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(54) IMPROVEMENTS IN OR RELATING TO METHODS AND MEANS FOR THE PRODUCTION OF FASTENING STRIPS

(71) We, REPLA INTERNATIONAL S.A.H., a Luxembourg Corporate Body, of: 56 Boulevard Napoléon, Luxembourg, 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 invention relates to methods and means for the production of strips for use as or in strip fasteners.

Fasteners are known which are constituted by a strip provided on one side with a multiplicity of fastening members. In a known arrangement, the strip is made of a velvet or similar fabric, the pile of which is made of synthetic resin and terminates with incurved hook-shaped ends. When such a strip engages a similar strip or another piece of fabric, its hooked pile seizes said other strip or piece of fabric, whereby the first mentioned strip is held fast on said other strip or piece of fabric. Such hook-shaped fastening members must be woven on special looms and are comparatively expensive.

The present invention has for its object a very cheap method of producing fastening strips of the type referred to.

The invention provides a method for producing a strip for use as or in a strip fastener and provided on at least one side with a multiplicity of fastening members in the form of generally hook like projections, said method comprising forming a strip of material comprising an elongated flat web with longitudinal ribs of hook like section projecting from at least one of the surfaces of the web, and cutting longitudinally spaced notches across said ribs to divide them into a plurality of generally hook like fastening members, the web remaining intact.

The invention also provides apparatus for producing a strip for use as or in a strip fastener and provided on at least one side with a multiplicity of fastening members in the form of generally hook like projections, the apparatus comprising means for pro-

ducing a strip of material in the form of an elongated web with longitudinal ribs of generally hook like section projecting from at least one of the surfaces of the web, means for guiding the strip of material, and a cutting system adapted to cut notches across the ribs of the strip and leave the web intact.

The accompanying drawing illustrates by way of example apparatus for the execution of the above-described method together with successive stages in the production of the strip. In said drawing:

Fig. 1 is a general diagrammatic view of the apparatus;

Fig. 2 is a perspective view of a portion of the strip as it passes out of an extruding machine;

Fig. 3 shows a portion of the strip as it passes underneath a cutting system adapted to notch the strip;

Fig. 4 shows the modification in shape of the strip when subjected to a hot drawing process;

Fig. 5 is a perspective view of a portion of the strip in its final condition;

Fig. 6 illustrates a cutting system provided with two blades adapted to form notches in the ribs of the strip; and

Fig. 7 is a longitudinal cross-section of the strip, showing the notches obtained by means of the arrangement according to Fig. 6.

As illustrated in Fig. 1, the apparatus includes an extruding machine producing, by means of a die 2, a strip 3 of thermoplastic resinous material, which strip, when it passes out of the extruding machine, has a number of longitudinal ribs 4 (Figs. 2) on one of its sides.

When leaving the extruding machine 1, the strip 3 is comparatively soft and, in order to prevent undesired deformations, it is carried by an endless conveyor belt 5 until it has cooled by a sufficient amount for it to attain sufficient stiffness.

Before the strip 3 reaches the end of the

conveyor belt 5, it passes underneath a roller 6 the periphery of which has areas lying at different distances from its rotary axis. Said roller thus exerts a pressure of variable intensity on the ribs 4, which produces deformations of the webs 7 of the ribs 4, whereby the height and breadth of the latter vary throughout the length of the strip 3. Such modifications in the cross-sectional dimensions of the ribs are not essential but they have a favourable effect on the fastening properties of the strip.

When it has left the conveyor belt 5, the strip passes over a drum 8 in contact with which it is held by two rollers 9 and 10. Said drum is located underneath a cutting system 11 provided with a flat cutting blade 12 adapted to reciprocate so as to cut notches 3 across the ribs 4 on the strip, as shown in Fig. 3. The depth of the notches is such that only the ribs are cut while the solid flat supporting section of the strip is not engaged by the cutting blade 12.

After it has registered with the cutting system 11, the strip 3 reaches a drawing frame 14 which includes strip-driving means constituted by rollers 15 at the input end of the frame and further rollers 16 at the output end. The output end rollers make the strip progress by a speed about 50% higher than the speed imparted by the input rollers 15. In the actual drawing frame, the strip 3 passes first through heating means 17 which may be, for instance, an electric radiator radiating infra-red rays, and then through cooling means 18 which may be constituted simply by a chamber fed with cool air by a fan 19.

Fig. 4 shows the modified shape assumed by the strip when it has passed through the drawing frame. As illustrated, the surface of the drawn out solid supporting portion of the strip has become longer and thinner as shown at 3¹. At the same time, the originally very narrow notches 3 are broadened considerably so as to form a comparatively large interval 13¹ between the successive fastening members. There is thus obtained a strip 3 the general appearance of which is shown in Fig. 5 and wherein each element cut out of a rib 4 and then drawn out acts as a fastening member 20.

