume the position of the warp threads 14 or 18 and vice versa.

The weaving of the two sliding clasp fastener halves then proceeds as follows:

The wire 19 first adopts the position according to Figure 1 and then all four shuttles 1—4 are shot through the warp thread sheds so that the two synthetic material weft threads 7 and 8 are shot through beneath the wire 19. Then the change of shed takes place in the aforementioned manner and at the same time the wire 19 moves into position 19a so that upon the return shooting of shuttles 1—4, the synthetic material weft threads 7 and 8 are shot through their warp threads above the wire 19a, i.e., the synthetic material weft threads 7 and 8 are passed around the wire 19 upon each to and fro shooting operation and constitute loops which freely project beyond the facing edges of the tape after they have been slipped off the wire (Figure 3), these loops being the interengagement loops which engage one another (in Figure 3 the loops are shown as separated from one another in the longitudinal direction, this being merely in order to make them more clearly visible). It is also possible to use synthetic material weft threads 7 and 8 which have been previously stamped to make deformed surfaces 26 with a spacing such that one stamped deformed surface 26 constitutes the interengagement surface in the apex of the free loops and the next stamped surface constitutes the point where the thread is reversed in direction in the woven tape. The stamping of the interengagement surfaces 26, the planes of which may be mutually displaced in succession along the tape, actually weakens the thread material and the stampings are therefore always similarly relatively located and shaped during the weaving process.

It is also possible, however, to use synthetic threads 7 and 8 having a flat, circular or other profile without previously applying any deformation, as will hereinafter be explained.

After the shooting of shuttles 1, 2 and shuttles 3, 4, shuttles 1 and 2 remain stationary and shuttles 3 and 4 are shot to and fro through the sheds. The shuttles 3 and 4 remain stationary and shuttles 1 and 2 are shot through the sheds. The shooting cycle of the shuttle then recommences.

After each shot the weft threads 5; 7 and 6, 8 are beaten-up by the reed 27, so that a firm fabric of tapes 9 and 10 and a desired

juxtaposition of the fastener members of the synthetic weft threads 7 and 8 is achieved, the interengagement surfaces 26 of the synthetic threads 7 and 8 producing an interengagement of the two fastened parts after being released from wire 19.

This operation of the beater may, according to the invention, alternatively be directly used to produce the coupling surfaces if the synthetic threads 7 and 8, are given a flat, circular or other section, and are used without previous deformation. In such a case the blades of the reed 27, which beats up on both sides of the guide wire 19, between the wire 19 and the facing edges of tapes 9 and 10, is arranged to project in relation to the other reed blades and these projecting reed blades may be wider than the remaining reed blades and therefore project beyond the other reed blades to the extent of such greater width. If a flat synthetic weft thread 7a, 8a is used, as shown in Figure 4, and the projecting reed blades of the beater operate with a large force towards the fastener tape, then the flat threads 7a, 8a, present their edges thereto, will be deformed by striking against the wire 19 so that the synthetic threads will lie flat where they pass around the wire 19 and as a result of the deformation against the wire, will produce interengagement surfaces for the mutual engagement of the two parts of the fastener as shown in the partial view in Figure 4.

Such a deformation for producing the interengagement surfaces may alternatively be produced with synthetic threads having a continuous round or polygonal section, if the reed is constituted in the aforementioned manner and is made to beat up so that a thread with such a cross-section is deformed so as to have the fastener shape according to the partial view shown in Figure 5. A condition is obviously that the material of the synthetic thread 7 and 8 should be capable of being permanently deformed, and this deformation may be assisted by a local heating of the thermoplastic material of thread 7 and 8, for example by a high frequency heating or any other heating means.

After weaving of the fastener parts, further heating of the two parts of the fastener may be effected in order to release the tension built up in the threads 7 and 8, by the weaving process.

According to the invention it is, of course, possible so to guide and bind the synthetic threads 7 and 8 that they adopt a U-shaped curve having a wavy configuration as shown in Figure 3 or also a flattened helical shape, or a combination of the two kinds.

According to the preceding description of a weaving process, it is possible to produce engaging sliding clasp fastener portions of any desired length. For practical purposes, however, individual sliding clasp fasteners which are ready for use are made only in specified



A/ta

70 fastener

75

80

85

90

95

100

105

110

115

120

125

130



lengths. According to the aforementioned process and with the loom described, it is possible, while weaving stringer tapes 9 and 10 which are endless or of any desired length, to provide both tapes 9 and 10 with fastener members of synthetic weft threads which are woven thereinto and according to the desired specific fastener length, and then to produce a portion of free stringer tapes with no members thereon, this being repeated so that an indefinite length of stringer tape is produced, carrying fastener members in discrete portions of specified lengths, with free tape between them. For this purpose the procedure is as follows:

As soon as the desired length of an individual sliding clasp fastener with fastener members woven thereinto is produced, shuttles 2 and 4 with the synthetic thread spools 2a and 3a are stopped, e.g., but cutting out their drive. Thereby only the two tapes 9 and 10 will be woven, without fastener members, and after producing a desired length of tape without fastener members, shuttles 2 and 4 with the synthetic threads are once more set in operation to produce fastener members.

