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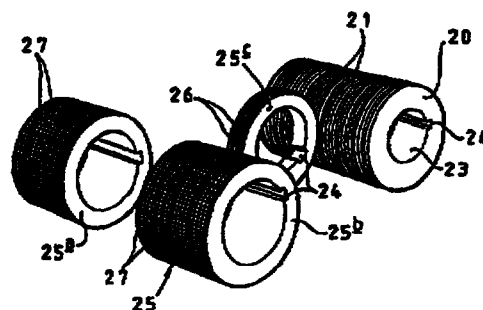
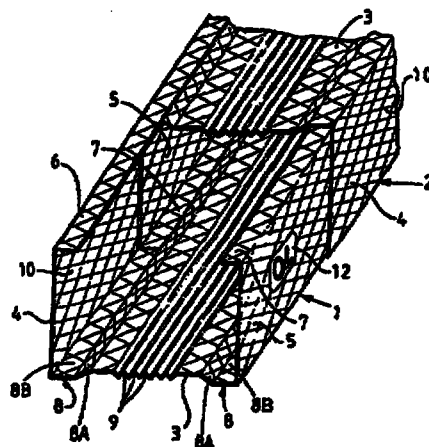
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(54) Title: STRUCTURAL PROFILE

(57) Abstract

An elongate structural profile has a base (3) and a pair of side walls (4) projecting from the base along its length, the base being provided with formations (9) extending longitudinally of the profile. At least a major part of the remaining surface area of the profile is formed with a multiplicity of localised individual formations (10). Also disclosed are a method of producing surface formations on sheet or strip material and apparatus for carrying out the method.



STRUCTURAL PROFILE

This invention relates to an elongate structural profile formed from sheet or strip material, usually but not exclusively of metal, for use particularly in the construction of partitioning systems, such as partition walls employing plasterboard or similar material. The invention also embraces a method of and apparatus for producing surface formations, such as knurling and grooving on sheet or strip material used in forming the aforesaid profile.

An object of the invention is to provide such a profile of improved form which may be readily manufactured from sheet or strip material. A further object of the invention is to provide an improved method of and apparatus for producing surface formations on sheet or strip material.

According to the invention, an elongate structural profile comprises a base and at least one side wall extending longitudinally of the base and out of the plane thereof, an area of the base and/or wall being provided with at least one elongate formation extending generally longitudinally of the profile, at least a major part of the remainder of the surface area of the profile being formed with a multiplicity of localised deformations.

Typically, the profile has a pair of spaced side walls extending from the opposed transverse extremities of the base to form a generally channel-shaped profile, the base being formed with a plurality of elongate formations, preferably in the form of parallel longitudinal ribs.

In one convenient arrangement, the deformations are interrupted by the provision of one or more relatively plain areas serving for the application of an informative, decorative or similar marking.

According to a further aspect of the invention, a method of producing surface formations on sheet or strip material comprises passing the material between cooperating rolls rotating about generally parallel axes, one of which rolls has an area of circumferential grooving and the other of which has an area of similar circumferential grooving as well as an area in which its circumferential grooving is intersected by grooving generally parallel to the rotational axis of the roll to create a multiplicity of knurling formations, whereby the sheet or strip is formed with one or more longitudinal grooves and an adjacent knurled area.

Preferably, knurled areas, which may conveniently be generally co-extensive, are formed respectively at either side of the grooved area.

From a further aspect, the invention provides an apparatus for applying surface formations on sheet or strip material comprising a first roll having an area of circumferential grooving, and a second roll of which an area is provided with circumferential grooving generally complementary to that on the first roll, the second roll also having an area in which its circumferential grooving is intersected by grooving generally parallel to the rotational axis of the roll to create a multiplicity of knurling formations, whereby an area of the sheet or strip passed between the rotating cooperating rollers is formed with one or more longitudinal grooves and an adjacent knurled area.

With such an arrangement, the knurling formations on the second roll may be positioned to move within and along the grooves of the first roll so that the knurling formations are not required to mesh with corresponding formations on the first roll arriving successively at a given location. This means in turn, that the relative speeds of rotation of the rolls do not require strict control so as to be strictly sequenced even if rolls of different respective diameters are used.

