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(54) **EQUIPMENT FOR PROCESSING AT LEAST ONE STRIP OF FILTER MATERIAL IN THE TOBACCO INDUSTRY**

EINRICHTUNG ZUR VERARBEITUNG WENIGSTENS EINES FILTERMATERIALSTREIFENS IN DER TABAKINDUSTRIE

ÉQUIPEMENT POUR TRAITER AU MOINS UNE BANDE DE MATÉRIAU FILTRANT DANS L'INDUSTRIE DU TABAC

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## Description

### Technical Field

**[0001]** The present invention relates to equipment for processing at least one strip of filter material in the tobacco industry.

### Background Art

**[0002]** The prior art embraces equipment for processing a strip of filter material fed along a predetermined path and caused, as it advances along the path, to undergo a succession of processing steps before being directed into a filter making machine.

**[0003]** Such an equipment is disclosed e.g. in US-A-5733234.

**[0004]** Generally speaking, these steps will consist in a longitudinal and/or transverse pulling or stretching operation, and a step of treating the strip with additive materials.

**[0005]** The aforementioned pulling or stretching operation is accomplished using pairs of rollers, each composed typically of a threaded roller and an anvil roller.

**[0006]** It has been found that the constituent fibres of the strip can suffer damage and rupture in the course of these longitudinal and/or transverse pulling or stretching operations, with the result that the filtration properties of the finished filters are adversely affected.

### Disclosure of the Invention

**[0007]** The object of the present invention is to provide equipment for processing at least one strip of filter material, such as will be unaffected by the drawbacks mentioned above.

**[0008]** The stated object is duly realized in equipment according to the present invention for processing at least one strip of filter material, in the tobacco industry, as characterized in one or more of the claims appended.

### Brief Description of the Drawings

**[0009]** The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- figure 1 is a schematic front view of equipment for processing a strip of filter material;
- figure 2 shows a detail of figure 1, viewed from the side and partly in section;
- figures 3, 4 and 5 show a detail of figure 2, enlarged and in three different embodiments;
- figure 6 shows a detail of figure 2, enlarged and in a further embodiment, which is not within the scope of the invention;
- figure 7 shows a detail of figure 2, enlarged and under operating conditions;

- figure 8 is a schematic plan view of equipment for processing two strips of filter material.

### Detailed description of the preferred embodiments of the invention

**[0010]** With reference to figure 1, numeral 1 denotes equipment, in its entirety, for processing a strip 2 of filter as used in the tobacco industry, interposed between a feed unit 3 supplying the strip 2 and a filter maker, or filter assembly section, represented schematically as a block denoted 4.

**[0011]** The feed unit 3, the equipment 1 and the section denoted 4 constitute interoperative parts of a filter maker which, with the exception of the equipment 1 disclosed, is of familiar type and therefore neither illustrated nor described in detail.

**[0012]** Proceeding along the feed direction F followed by the strip 2, the equipment 1 comprises a pair of guide rollers 5 and 6 combining in operation one with another, and next in sequence, along a processing path denoted P, means denoted 7, in their entirety, by which the strip 2 is stretched and pulled longitudinally and/or transversely. Further along, the equipment 1 comprises treatment means 8 by which additives such as a plasticizing compound are applied to the strip 2 of filter material.

**[0013]** Lastly, numerals 9 and 10 denoted two further guide rollers by which the strip 2 is directed toward the filter maker 4.

**[0014]** As illustrated in figure 2, the longitudinal and/or transverse stretching and pulling means 7 include at least one pair of rollers comprising a top roller 11 of which the axis 11a is disposed transversely to the processing path P, and an anvil roller 12 of which the axis 12a lies parallel to the former axis 11a.

**[0015]** The upstream guide rollers 5 and 6, the processing rollers 11 and 12 and the downstream guide rollers 9 and 10 combine to provide means by which the strip 2 is fed along the processing path P.

**[0016]** Also illustrated in figure 1 is a second pair of stretching and pulling rollers comprising a roller 13 of which the axis 13a is disposed transversely to the processing path P, and an anvil roller 14 of which the axis 14a lies parallel to the former axis 13a.

**[0017]** In practice, the equipment 1 might incorporate any number of paired stretching and pulling rollers.

**[0018]** Referring to figures 2, 3 and 4, and in particular to the pair of rollers denoted 11 and 12, the outer cylindrical surface of the top roller 11 presents a helical thread 15, whilst the anvil roller 12 is faced with resilient material.