WHAT WE CLAIM IS:—

1. A method for weaving the two engaging parts of a sliding clasp fastener at the same time, on a ribbon loom having at least two pairs of shuttles, weft threads of synthetic material which are to constitute the fastener members and which are to be woven into the two portions, being passed around a fixed, operated by the shedding mechanism, in order to produce the interengagement loops on the opposed tape edges, wherein the warp thread sheds for the simultaneous production of the two sliding clasp fastener parts are arranged at different heights, and the shuttles with the weft threads for constituting each stringer tape and with the synthetic material threads for constituting the fastener members of each part, are shot into the mutually opposed warp thread sheds without varying the height of a batten.

2. A method as claimed in claim 1, wherein the warp thread sheds for producing the two sliding clasp fastener parts are so constituted that for each shot to be made, the lower warp threads of the upper shed are located at the same, or approximately same, height as the upper warp threads of the lower shed.

3. A method as claimed in claim 1 or 2, wherein the shuttles carrying the spools of the two synthetic material threads are temporarily stopped after production of a required length of completed fastener, so that on continued operation the stringer tapes are woven, but without fastener members.

4. A method as claimed in claim 1 or 2, wherein the synthetic material threads are provided with transverse deformations which act as interengagement surfaces at the position where they are turned around the guide wires during weaving.

5. A method as claimed in claim 1 or 2, wherein the weft threads for forming the fastener elements are constituted by synthetic material having a continuous flat, circular or polygonal section which are bent and deformed by the reed blade on looping around the fixed wire in such a way as to effect a mutual coupling of the fastener members of the two fastened parts.

6. A loom for carrying out the method according to claim 5, wherein a reed is provided on the beater of the loom, one blade of the reed between the fixed wire and the adjacent edge of the tape projecting beyond the other reed blade towards the fastener.

7. A loom as claimed in claim 6, wherein the projecting reed blade is broader than the other reed blades.

8. A method as claimed in any one of the claims 1 to 5, wherein the synthetic material threads are softened before or during the beating up by the beater, by the application of heat, for example high frequency heating or radiant heat.

9. A method as claimed in any one of the preceding claims 1 to 5, or 8, wherein the bent and deformed fastener members are heated after the weaving operation in order to release the internal tension produced in the thread during weaving.

10. A method for weaving the two engaging portions of a sliding clasp fastener at the same time, on a ribbon loom, substantially as herein before described with reference to the accompanying drawings.

11. A loom for carrying out the method according to claim 10, substantially as hereinbefore described with reference to the accompanying drawings.

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lengths. According to the aforementioned process and with the loom described, it is possible, while weaving stringer tapes 9 and 10 which are endless or of any desired length, to provide both tapes 9 and 10 with fastener members of synthetic weft threads which are woven thereinto and according to the desired specific fastener length, and then to produce a portion of free stringer tapes with no members thereon, this being repeated so that an indefinite length of stringer tape is produced, carrying fastener members in discrete portions of specified lengths, with free tape between them. For this purpose the procedure is as follows:

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WHAT WE CLAIM IS:—

1. A method for weaving the two engaging parts of a sliding clasp fastener at the same time, on a ribbon loom having at least two pairs of shuttles, weft threads of synthetic material which are to constitute the fastener members and which are to be woven into the two portions, being passed around a wire, operated by the shedding mechanism, in order to produce the interengagement loops on the opposed tape edges, wherein the warp thread sheds for the simultaneous production of the two sliding clasp fastener parts are arranged at different heights, and the shuttles with the weft threads for constituting each stringer tape and with the synthetic material threads for constituting the fastener members of each part, are shot into the mutually opposed warp thread sheds without varying the height of a batten.

2. A method as claimed in claim 1, wherein the warp thread sheds for producing the two sliding clasp fastener parts are so constituted that for each shot to be made, the lower warp threads of the upper shed are located at the same, or approximately same, height as the upper warp threads of the lower shed.

3. A method as claimed in claim 1 or 2, wherein the shuttles carrying the spools of the two synthetic material threads are temporarily stopped after production of a required length of completed fastener, so that on continued operation the ~~stronger~~ tapes are woven, but without fastener members.

4. A method as claimed in claim 1 or 2, wherein the synthetic material threads are provided with transverse deformations which act as interengagement surfaces at the position where they are turned around the guide wires during weaving.

5. A method as claimed in claim 1 or 2, wherein the weft threads for forming the fastener elements are constituted by synthetic material having a continuous flat, circular or polygonal section which are bent and deformed by the reed blade on looping around the fixed wire in such a way as to effect a mutual coupling of the fastener members of the two fastened parts.

6. A loom for carrying out the method according to claim 5, wherein a reed is provided on the beater of the loom, one blade of the reed between the fixed wire and the adjacent edge of the tape projecting beyond the other reed blade towards the fastener.

7. A loom as claimed in claim 6, wherein the projecting reed blade is broader than the other reed blades.

8. A method as claimed in any one of the claims 1 to 5, wherein the synthetic material threads are softened before or during the beating up by the beater, by the application of heat, for example high frequency heating or radiant heat.

9. A method as claimed in any one of the preceding claims 1 to 5, or 8, wherein the bent and deformed fastener members are heated after the weaving operation in order to release the internal tension produced in the thread during weaving.

10. A method for weaving the two engaging portions of a sliding clasp fastener at the same time, on a ribbon loom, substantially as herein before described with reference to the accompanying drawings.

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