Obviously, numerous modifications may be made to the method and apparatus described, for example as concerns the shape of the rib 4, which shape defines the final shape given to the fastening members. The latter may, in particular, be in the shape of an arrow or of a harpoon, if it is desired to increase their fastening capability.

Also, if it is desired to obtain a high speed for the production of the notches, the cutting system may be provided with a plurality of cutting blades operating simultaneously.

Figs. 6 and 7 relate to a modification of the cutting system. The strip 3 passes in this case over a drum 8 of a comparatively large size in registry with a cutting system constituted by an arm 21 carrying two cutting blades. The latter lie in two planes lying to either side of the rotary axis of the drum 8, said blades thus forming notches sloping obliquely in opposite directions with reference to the longitudinal direction of the strip 3.

The spacing between the blades 22, 23 and the speed of progression of the strip are selected in a manner such that the bottom of a cut executed by one blade may register with that executed by the other blade. It is thus possible to obtain, as illustrated in Fig. 7, V-shaped notches 24 providing a sufficient spacing between the successive article-catching elements. This results in a possibility of cutting out the strip drawing step as described with reference to Figs. 1 and 4.

In the embodiments illustrated, the strip 3 is provided with ribs on only one side, but, of course, such ribs may be carried on both sides, whereby a succession of fastening members are formed on each side of the strip 3, the fastening members located on one side being similar to or different from those at the opposite side.

WHAT WE CLAIM IS:—

1. A method for producing a strip for use as or in a strip fastener and provided on at least one side with a multiplicity of fastening members in the form of generally hook like projections, said method comprising forming a strip of material comprising an elongated flat web with longitudinal ribs of hook like section projecting from at least one of the surfaces of the web, and cutting longitudinally spaced notches across said ribs to divide them into a plurality of generally hook like fastening members, the web remaining intact.

2. A method according to claim 1, in which the web is subjected after the notches have been cut in the longitudinal ribs to a permanent elongation, whereby the distance between the fastening members is increased in the longitudinal direction of the web.

3. A method according to claim 1 or 2, in which the strip is formed from a thermoplastic resinous material, the elongation of which is carried out at a raised temperature.

4. A method according to any preceding claim, in which the cross-sectional dimensions of the ribs vary through at least part of their length.

5. A method according to any preceding claim in which the ribbed web is obtained by extrusion through a die.

6. A method according to any preceding claim, in which the web is subjected to a continuous drawing operation by means of



conveyor belt 5, it passes underneath a roller 6 the periphery of which has areas lying at different distances from its rotary axis. Said roller thus exerts a pressure of variable intensity on the ribs 4, which produces deformations of the webs 7 of the ribs 4, whereby the height and breadth of the latter vary throughout the length of the strip 3. Such modifications in the cross-sectional dimensions of the ribs are not essential but they have a favourable effect on the fastening properties of the strip.

When it has left the conveyor belt 5, the strip passes over a drum 8 in contact with which it is held by two rollers 9 and 10. Said drum is located underneath a cutting system 11 provided with a flat cutting blade 12 adapted to reciprocate so as to cut notches 3 across the ribs 4 on the strip, as shown in Fig. 3. The depth of the notches is such that only the ribs are cut while the solid flat supporting section of the strip is not engaged by the cutting blade 12.

After it has registered with the cutting system 11, the strip 3 reaches a drawing frame 14 which includes strip-driving means constituted by rollers 15 at the input end of the frame and further rollers 16 at the output end. The output end rollers make the strip progress by a speed about 50% higher than the speed imparted by the input rollers 15. In the actual drawing frame, the strip 3 passes first through heating means 17 which may be, for instance, an electric radiator radiating infra-red rays, and then through cooling means 18 which may be constituted simply by a chamber fed with cool air by a fan 19.

Fig. 4 shows the modified shape assumed by the strip when it has passed through the drawing frame. As illustrated, the surface of the drawn out solid supporting portion of the strip has become longer and thinner as shown at 3¹. At the same time, the originally very narrow notches 3 are broadened considerably so as to form a comparatively large interval 13¹ between the successive fastening members. There is thus obtained a strip 3 the general appearance of which is shown in Fig. 5 and wherein each element cut out of a rib 4 and then drawn out acts as a fastening member 20.

Obviously, numerous modifications may be made to the method and apparatus described, for example as concerns the shape of the rib 4, which shape defines the final shape given to the fastening members. The latter may, in particular, be in the shape of an arrow or of a harpoon, if it is desired to increase their fastening capability.