**[0019]** Viewed on a radial section of the roller 11, as in figures 3 and 4, the helical thread 15 describes a sinuous profile 16, with each turn presenting a crest portion denoted 17, compassed between two roots 18 connected to the crest portion 17 by way of relative flanks 19.

**[0020]** The crest portions 17, which are offered in contact to the strip 2 of filter material and identifiable thus as active portions, appear essentially flat and are merged

with the flanks 19 by way of respective rounded portions 20.

**[0021]** Importantly, the aforementioned portions 20 are incorporated in such a way as to lie substantially tangential to the active portion 17 at all points.

**[0022]** The portions 20 in question will present a preferably constant radius of curvature, although the radius of curvature might also be variable.

**[0023]** In the example of figure 3, the ratio between the size of the active portion 17, denoted D, and the pitch p of the helical thread 15, denoted 21, is nominally 0.25 and more broadly might be between 0.22 and 0.28.

**[0024]** In the example of figure 4, the ratio between the size D of the active portion 17 and the pitch 21 of the helical thread 15 is nominally 0.5, and more broadly might be between 0.48 and 0.53.

**[0025]** In the example of figure 5, the ratio between the size D of the active portion 17 and the pitch 21 of the helical thread 15 is nominally 0.75, and more broadly might be between 0.72 and 0.78.

**[0026]** In the example of figure 6, which is not within the scope of the invention, the active portions 17 are merged with the flanks 19 by way of rounded portions 20 and present an arcuate profile.

**[0027]** Likewise in figure 6, the same considerations apply as for the embodiments illustrated in figures 3, 4 and 5, in terms of the ratio between the size D of the active portion 17 and the pitch 21 of the thread.

**[0028]** With the equipment 1 in operation, referring in particular to figures 1, 6 and 7, the strip 2 advances in the feed direction F, drawn forward at least by the first stretching and pulling rollers 11 and 12. The advancing strip 2 is subjected by the thread 15 of the top roller 11 to a longitudinal and transverse stretching action.

**[0029]** As discernible from figures 6 and 7, the strip 2 of material passing between the threaded roller 11 and the roller 12 of resilient material will be deformed, but without suffering any damage, and in particular without longitudinal splits or cuts occurring, given that the active portions 17 of the thread 15 are devoid of sharp corner edges.

**[0030]** Accordingly, the strip 2 of material emerging from the aforementioned stretching and pulling means 7 will present a more homogeneous and fuller bodied structure.

**[0031]** This also enables the filter maker 4 to turn out filters with a higher coefficient of filtration, per unit of material utilized.

**[0032]** The equipment 1 illustrated in figure 8, similar in every respect to that of figure 1, is designed to process two strips 2 of filter material advancing side by side.

**[0033]** Where two strips 2 are processed, the drive systems of the respective stretching and pulling rollers might operate either independently of one another or in concert.

**[0034]** Importantly, the profiles 16 of the aforementioned helical threads 15 presented by the longitudinal and/or transverse stretching and pulling rollers 11 and 13 will be generated advantageously by a grinding oper-

ation, so as to obtain a precision finish.

## Claims

1. Equipment for processing at least one strip of filter material in the tobacco industry, comprising feed means by which the strip (2) is advanced along a processing path (P), means (7) by which the strip (2) is stretched and pulled longitudinally and/or transversely, consisting in at least one pair of rollers placed on opposite sides of the processing path (P), of which one roller (11) presents a helical thread (15) and the other is an anvil roller (12), also feed means by which the strip is directed toward a filter making section (4), the profile (16) presented by each turn of the helical thread (15), when viewed in section, **including a substantially flat active portion (17) offered in contact to the strip (2) of filter material, characterized in that said active portion (17) is merged with two respective flanks (19) by way of smooth rounded portions (20), thereby ensuring that the strip (2) is not brought into contact with sharp corner edges during operation of the equipment.**
2. Equipment as in claims 1, wherein the rounded portions (20) present a constant radius of curvature.
3. Equipment as in claims 1 to 2, wherein the ratio between the size of the active portion (17) and the pitch (21) of the thread (15) is between 0.22 and 0.28.
4. Equipment as in claims 1 to 3, wherein the ratio between the size of the active portion (17) and the pitch (21) of the thread (15) is between 0.47 and 0.53.
5. Equipment as in claims 1 to 4, wherein the ratio between the size of the active portion (17) and the pitch (21) of the thread (15) is between 0.72 and 0.78.
6. Equipment as in claims 1 to 5, comprising two pairs of stretching and pulling rollers (11, 12; 13, 14) placed along the processing path (P).
7. Equipment as in claims 1 to 6, comprising feed means by which two strips (2) of filter material are advanced along the processing path (P).
8. Equipment as in claims 1 to 7, wherein the profile (16) of the helical thread (15) presented by each of the relative rollers (11; 13) is produced by a grinding operation.