In one convenient arrangement, the second roll has at least two rotationally interconnected parts, one of which has only circumferential grooving and the other has a multiplicity of knurling formations. Typically, the second roll is in three rotationally interconnected parts, of which the one having only circumferential grooving is disposed between two parts having knurling formations thereon.

The invention will now be described, by way of example, with reference to the accompanying drawings in which:-

Figure 1 is a fragmentary perspective view of one form of the structural profile of the invention nesting with an identical profile along part of its length;

Figure 2 is a view similar to Figure 1 illustrating an alternative form of the profile of the invention;

Figure 3 is an exploded perspective view of part of one form of an apparatus for producing surface formations on sheet or strip material;

Figure 4 is a view of the apparatus of Figure 3 in assembled condition, and

Figure 5 is an enlarged detail of part of the apparatus of Figures 4 and 5 in operative condition.

Referring to Figure 1, the pair of interengaged structural profiles 1 and 2 illustrated therein are of identical form and the following detailed description will be confined to the profile 1. The profile is generally channel shaped, having a base 3 and parallel side walls 4, 5 extending longitudinally of the base and having in-turned free end portions 6, 7 forming lips. The base 3 is connected to the side walls 4, 5 by respective stepped portions 8, each of which has an inclined part 8A connected to the base 3 and a part 8B parallel to the base and connecting the part 8A to the adjacent wall 4,5.

The base 3 is provided with a plurality of parallel longitudinally extending rib formations 9 which contribute very significantly to the longitudinal bending strength of the profile. The remaining area of the profile, that is to say all of its area not covered by the ribs 9, is covered by localised deformations illustrated schematically at 10, which appear on both sides of the surfaces. As can be seen from Figure 5, such deformations 32 are conveniently in the form of individual indentations formed by knurling or dimpling for example. Although the illustrated indentations 32 are square in shape, they may have any appropriate alternative shape, such as diamond, circular, rectangular, or triangular. Such deformations impart a considerable degree of rigidity to the profile, as well as providing a mechanical interlock between profiles when interengaged, for example, in the manner of the illustrated profiles 1 and

2. The deformations also serve as location points for screws during fixing to the profile of other elements, such as plasterboard. Some knurling or dimpling could also be provided in the ribbed area, if required.

With the particular form of profile illustrated in Figure 1, in which the base 3 is stepped at its connection with the walls 4, 5, it can be seen that two profiles can be nested in inverted relationship to form a closed box which, in practice, may conveniently serve as a stud for use in forming a plasterboard partition, for example. In the particular example illustrated, respective side walls 4 of the nested profiles serve as outer walls of the box, with the respective walls 5 lying internally of the box. The in-turned lip 7 of the wall 5 of one profile disposed within the box is received within the stepped portion 8 of the other profile and the lip 6 of that other profile engages around the external surface of the channel 8 of the one profile.

The ribs 9 and/or the other deformations over the remaining area of the profiles may be interrupted by the provision of one or more plain areas, of which an example is shown at 12, which areas may conveniently serve, for example, to carry an identification mark or possibly a form of decoration, either of which may be pressed into the area 12 as part of the structure, or subsequently painted thereon. The process of providing such markings is designated PERSONNURL.

The alternative profile illustrated in Figure 2 is identical with those of Figure 1, except that the lips 6 and 7 of Figure 1 are omitted from the walls 4, 5, so that this profile is not susceptible to the nesting previously described. This profile is, however, particularly suitable to form locating

channels, secured, for example, at opposed locations on a floor and ceiling respectively to locate box studs, of the kind shown in Figure 1, disposed vertically between the channels, in known manner, in order to provide surfaces for the attachment of claddings such as plasterboard.

It is considered that the profile of the invention will have at least as great an impact strength at comparable locations as many conventional forms of profile and, from a marketing point of view, the particular pattern of indentations can provide a significant identification of the product, on site, as compared to competitors' profiles. The PERSONNURL areas may conveniently provide a means of identifying profiles destined for a particular customer or location.

It will be understood that the profile may take alternative forms other than those described, typical examples being a "top hat" section, or a section in which the lips 6, 7 are extended across the base so that only a small gap or slot is left therebetween. A further alternative would be to provide an integral box unit by extending the lips so that they overlap, possibly being crimped together or otherwise interlocked to prevent them from being separated.

