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(54) Card-clothed elements for textile machines.

(57) The invention relates to card-clothed elements for textile machines of the type having card-clothing "tops" made of metallic wire type card-clothing. In accordance with the invention, the top itself comprises a plurality of strips of metallic wire type card-clothing arranged in a side-by-side array, and the element has a substantially rigid body with a longitudinally extending recess, at least one of the longitudinal edges of the recess being undercut. The shape of the lower part of each of the card-clothing strips is the same as the cross-section of the longitudinally extending recess, and the "top" is slid into the recess through the open end thereof. In this way, the "top" is held in the body of the element, and can only be fitted therein by sliding through the open end of the recess. The recess is closed inwardly after the "top" has been fitted to secure the "top" in the body.

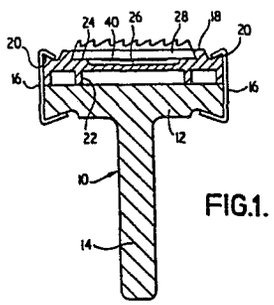

FIG.1.

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"Card-clothed elements for textile machines."

BACKGROUND TO THE INVENTION.

This invention relates to card-clothed elements for textile machines and more particularly, to elements having a card-clothing "top", this "top" being made of metallic wire type card-clothing, that is to say, card-clothing which has teeth formed in one edge of a wire, the rib portion of which provides the "foundation". In recent years, metallic wire type card-clothing has been used for the "tops" of revolving flats, but there are problems in securing the card-clothing "top" to a flat, because it consists of a large number of short wire strips (the length of each strip extending transversely of the flat) arranged in side-by-side array. One solution is to assemble the card-clothing strips in a thin metal channel and then to bend over the edges of the channel flanges to nip the ends of the card-clothing strips. The channel then holds the array of strips and effectively provides a "foundation" which can be secured to the flat body in similar manner to that which is employed when flexible foundation type card-clothing is used as the "top", for example, by the use of clips. Another solution which has been adopted is to secure the roots of the card-clothing strips to an extrusion of plastics material by adhesive, so that the plastics extrusion provides an effective foundation.

The primary object of the invention is to provide a card-clothed element, in which the fitting of a metallic wire type card-clothing "top" is simplified as compared with the known methods described above. Although the invention is particularly applicable to revolving flats, it is to be understood that it is not restricted to flats.

GENERAL FEATURES OF THE INVENTION.

According to one aspect of the invention a method of manufacturing a card-clothed element for use in a carding machine, of the kind which has a substantially rigid body and a card-clothing "top" which itself comprises a plurality of strips of metallic-wire type card-clothing aligned in an array in which the ends of the strips together form longitudinal edges of the array is characterised in that a longitudinally extending recess is formed in the rigid body, the recesses being open at one or both ends, and having at least one longitudinal edge undercut; the card-clothing strips are formed to such dimensions and shape that, as seen in side elevation, at least a lower part of each strip is substantially the same shape and dimensions as the cross-section of the recess and the strips are attached to each other whereby the "top" is manipulable as an entity; the "top" is threaded through an open end of the recess and drawn along the recess until it is contained within the recess, so that the "top" then becomes located in the rigid body by virtue of the interengagement between the longitudinal edges of the recess and the longitudinal edges of the "top" and at least one of the longitudinal edges of the recess is closed inwardly to secure the "top" in the body.

According to another aspect of the invention a card-clothed element for use in a carding machine of the kind which has a substantially rigid body and a card-clothing "top" which itself comprises a pluraliry of strips of metallic-wire type card-clothing aligned in an array in which the ends of the strips together form longitudinal

edges of the array is characterised in that: a longitudinally extending recess is formed in the rigid body, the recess being open at one or both ends, and having at least one longitudinal edge undercut, the card-clothing strips having such dimensions and shape that, as seen in side elevation, at least a lower part of each strip is of substantially the same shape and dimensions as the cross-section of the recess, and the strips are attached to each other; the "top" being located in the recess, with the longitudinal edges of the "top" engaging with the longitudinal edges of the recess, and because of the engagement of the undercut edge or edges of the recess with the longitudinal edge or edges of the "top", the "top" can only be inserted in the body by sliding through an open end of the recess, the "top" being secured in the recess by being nipped by the longitudinal edges of the recess.