## Patentansprüche

1. Einrichtung zur Verarbeitung wenigstens eines Filtermaterialstreifens in der Tabakindustrie, umfas-

- send Zuführungsmittel, von denen der Streifen (2) entlang eines Verarbeitungswegs (P) vorgeschoben wird, Mittel (7), von denen der Streifen (2) gestreckt und längs und/oder quer gezogen wird, bestehend aus mindestens einem Paar Walzen, die an entgegengesetzten Seiten des Verarbeitungswegs (P) angeordnet sind, wobei eine dieser Walzen (11) ein schraubenförmiges Gewinde (15) aufweist und die andere eine Riffelwalze (12) ist, zudem Zuführungsmittel, mittels derer der Streifen zum Filterherstellungsbereich (4) geführt wird, wobei das Profil (16), das sich bei jeder Umdrehung des schraubenförmigen Gewindes (15) im Schnitt gesehen zeigt, einen im Wesentlichen flachen aktiven Abschnitt (17) einschließt, der in Kontakt mit dem Streifen (2) Filtermaterial geboten wird, **dadurch gekennzeichnet, dass** dieser aktive Abschnitt (17) durch abgerundete Abschnitte (20) mit zwei jeweiligen Flanken (19) vereint ist, was gewährleistet, dass der Streifen (2) während des Betriebs der Einrichtung nicht mit den scharfen Ecken in Kontakt gebracht wird.
2. Einrichtung nach Anspruch 1, wobei die abgerundeten Abschnitte (20) einen konstanten Krümmungsradius aufweisen.
  3. Einrichtung nach Anspruch 1 bis 2, wobei das Verhältnis zwischen der Größe des aktiven Abschnitts (17) und der Steigung (21) des Gewindes (15) zwischen 0,22 und 0,28 beträgt.
  4. Einrichtung nach Anspruch 1 bis 3, wobei das Verhältnis zwischen der Größe des aktiven Abschnitts (17) und der Steigung (21) des Gewindes (15) zwischen 0,47 und 0,53 beträgt.
  5. Einrichtung nach Anspruch 1 bis 4, wobei das Verhältnis zwischen der Größe des aktiven Abschnitts (17) und der Steigung (21) des Gewindes (15) zwischen 0,72 und 0,78 beträgt.
  6. Einrichtung nach Anspruch 1 bis 5, umfassend zwei Paar Streck- und Zugwalzen (11, 12; 13, 14), die entlang des Verarbeitungspfad (P) angeordnet sind.
  7. Einrichtung nach Anspruch 1 bis 6, umfassend Zuführungsmittel, anhand derer zwei Streifen (2) Filtermaterial entlang des Verarbeitungspfad (P) vorgeschoben werden.
  8. Einrichtung nach Anspruch 1 bis 7, wobei das Profil (16) des schraubenförmigen Gewindes (15), das eine jede der entsprechenden Walzen (11; 13) aufweist, durch einen Schleifvorgang hergestellt wird.