Figures 3 to 5 illustrate rolls through which sheet or strip material is passed in order to produce the surface deformations 9 and 10 to be found in the finished profiles of Figures 1 and 2. As can be seen clearly from the exploded view of Figure 3, substantially the entire surface of one roll 20 is formed with parallel identical circumferential grooves 21 which, although shown regularly and equi-spaced, may be in any convenient asymmetrical arrangement. The roll has a central axial bore 23 provided with a key-way 24 enabling the roll to be mounted in

driving engagement on a shaft (not shown) driven in conventional manner. The position of the key-way 24 relative to the grooves is not critical and may be chosen as a matter of convenience.

The other roll 25 is a composite structure made up of three distinct roll parts 25a, 25b, 25c arranged co-axially in use, as can be seen from Figure 4, although both rolls may alternatively be unitary structures. The central roll part 25c is formed across its width with circumferential grooves 26 complementary with those of roll 20. The other roll parts 25a, 25b are also circumferentially grooved in a similar manner, but this circumferential grooving is intersected by axial grooves extending at 90° to the circumferential grooves and, in this embodiment, of the same or similar depth and form to the latter, although axial grooves having different forms and depths may be employed in an alternative arrangement. The pitch of the axial grooves in the illustrated arrangement is such as to result in a divisible whole number of grooves when divided into the circumference of the roll. The effect of this arrangement is to produce a multiplicity of identical or similar knurling formations 27 across the entire circumferential area, or substantially so, of the roll parts 25a, 25b. When the roll parts 25a, 25b, 25c are assembled in the manner illustrated in Figure 4, being, in practice, keyed to a drive shaft (not shown) by the key-ways 24, the surface of the roll 25 will be seen to have a narrow central grooved portion A flanked on both sides by knurled portions B.

In order to produce a desired pattern of formations in a piece of sheet or strip material 30, the material is introduced between a roller assembly of Figure 4 with the roller 20 and 25 in contra-rotation. A detail of the operational arrangement is illustrated in greater detail in Figure 5.

Although only two rows of knurling formations 27 are shown in full on the roller, the remainder, schematically represented, are identical or similar. The rolls are arranged in tangential engagement and mutually offset slightly axially so that ridges between the circumferential grooves of one roll rest and rotate within the circumferential grooves of the other roll. As the sheet or strip advances through the rolls, a central portion of the material has longitudinal grooves 8 formed therein corresponding to those in the profile of Figures 1 and 2. Simultaneously, continuous rows of individual indentations or knurls 32 are formed in the material at either side of the grooves 9. It will be understood that the rolls need not necessarily be sequenced one with the other and neither need they be of identical diameters in view of the identical form and size of the grooves, enabling the knurling formations on the roll 25 to roll unhindered within the grooves of the roll 20 during forming.

The formation of the longitudinal grooves in the material by cold rolling makes a significant contribution to the strength and stiffness of the finished product. The forming process results in a product of which the thickness of a wall thereof measured from the peaks of the grooves 9 and/or from the bottoms of the individual knurl formations 32 formed in that wall, to a flat face of the wall at the side thereof opposite to the aforesaid peaks or bottoms, is less than twice the thickness of the unformed stock material.

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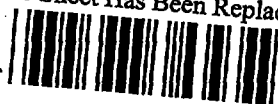


CLAIMS

1. An elongate structural profile comprising a base and at least one side wall extending longitudinally of the base and out of the plane thereof, an area of the base and/or wall being provided with at least one elongate formation extending generally longitudinally of the profile, at least a major part of the remainder of the surface area of the profile being formed with a multiplicity of localised deformations.
2. A profile according to Claim 1, wherein the profile has a pair of spaced side walls extending from the opposed transverse extremities of the base to form a generally channel-shaped profile, the base being formed with a plurality of elongate formations, preferably in the form of parallel longitudinal ribs.
3. A profile according to Claim 2, wherein the base comprises a central area in which the longitudinal formations are provided and which is connected to the side walls by at least one stepped connecting portion having an inclined part connected to the base and a further part extending parallel to the base and connecting the inclined part to the adjacent side wall.
4. A profile according to Claim 1 or Claim 2, wherein the deformations are interrupted by the provision of one or more relatively plain areas serving for the application of an informative, decorative or similar marking.