In a preferred construction, the recess is of substantially dovetail cross-section, and each end of each card-clothing strip is chamfered to match the angled edges of the dovetail recess. Because the card-clothing strips are attached to each other the "top" is manipulable as an entity. Hence, it is possible to slide to card-clothing array or "top" into the recess through one end of the recess and obviously, this is an easier operation to carry out than that of inserting the strips one at a time. Any method of securing the strips together in the array may be employed, but it is preferred to use a flexible spine, for example as described in the Specification of United States Patent Application Serial No: 304,447.

The card-clothing may be secured in the body of the element by peening the undercut longitudinal edge or

edges of the recess. Alternatively, the body of the element may be so constructed that a clamping part of it is weakened and is deformable in a direction to close the recess, there being means for producing such deformation of the clamping part as will grip the card-clothing array. In another construction, the body has a substantially H-shaped cross-section, the web of the H dividing the undercut recess in the obverse side of the element from a channel in the reverse side of the element, and the construction being such that the card-clothing array is an interference fit in the undercut recess, but by squeezing together the flanges of the reverse side channel, the flanges of the undercut recess are opened sufficiently to allow the card-clothing array to enter the undercut recess, and when the squeezing stress is removed, the body of the element will, by virtue of its own resilience, close the undercut recess into gripping engagement with the card-clothing array.

Several constructions, each in accordance with both aspects of the invention, will now be described by way of examples only, with reference to the accompanying drawings, in which:-

Figure 1 is a transverse section through a flat for use in a revolving flat type carding machine,

Figure 2 is a part transverse section through a flat of alternative construction,

Figure 3 is a part transverse section through a third form of flat,

Figure 4 is a side view of a short section of metallic wire type card-clothing,

Figure 5 is a section through a part of a carding machine associated with a taker-in roller, and

Figure 6 is a transverse section through a stationary flat for a carding machine.

In Figure 1, there is illustrated a cast iron flat 10 of a type conventionally used in revolving flat type carding machines. Essentially, the flat 10 has a flange 12 for the accommodation of the card-clothing "top" and a reinforcing rib 14. The ends of the flat are formed with the usual bevels and nugs, but these are not shown in the drawing. The flat 10 is provided with a pair of steel clips 16, which extend through most of the length of the flange 12, and are used, in the conventional flat construction, to hold the foundation of flexible foundation type card-clothing "top" on to the flange 12. In this arrangement however, there is a special extruded aluminium foundation element 18 which sits on the flange 12 and has sloping lips 20 along its longitudinal top edges for engagement by the clips 16. Thus, the foundation element 18 is secured to the flat 10 by the clips 17 in much the same manner as a flexible foundation is secured, but of course it has a rigid rather than a flexible nature.

Basically, the foundation element 18 comprises a plate, with longitudinally extending ribs 22 on the underside to provide feet for the element. A recess 24 of dovetail shaped cross-section is formed in the top or obverse side of the plate and the bottom of this recess is relieved at 26 leaving longitudinal marginal lands forming the base of the recess. Being an extrusion, the foundation element is of constant cross-section throughout its length and consequently, the ends of the recess 24 are open.