## Revendications

1. Équipement pour traiter au moins une bande de matériau filtrant dans l'industrie du tabac, comprenant des moyens d'alimentation par lesquels la bande (2) est avancée le long d'un parcours de traitement (P), des moyens (7) par lesquels la bande (2) est étirée et tirée longitudinalement et/ou transversalement, consistant en au moins une paire de rouleaux placés sur des côtés opposés du parcours de traitement (P), dont un rouleau (11) présente un filetage hélicoïdal (15) et l'autre est un contre-rouleau (12), ainsi que des moyens d'alimentation par lesquels la bande est dirigée vers une section de fabrication de filtres (4), le profil (16) présenté par chaque spire du filetage hélicoïdal (15), vu en coupe, incluant une partie active substantiellement plate (17) placée en contact avec la bande (2) de matériau filtrant, **caractérisé en ce que** ladite partie active (17) est fusionnée avec deux flancs (19) respectifs par l'intermédiaire de parties arrondies (20), garantissant ainsi l'absence de tout contact entre la bande (2) et des arêtes vives pendant le fonctionnement de l'équipement.
2. Équipement selon la revendication 1, dans lequel les parties arrondies (20) présentent un rayon de courbure constant.
3. Équipement selon les revendications de 1 à 2, dans lequel le rapport entre la taille de la partie active (17) et le pas (21) du filetage (15) est compris entre 0,22 et 0,28.
4. Équipement selon les revendications de 1 à 3, dans lequel le rapport entre la taille de la partie active (17) et le pas (21) du filetage (15) est compris entre 0,47 et 0,53.
5. Équipement selon les revendications de 1 à 4, dans lequel le rapport entre la taille de la partie active (17) et le pas (21) du filetage (15) est compris entre 0,72 et 0,78.
6. Équipement selon les revendications de 1 à 5, comprenant deux paires de rouleaux d'étirement et de traction (11, 12 ; 13, 14) placés le long du parcours de traitement (P).
7. Équipement selon les revendications de 1 à 6, comprenant des moyens d'alimentation par lesquels deux bandes (2) de matériau filtrant sont avancées le long du parcours de traitement (P).
8. Équipement selon les revendications de 1 à 7, dans lequel le profil (16) du filetage hélicoïdal (15) présenté par chacun des rouleaux (11 ; 13) correspondants est obtenu par le biais d'une opération de rectification.