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5. A profile according to any one of Claims 1 to 4, wherein each longitudinally extending elongate formation is in the form of a continuous rib or channel.
6. A profile according to any one of the preceding claims, wherein the localised deformations are indentations formed by knurling or dimpling.
7. A profile according to any one of the preceding claims, wherein the thickness of a wall thereof measured from the peaks of the grooves and/or from the bottoms of individual knurl formations formed in that wall to a flat face of the wall at the side thereof opposite to the aforesaid peaks or bottoms, is less than twice the thickness of the unformed stock material.
8. A method of producing surface formations on sheet or strip material comprises passing the material between cooperating rolls rotating about generally parallel axes, one of which rolls has an area of circumferential grooving and the other of which has an area of similar circumferential grooving as well as an area in which its circumferential grooving is intersected by grooving generally parallel to the rotational axis of the roll to create a multiplicity of knurling formations, whereby the sheet or strip is formed with one or more longitudinal grooves and an adjacent knurled area.
9. A method according to Claim 8, which includes forming knurled areas respectively at either side of the grooved area.



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10. Apparatus for applying surface formations on sheet or strip material comprises a first roll having an area of circumferential grooving, and a second roll of which an area is provided with circumferential grooving generally complementary to that on the first roll, the second roll also having an area in which its circumferential grooving is intersected by grooving generally parallel to the rotational axis of the roll to create a multiplicity of knurling formations, whereby an area of the sheet or strip passed between the rotating cooperating rollers is formed with one or more longitudinal grooves and an adjacent knurled area.

11. Apparatus according to Claim 10, wherein the second roll has at least two rotationally interconnected parts, one of which has only circumferential grooving and the other has a multiplicity of knurling formations.

12. Apparatus according to Claim 11, wherein the second roll is in three rotationally interconnected parts, of which the one having only circumferential grooving is disposed between two parts having knurling formations thereon.



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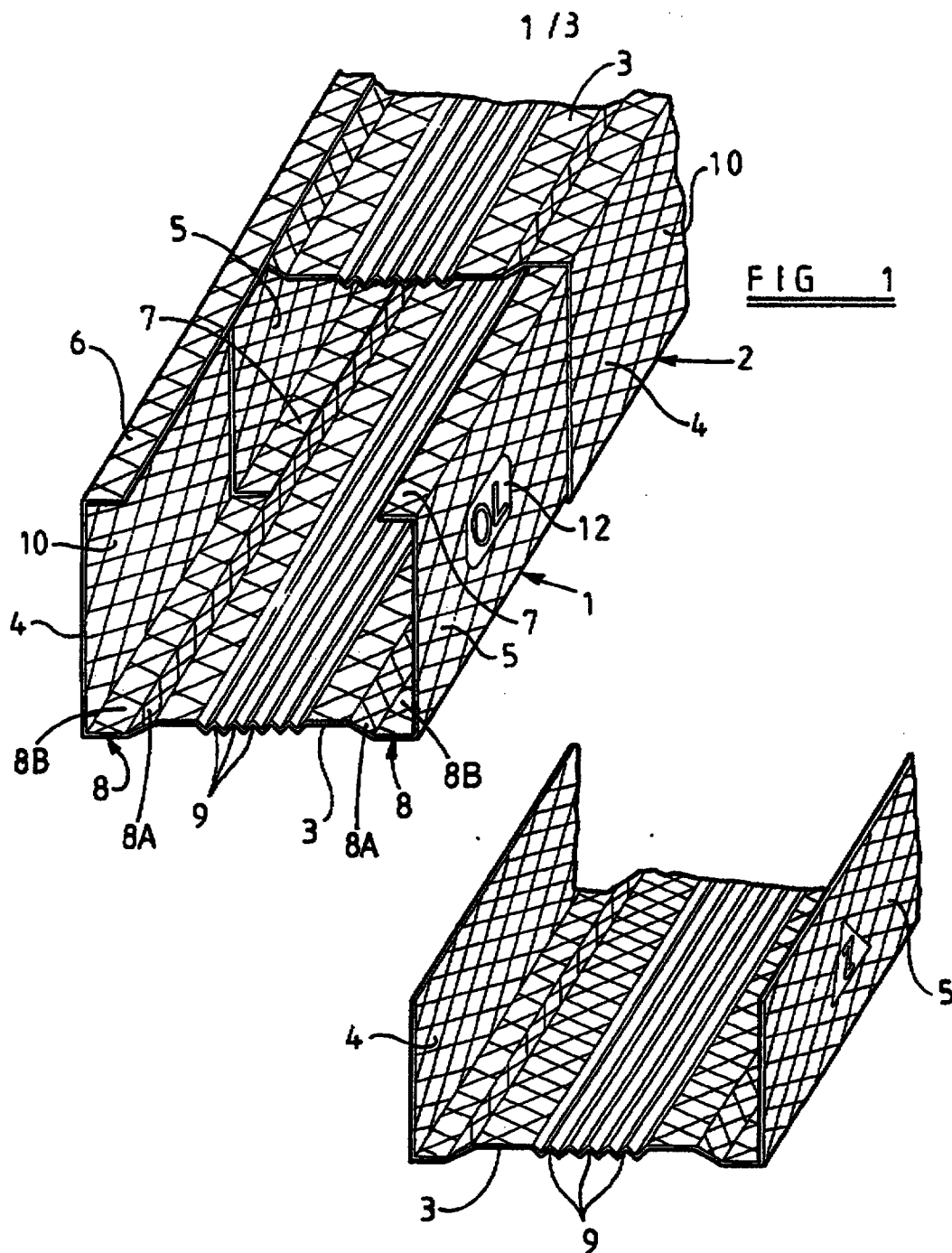