The card-clothing "top" comprises the foundation element 18 and an array of metallic wire type card-clothing

strips 28, one of which is visible in Figure 1. Metallic wire type card-clothing is in itself well known, and as illustrated in Figure 4, comprises a series of teeth 30 cut in a tooth portion 32 of a wire, the wire having a rib portion 34, thicker than the tooth portion, so that when strips of the wire are placed in abutting side-by-side arrangement (or adjacent convolutions abut each other when the wire is coiled around a roller) the teeth of adjacent strips (or convolutions) are spaced from each other in the longitudinal direction. Each of the strips making up the array 28 is cut from the length of card-clothing wire, and as shown in Figure 4, the cuts are made at an angle to produce chamfered edges on each strip. One such strip extends between the cuts indicated at 36 and 38. The length of each card-clothing strip is arranged so that the strip extends across the full width of the recess 24 in the foundation element 18, and the chamfered ends of each strip are cut at the same angle as the inclined front and rear edges of the dovetail shaped recess. Hence, each strip is a close fit in the recess 24 in the position indicated in Figure 1, where the root portion 34 is in the recess 24, but the teeth 30 project above the obverse side of the foundation element 18. It will be appreciated, that because of the undercut nature of the recess 24 and the close fit of the strips 28 into it, the card-clothing strips can only be fitted into or removed from the foundation element by sliding them through one of the open ends of the recess.

The array 28 is constructed as described in the Specification of United States Patent Application Serial No: 304,447. A large number of strips such as that formed between the cuts 36 and 38 is arranged in a side-by-side array and a spine comprising a tape 40 with a self-adhesive surface is affixed to the reverse face of the array 28 (i.e. the face formed by the root portions 34). As described in the

the spine 40 is flexible, but it holds the card-clothing strips in the side-by-side array, so that the arrays form a readily manipulable entity. The length of the card-clothing array is held together by the spine 40 is that required for the complete "top", and it is slid into the recess 24 through one end thereof, the spine 40 being located in the relieved part of the bottom of the recess, so that it does not interfere with the location of the array in the recess.

When the array 28 has been slid into the correct longitudinal position in the recess 24, the overlying edges of the recess are peened on to the chamfered edges of the card-clothing array, so that the latter becomes firmly gripped in the foundation element 18. In this way, the foundation element and the array 28 of card-clothing are formed into a "top" which can be mounted on the flat 10 by use of the clips 16. When the card-clothing becomes worn or damaged, the clips 16 are removed, and the complete "top" replaced by a similarly formed fresh "top".

Because it is formed as an extrusion in aluminium, the foundation element 18 is relatively inexpensive and it does not require machining (other than cutting to length). The card-clothing array is also readily produced and the method of securing it into the foundation element requires no special skills.

Figure 2 illustrates an alternative construction, in which a flat 50 is itself made as an extrusion in aluminium or aluminium alloy. The actual method of producing the complete flat is not relevant to the present invention. Of significance for present purposes is the fact that the flange 52 of the flat is formed with a recess 54 of the same cross-section as the recess 24 described with reference to Figure 1. Since the recess 54 is formed by the

extrusion process, it extends throughout the length of the flat and is open at both ends.

An array of metallic wire type card-clothing of identical construction to that described above with reference to Figure 1, is provided, and it is slid into the recess 54 and secured therein by peening the edges of the recess exactly as described with reference to Figure 1. There is thus provided a flat 50 fitted with a metallic wire type card-clothed "top", but there is no separate foundation element the card-clothing array is secured directly to the flat itself. Whilst the flat shown in Figure 2 is extremely simple to manufacture, since it does not require the foundation element and the clips 16, it suffers from the drawback that when the card-clothing is worn or damaged it is not readily replaceable and the entire flat may have to be discarded. The flat must therefore be regarded as disposable.

Figure 3 shows another form of extruded aluminium flat 60, with a dovetail cross-section recess 64 in its flange 62, and a metallic wire type card-clothing "top" 68 which is almost identical to that shown in Figure 2, but in this construction, the method of securing the card-clothing "top" permits it to be replaced. To this end, a longitudinal slit 70 is provided in the flange 62 of the flat, the top end of the slit 70 opening into the recess 64 adjacent to one side thereof, and the slit penetrating deeply into the flange 62, so that there is only a thin strip of metal 72 below the bottom of the slit. A series of longitudinally spaced holes 74 is formed in the flange 62, each of these holes extending across the slit 70. On the outside of the slit, each of the holes 74 is a clearance hole for a countersunk headed set-screw 76, and on the inside of the slit, it is screw-threaded to receive the shank of the setscrew.