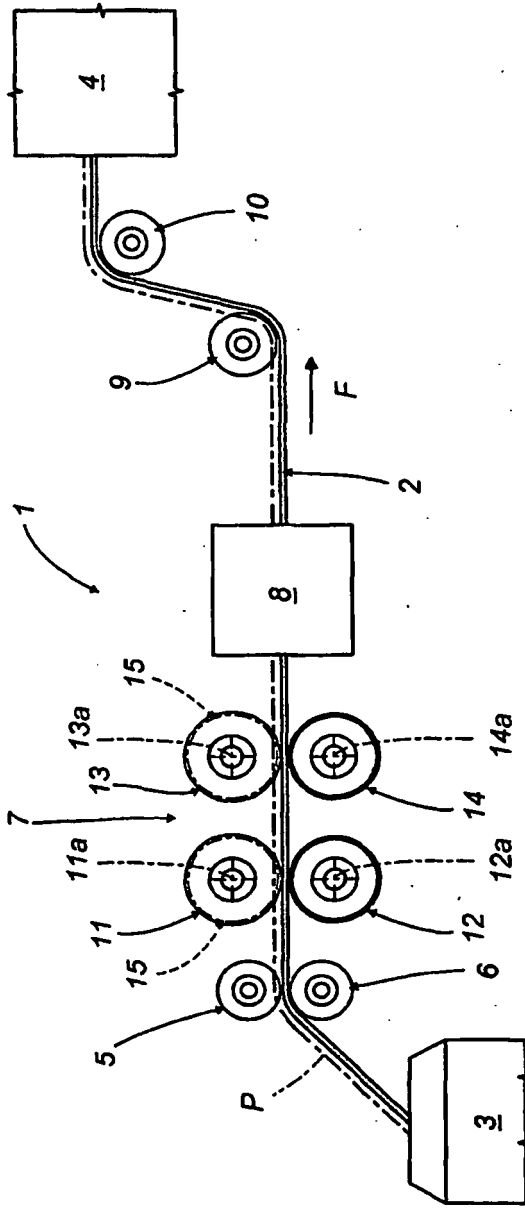


FIG. 1

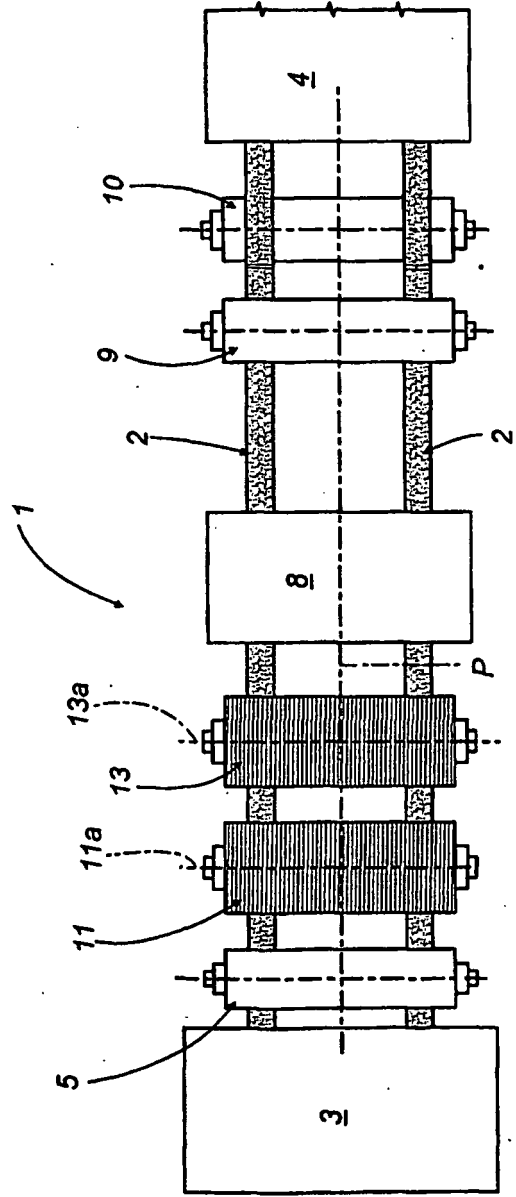


FIG. 8

FIG.2