FIG 3

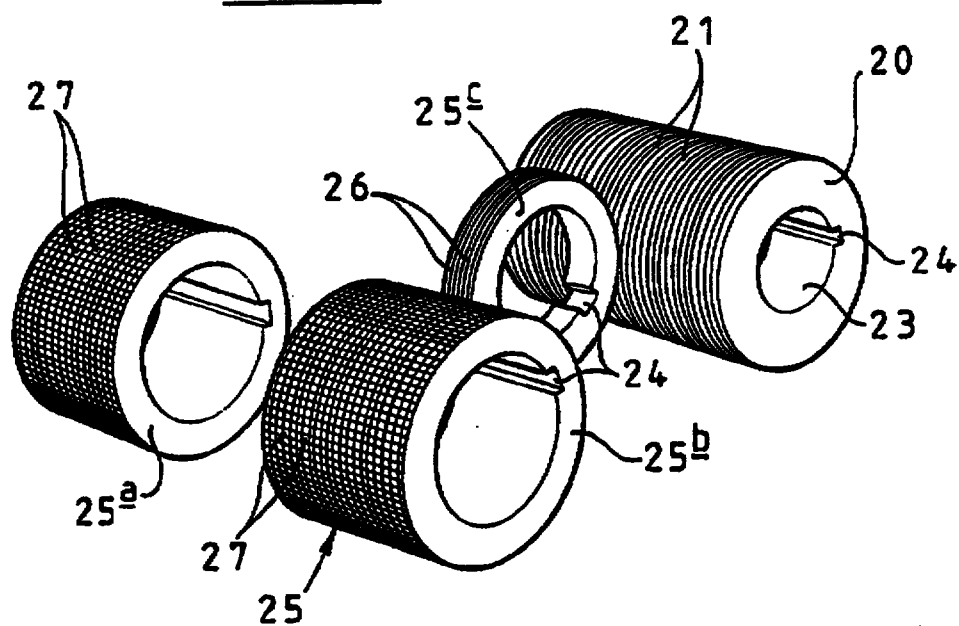
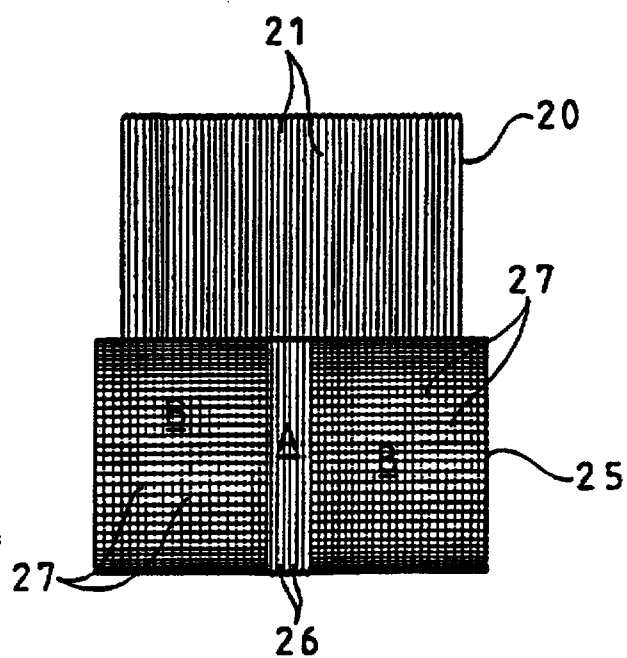