The recess 64 has a width such that the array 68 of card-clothing can be slid into it, but there is only a small

lateral clearance between the array 68 and the longitudinal sides of the recess. After the card-clothing array has been slid into the correct longitudinal location in the flange 62, the screws 76 are tightened and the part of the flange 62 on the outside of the slit 70 is deflected inwardly (the narrow strip of metal 72 providing an effective hinge) thus closing up the slit 70 to some extent and nipping the card-clothing array 68 laterally between the chamfered longitudinal edges of the recess 64. It will be appreciated that since there is only minimal lateral clearance between the array 68 and the edges of the recess 64, it is only necessary to deflect the part of the flange 62 on the outside of the slit 70 by a small amount to lock the array 68 into the flat.

With this construction, when the card-clothing "top" becomes worn or damaged, it is possible to slacken the screws 76 allowing the flange 62 to relax and the card-clothing array can then be slid out of the recess 64 and replaced by a fresh card-clothed array.

Figure 5 shows an assembly which is employed beneath the taker-in roller (not shown) of a carding machine for the purpose of opening the fibres travelling on that roller before they reach the cylinder of the machine. A bed 80 which may in fact form part of the carding machine extends across the underside of the machine below the taker-in roller, and an adapter 82 rests on the bed 80. The adapter 82 is formed as an aluminium extrusion, so that it is of constant cross-section throughout its length, and essentially, the adapter comprises a web 84 curved about the rotational axis of the taker-in roller, and provided with front and rear foot portions 86 and 88 which sit on the bed 80. As illustrated in Figure 5, bolts 90 are passed upwardly through clearance holes in the bed 80, the screwthreaded portions of these bolts engaging in screwthreaded holes in the adapter 82, so that when the bolts 90 are tightened, they pull the adapter firmly on to the bed 80. In this way, the adapter is secured to a

part of the carding machine but it is possible to remove the adapter 82 when necessary, by slackening the bolts 90.

The curved web 84 of the adapter 82 is formed with three parallel longitudinally extending recesses 92, 94 and 96, each of these recesses being similar to the recess 24 described with reference to Figure 1. Obviously, because the recesses 92, 94 and 96 are formed during the extrusion process, they extend throughout the length of the adapter 82 (that is transversely of the carding machine) and they are open at both ends.

Three metallic wire type card-clothing arrays 98, 100 and 102 are fitted respectively into the recesses 92, 94 and 96, and then the longitudinal edges of these recesses are peened on to the card-clothing arrays to secure them in position in the adapter 82. In other words, the method of fitting each of these metallic wire type card-clothing arrays into its respective groove in the adapter 82 is the same as that described with reference to Figures 1 and 2 of the drawings.

The card-clothing arrays 98, 100 and 102 co-operate in use, with the card-clothing on the taker-in roller, so that as the material is passing under the taker-in roller, it is subjected to successive opening actions of the card-clothing arrays 102, 100 and 98, and this has been found to have a beneficial effect on the carding process. When the card-clothing supported by the adapter 82 becomes worn or damaged, then the adapter must be removed, discarded and replaced by a similar adapter fitted with three card-clothing arrays for co-operation with the taker-in roller. The arrangement shown in Figure 5, illustrated the fact that the invention is not restricted to application to revolving flats.

Alternatively, the adapter 82 is machined from, for example, solid steel bar and the card-clothing arrays are retained in the dove-tailed recesses either by securing end plates thereto to close the open ends of the recesses

or by other releaseable clamping arrangements. It will be appreciated that this form of adapter 82 could be re-used after replacement of the card-clothing arrays therein.

In addition, it will also be appreciated that a single carding segment having the recesses machined therein could be used instead of the adapter 82 and the bed 80.