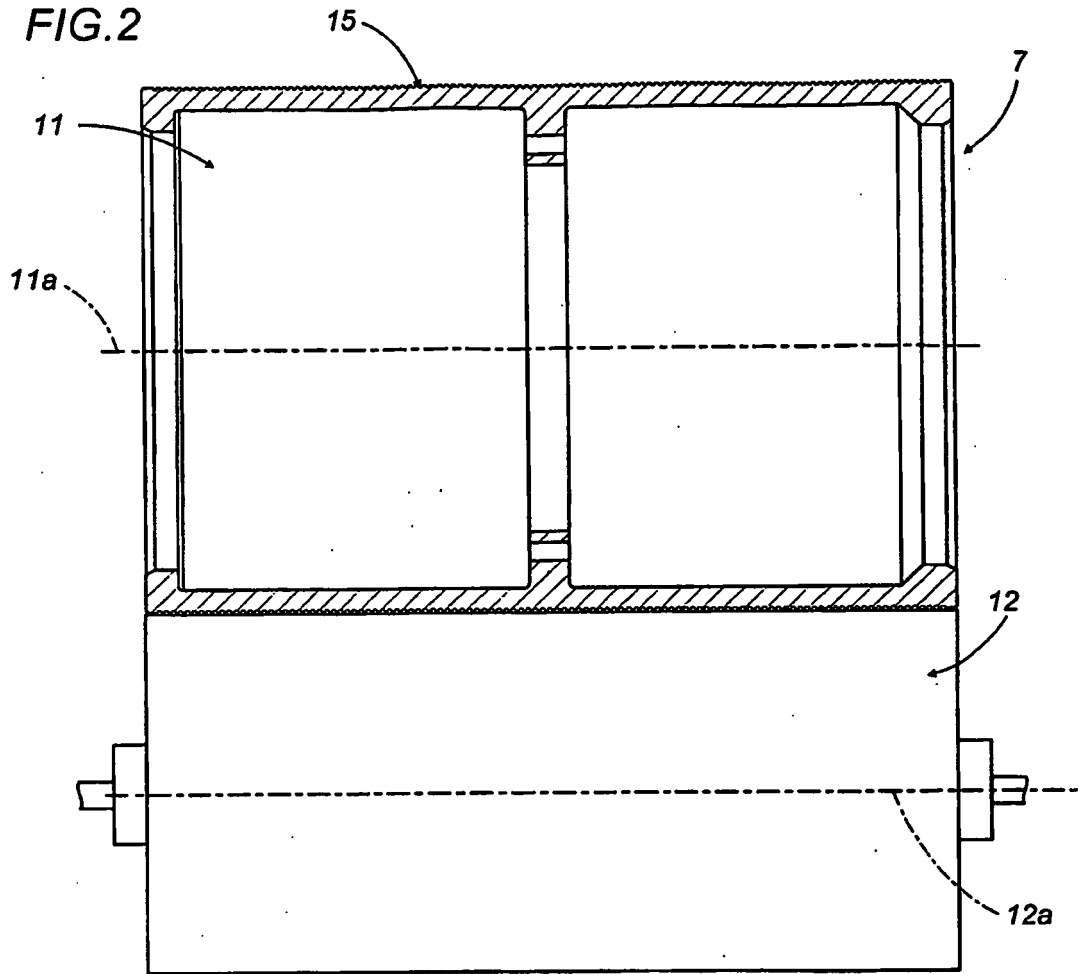


FIG.3

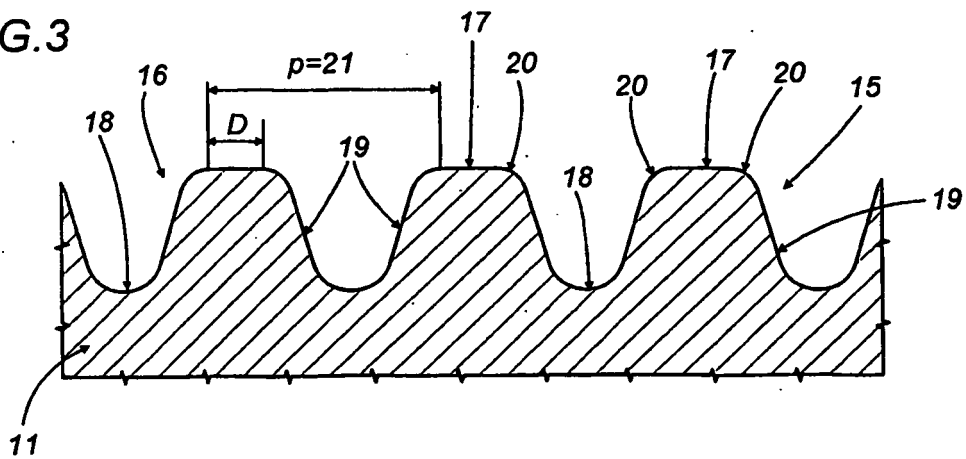


FIG.4

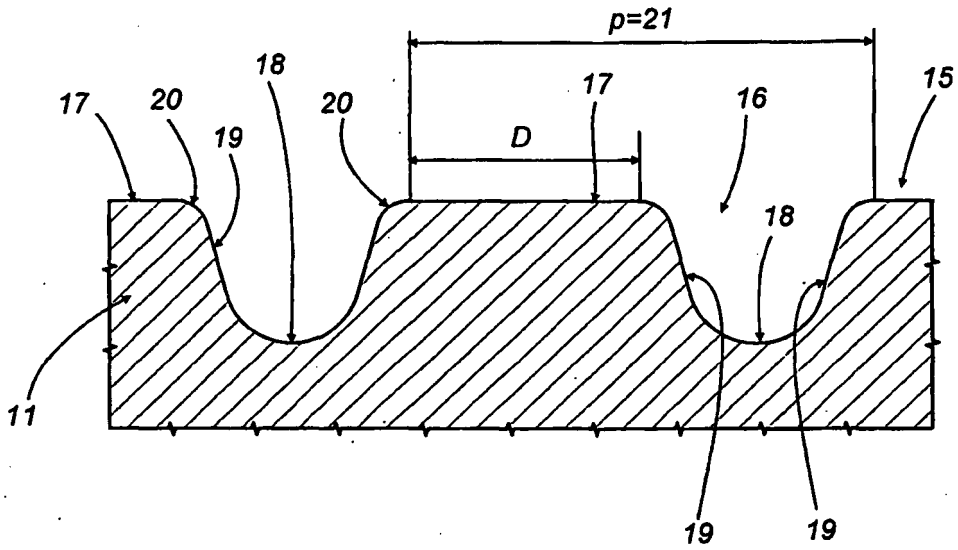