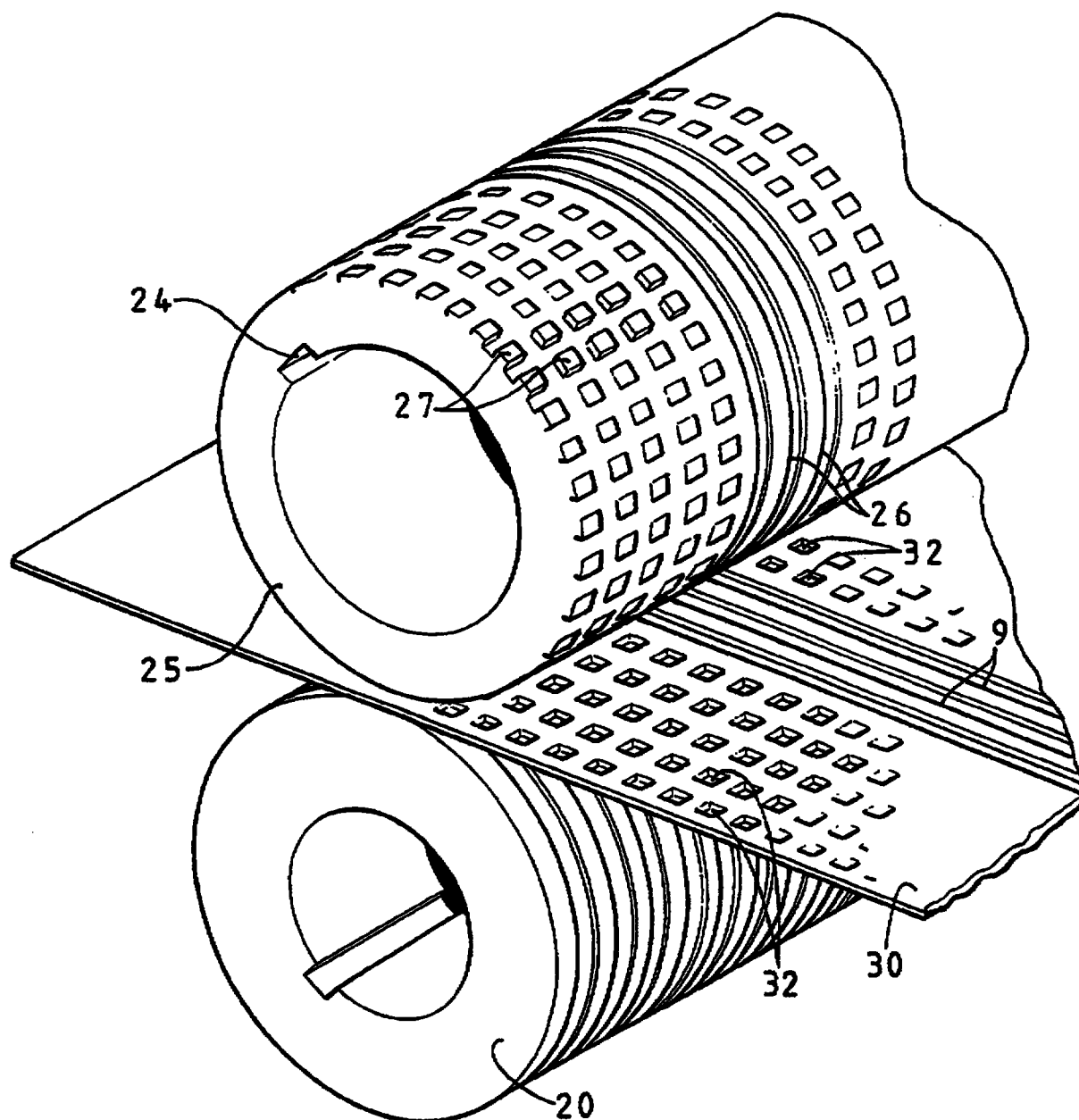
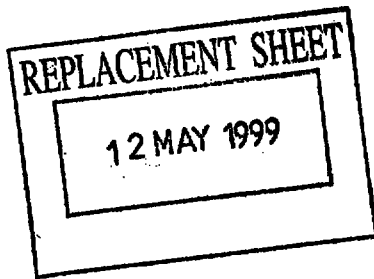