Another kind of flat for use in a carding machine is illustrated in Figure 6. In fact, this is intended to be a stationary flat, and a plurality of such flats are arranged in the carding machine around part of the periphery of the carding cylinder, each of the flats lying tangential to the cylinder, The stationary flats perform the same function as the revolving flats, but in modern high speed carding, by using card-clothing having relatively small teeth for the "tops" it is possible to employ stationary flats, because waste material does not rapidly build up on the flats. From time to time, it is necessary to remove the stationary flats and clean them.

In the construction illustrated in Figure 6, a flat 130 is formed as an aluminium or aluminium alloy extrusion, so that it is of constant cross-section throughout its length. Essentially, the flat comprises a plate 132 in which there is formed a recess 134 of dovetail shaped cross-section relieved at 136, as described with reference to the construction illustrated in Figure 1. Furthermore, an array 138 of metallic wire type card-clothing similar to the array 24, is fitted into the dovetail-shaped recess 134. It will be noted, that the construction provides a pair of longitudinally extending strips 140 and 142 along the front and rear edges of the recess 134.

The flat is also formed with a pair of depending legs 144 and 146, and these legs are used for mounting the flat on the carding machine. For present purposes, the flat can thus be considered to be of generally H-shaped cross-section the uprights of the H comprising each of the

legs 144 and 146 with its upward extension strip 140 or 142, and the horizontal crosspiece of the H being provided by the plate section 132 of the flat.

The width of the card-clothing array, which is of course determined by the length of the individual card-clothing wire strips, is very slightly greater than the width between the strips 140 and 142, so that the array 138 is an interference fit in the recess 134. Clearly therefore, it is not possible to fit the array 138 into the flat, without deforming the flat. Now by applying a compressive force to the legs 144 and 146 (in the direction of the arrows A) the uprights of the H cross-section are caused to deflect about their connection with the crosspiece 132, and as a result, each of the strips 140 and 142 is moved outwardly in the direction of the arrows B. It will be appreciated, that the movement of the strips 140 and 142 in the direction of the arrows B need only be sufficient to allow the card-clothing array 138 to be inserted into the recess 134 by sliding it in from one end. Once the card-clothing array is in the correct longitudinal location, the compressive force applied to the legs 144 and 146 is relaxed, and the inherent resilience of the flat, causes the legs 144 to move apart, and the strips 140 and 142 to move towards each other (i.e. in the opposite directions to the directions of the arrows in Figure 6). This has the effect of clamping the card-clothing array, which thereby becomes secured in position.

The method of clamping the card-clothing array illustrated in Figure 6, could be applied to revolving flats.

In the examples illustrated in Figures 1, 2, 3, 5 and 6, it is assumed that the card-clothing array employs a spine in the form of a flexible tape having a self-adhesive surface. It is to be understood however, that any of the methods of providing a spine described in the Specification of United

States Patent Application Serial No: 304,447 could be employed with any of the constructions illustrated in the drawings of the present application.

1. A method of manufacturing a card-clothed element for use in a carding machine of the kind which has a substantially rigid body and a card-clothing "top" which itself comprises a plurality of strips of metallic-wire type card-clothing aligned in an array in which the ends of the strips together form longitudinal edges of the array characterised in that a longitudinally extending recess (24,54,92,134) is formed in the rigid body (18,52, 62,82,130), the recess being open at one or both ends, and having at least one longitudinal edge undercut; the card-clothing strips (28,58,68,98,138) are formed to such dimensions and shape that, as seen in side elevation at least a lower part of each strip is of substantially the same shape and dimensions as the cross-section of the recess and the strips are attached to each other whereby the "top" is manipulable as an entity; the "top"is threaded through an open end of the recess (24, 54, 92, 134) and drawn along the recess until it is contained within the recess, so that the "top" then becomes located in the rigid body by virtue of the internengagement between the longitudinal edges of the recess and the longitudinal edges of the "top" and at least one of the longitudinal edges of the recess is closed inwardly to secure the "top" in the body.