Also, if it is desired to obtain a high speed for the production of the notches, the cutting system may be provided with a plurality of cutting blades operating simultaneously.

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The spacing between the blades 22, 23 and the speed of progression of the strip are selected in a manner such that the bottom of a cut executed by one blade may register with that executed by the other blade. It is thus possible to obtain, as illustrated in Fig. 7, V-shaped notches 24 providing a sufficient spacing between the successive article-catching elements. This results in a possibility of cutting out the strip drawing step as described with reference to Figs. 1 and 4.

In the embodiments illustrated, the strip 3 is provided with ribs on only one side, but, of course, such ribs may be carried on both sides, whereby a succession of fastening members are formed on each side of the strip 3, the fastening members located on one side being similar to or different from those at the opposite side.

WHAT WE CLAIM IS:—

1. A method for producing a strip for use as or in a strip fastener and provided on at least one side with a multiplicity of fastening members in the form of generally hook like projections, said method comprising forming a strip of material comprising an elongated flat web with longitudinal ribs of hook like section projecting from at least one of the surfaces of the web, and cutting longitudinally spaced notches across said ribs to divide them into a plurality of generally hook like fastening members, the web remaining intact.

2. A method according to claim 1, in which the web is subjected after the notches have been cut in the longitudinal ribs to a permanent elongation, whereby the distance between the fastening members is increased in the longitudinal direction of the web.

3. A method according to claim 1 or 2, in which the strip is formed from a thermoplastic resinous material, the elongation of which is carried out at a raised temperature.

4. A method according to any preceding claim, in which the cross-sectional dimensions of the ribs vary through at least part of their length.

5. A method according to any preceding claim in which the ribbed web is obtained by extrusion through a die.

6. A method according to any preceding claim, in which the web is subjected to a continuous drawing operation by means of



two sets of rollers, said web being first heated and then cooled as it passes from one set of rollers to the other.

7. A method according to any preceding claim, in which the notches are formed by making two cuts oblique to the longitudinal axis of the strip and thereby removing wedges of material from the longitudinal ribs.

8. Apparatus for producing a strip for use as or in a strip fastener and provided on at least one side with a multiplicity of fastening members in the form of generally hook like projections, the apparatus comprising means for producing a strip of material in the form of an elongated web with longitudinal ribs of generally hook like section projecting from at least one of the surfaces of the web, means for guiding the strip of material, and a cutting system adapted to cut notches across the ribs of the strip and leave the web intact.

9. Apparatus according to claim 8 including a drawing frame adapted to give the web passing out of the cutting system a permanent elongation.

10. Apparatus according to claim 9 wherein the drawing frame is provided at its input and output ends with sets of rollers and includes means for first heating and then cooling the strip between the two sets of rollers.

11. Apparatus according to claim 8, 9 or 10 in which the cutting system includes a rotary drum over which the strip is wound with said ribs facing outwardly, said drum facing the cutting means which includes at least one cutting blade adapted to effect a reciprocatory movement to cut notches in the ribs of the strip as the latter passes over said drum.

12. Apparatus according to any of claims 8 to 11 in which the means for producing the strip of material is an extruding machine provided with a die, of suitable cross-section.

13. Apparatus according to claim 12, comprising between the extruding machine and the cutting system means for deforming the longitudinal ribs so that their cross-

sectional dimensions vary along at least part of their length.

14. Apparatus according to claim 13, wherein the means for deforming the longitudinal ribs is constituted by a rotary member, the periphery of which engages the strip and includes parts located at different distances from the stationary rotary axis of said member, thereby to compress the ribs to a varying extent.

15. Apparatus according to claim 11 in which the cutting means comprises a pair of cutting blades adapted to make oblique cuts in the ribs, the cuts being inclined to one another so that V-shaped notches are removed from the ribs as the strip of material passes over the drum associated with the cutting means.

16. A strip for use as or in a strip fastener produced by the method of any of claims 1 to 7.

17. A method for producing a strip, provided on at least one side with a multiplicity of generally hook like fastening members substantially as described herein.

18. Apparatus for producing a strip provided on at least one side with a multiplicity of generally hook like fastening members substantially as described herein with reference to and as illustrated in Fig. 1 of the accompanying drawings.

19. Apparatus for producing a strip provided on at least one side with a multiplicity of generally hook like fastening members substantially as described herein with reference to and as illustrated in Fig. 6 of the accompanying drawings.

20. A strip for use in or as a strip fastener substantially as described herein with reference to and as illustrated in Fig. 5 of the accompanying drawings.

21. A strip for use in or as a strip fastener substantially as described herein with reference to and as illustrated in Fig. 7 of the accompanying drawings.

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