FIG 4



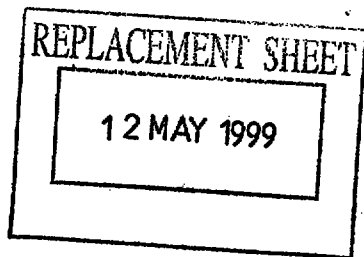
FIG 5



CLAIMS

1. Apparatus for applying surface formations on sheet or strip material (30) characterised by a first roll (20) having an area of circumferential grooving (21), and a second roll (25) of which an area (25c) is provided with circumferential grooving (26) generally complementary to that on the first roll, the second roll also having an area (25a, 25b) in which its circumferential grooving is intersected by grooving generally parallel to the rotational axis of the second roll to create a multiplicity of knurling formations (27), whereby an area of the sheet or strip passed between the rotating cooperating rolls, in use, is formed with one or more longitudinal grooves (9) and an adjacent knurled area (32).
2. Apparatus according to Claim 1, characterised in that said area of the first roll (20) is formed with parallel identical circumferential grooves (21).
3. Apparatus according to Claim 2, characterised in that said grooves (21) are equi-spaced.
4. Apparatus according to any one of Claims 1 to 3, characterised in that the second roll (25) has at least two rotationally interconnected parts, one of which (25c) has only circumferential grooving (26) and the other (25a; 25b) has a multiplicity of knurling formations (32).
5. Apparatus according to Claim 4, characterised in that the second roll (25) is in three rotationally interconnected parts, of which the one (25c) having only circumferential grooving (26) is disposed between two parts (25a, 25b) having knurling formations thereon.





6. Apparatus according to any one of Claims 1 to 5, characterised in that the second roll (25) is a unitary structure.
7. Apparatus according to any one of Claims 1 to 6, characterised in that the pitch of said grooves generally parallel to the rotational axis of the second roll (25) is such as to result in a divisible whole number of grooves when divided into the circumference of said second roll (25).
8. Apparatus according to any one of Claims 1 to 7, characterised in that the circumferential grooving of the second roll (25) is intersected by grooving parallel to the rotational axis of the second roll.
9. A method of producing surface formations on sheet or strip material characterised by passing the material, in use, between cooperating rolls (20, 25) rotating about generally parallel axes, one of which rolls (20) has an area of circumferential grooving (21) and the other of which has an area (25c) of similar circumferential grooving (26) as well as an area (25a; 25b) in which its circumferential grooving is intersected by grooving generally parallel to the rotational axis of the roll to create a multiplicity of knurling formations, whereby the sheet or strip is formed with one or more longitudinal grooves (9) and an adjacent knurled area (32).
10. A method according to Claim 9, characterised by forming knurled areas (32) respectively at either side of an area containing said longitudinal grooves (9).
11. A sheet or strip to which surface formations have been applied by the apparatus of any one of Claims 1 to 8.



REPLACEMENT SHEET

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12. A sheet or strip on which surface formations have been produced by the method of either of Claims 9 and 10.

13. An elongate structural profile formed from a sheet or strip as claimed in Claim 11 or Claim 12.

14. An elongate structural profile as claimed in claim 13, characterised in that the thickness of a wall thereof measured from the peaks of the grooves (9) and/or from the bottoms of individual knurling formations (32) formed in that wall to a flat face of the wall at the side thereof opposite to the aforesaid peaks or bottoms, is less than twice the thickness of the unformed sheet or strip material.

15. An elongate structural profile comprising a base and at least one side wall extending longitudinally of the base and out of the plane thereof, an area of the base and/or the wall being provided with at least one elongate formation extending generally longitudinally of the profile, at least a major part of the remainder of the surface area of the profile being formed with a multiplicity of localised deformations, characterised in that the thickness of a wall of the profile measured from the peaks of the elongate formations and/or from the bottoms of said localised deformations formed in that wall to a flat face of the wall at the side thereof opposite to the aforesaid peaks or bottoms, is less than twice the thickness of the unformed stock material.