2. A method of manufacturing a card-clothed element according to Claim 1, characterised in that the strips (28,58,68,98,138) are attached to each other by fixing a flexible spine (40) to all of the card-clothing strips.

3. A method of manufacturing a card-clothed element according to Claim 1 or Claim 2, characterised in that the inward closure of the edge or edges of the recess is obtained by peening at least one undercut longitudinal edge of the recess (24,54,92,134) after the "top" has been located in the body.

4. A method of manufacturing a card-clothed element according to Claim 1 or Claim 2, characterised in that a clamping part of the body is weakened (70) so that it is deformable in a direction to close the cross-section of the recess, and the inward closure is obtained by deforming this weakened part of the body.

5. A method of manufacturing a card-clothed element according to Claim 1 or Claim 2, characterised in that the body (130) is made of substantially H-shaped cross-section, in which the recess (134) is at one side of the web (132) of said H cross-section and a longitudinally extending channel is formed at the other side of the web (132) of said H cross-section the "top" (138) being a slight interference fit in the recess (134), and including the further step of squeezing together the flanges (144,146) on the sides of the channel to cause the flanges (140,142) on the sides of the recess (134) to open; carrying out the threading and drawing of the "top" (138) into and along the recess(134) whilst the recess is thus expanded, and then releasing the squeezing force on the flanges (144,146) of the channel to allow the recess to contract into gripping engagement with the "top" (138).

6. A card-clothed element for use in a carding machine of the kind which has a substantially rigid body and a card-clothing "top" which itself comprises a plurality of strips of metallic-wire type card-clothing aligned in an array in which the ends of the strips together form longitudinal edges of the array characterised in that a longitudinally extending recess (24,54, 92,134) is formed in the rigid body (18,52,62,82,130) the recess being open at one or both ends, and having at least one longitudinal edge undercut; the card-clothing strips having such dimensions and shape that, as seen in side elevation, at least a lower part of each strip is of substantially the same shape and dimensions as the cross-section of the recess, and

the strips are attached to each other; the "top" being located in the recess with the longitudinal edges of the "top" engaging with the longitudinal edges of the recess, and because of the engagement of the undercut edge or edges of the recess with the longitudinal edge or edges of the "top" the "top" can only be inserted into the body (18,52, 62,82,130) by sliding through an open end of the recess (24,54,92,134) the "top" being secured in the recess by being nipped by the longitudinal edges of the recess.

7. A card-clothed element according to Claim 6, characterised in that all the plurality of card-clothing strips (28,58,68,98, 138) are attached to a flexible spine (40).

8. A card-clothed element according to Claim 6 or Claim 7, characterised in that the "top" is secured in the body by at least one longitudinal edge of the recess (24,54) having been peened to produce the nipping of the "top".

9. A card-clothed element according to Claim 6 or Claim 7, characterised in that a clamping part of the body (62) is weakened (70) so that it is deformable in a direction to close the cross-section of the recess and means (76) are provided for controlling the deformation of said clamping part.

10. A card-clothed element according to Claim 6 or Claim 7, characterised in that the recess (24,54,92,134) is of substantially dovetail cross-section, and the rib portion (34) of each strip of card-clothing has its ends chamfered (36,38) to match the angled edges of the dovetail recess.

11. A card-clothed element according to Claim 6 or Claim 7, characterised in that the body (130) is of substantially H-shaped cross-section, the recess (134) lying at one side of the web (132) of said H cross-section and a longitudinally extending channel defined by a pair of flanges (144,146) lying at the other side of the web, the "top" being a slight interference fit in the recess (134), but the design of the body (130) permitting opening of the recess (134) to an extent which allows the "top" to be fitted therein when a compressive force is applied squeezing the flanges (144,146) of the channel towards each other.

12. A card-clothed element according to Claim 6 or Claim 7, characterised in that the body (10,50,60) is generally of T-shaped cross-section and the recess is formed in the cross-piece of the T.

13. A card-clothed element according to Claim 6 or Claim 7, characterised in that the body is a bed (82) having a concave surface for location concentric with a card-clothed roller and a plurality of longitudinally extending recesses (92,94, 96) is formed in the concave surface, there being a "top" in each of the plurality of recesses.

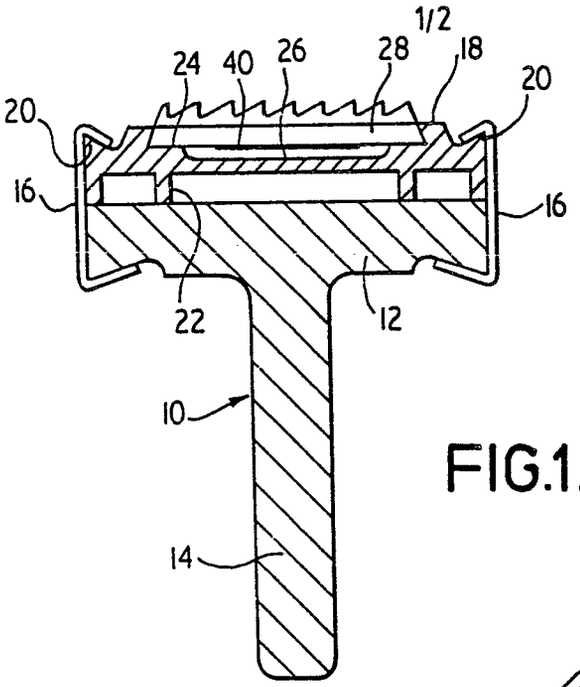

FIG.1.

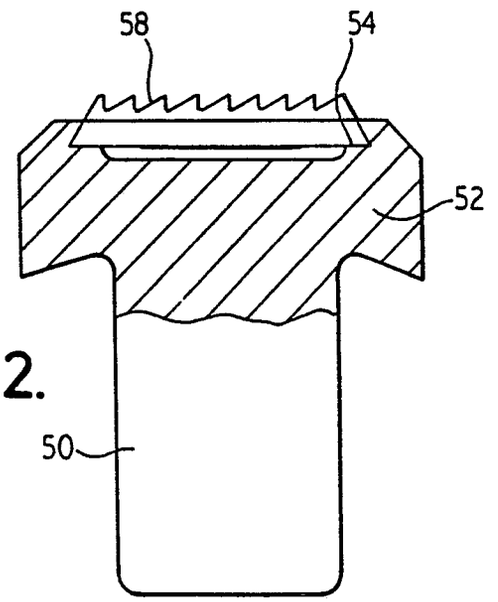

FIG.2.

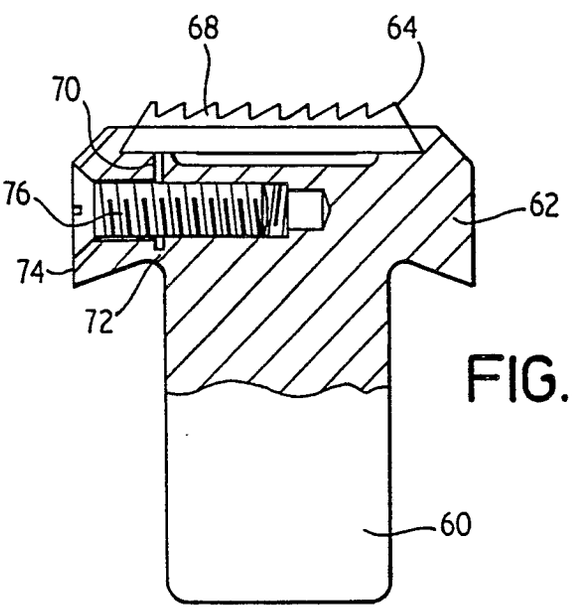

FIG.3.

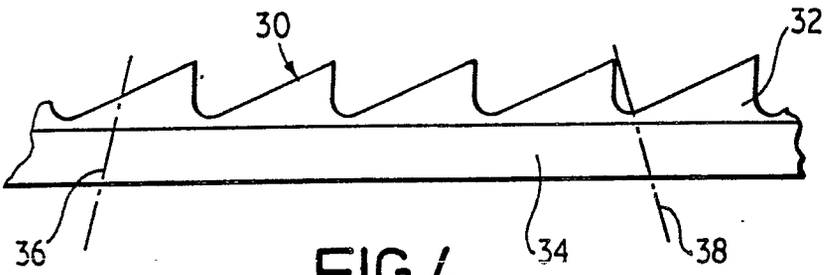

FIG.4.

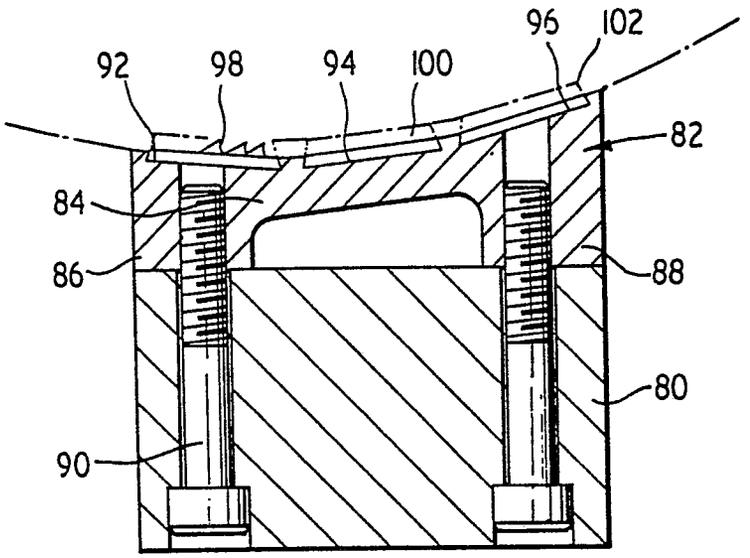

FIG.5.

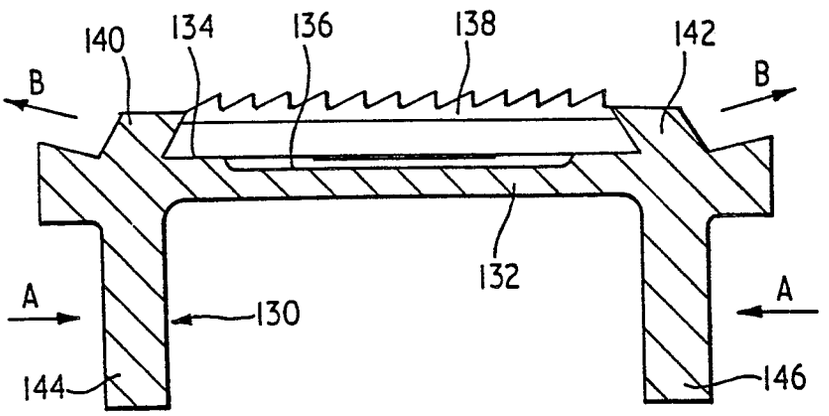

FIG.6.

European Patent Office

EUROPEAN SEARCH REPORT

0067600
Application number

EP 82 30 2779

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)
X	DE-A-2 128 620 (FA.WOLTERS, P.) *Pages 8-10; figures 1-4*	1,3,6, 8,10	D 01 G 15/24 D 01 G 15/92
Y	US-A-4 221 023 (HENDERSON, W.E. et al.) *Column 2, lines 47-68*	2,7,12	
A	DE-C- 552 414 (NOLL, E.)		
A	DE-C- 52 874 (WILKINSON, F.)		

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

D 01 G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17-09-1982	MUNZER E.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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