FIG.5

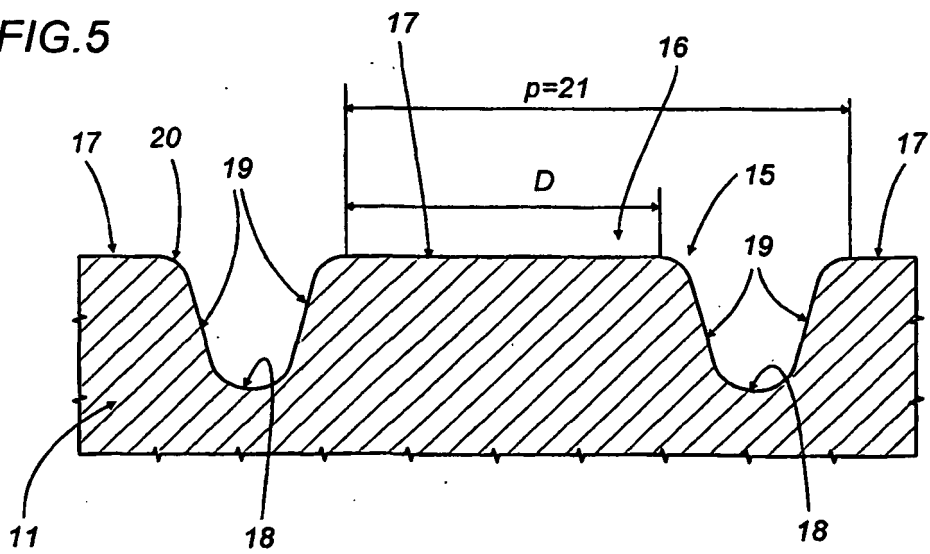


FIG.6

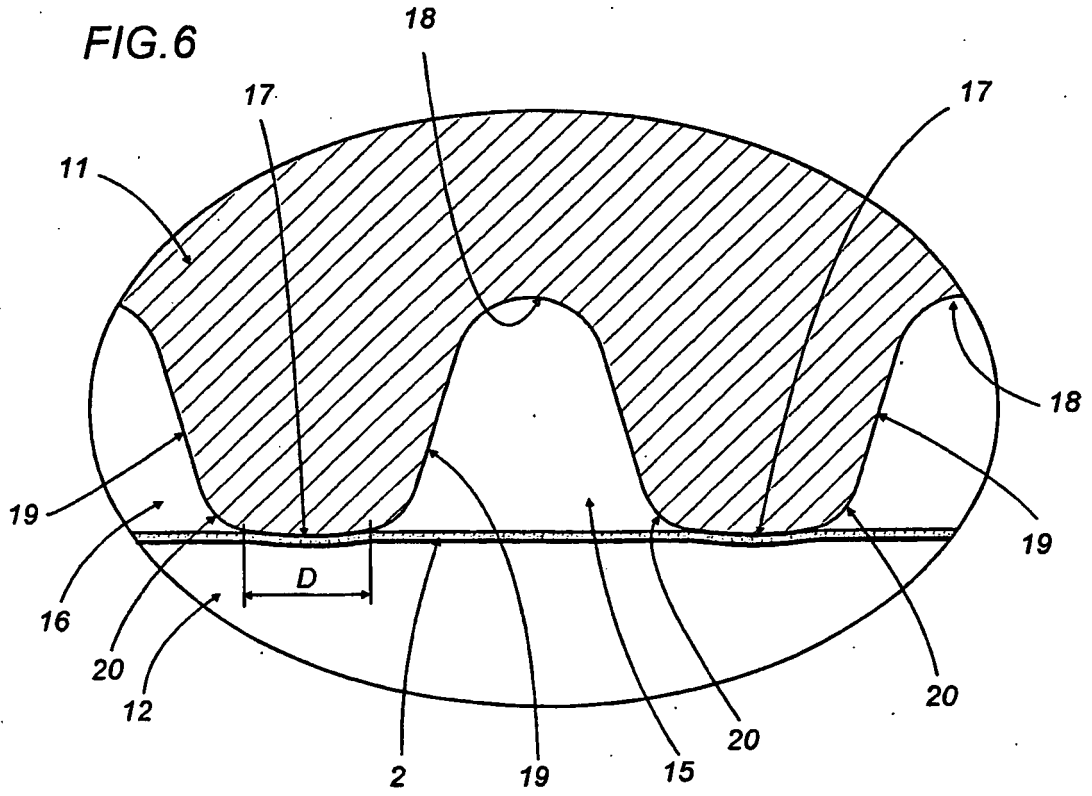
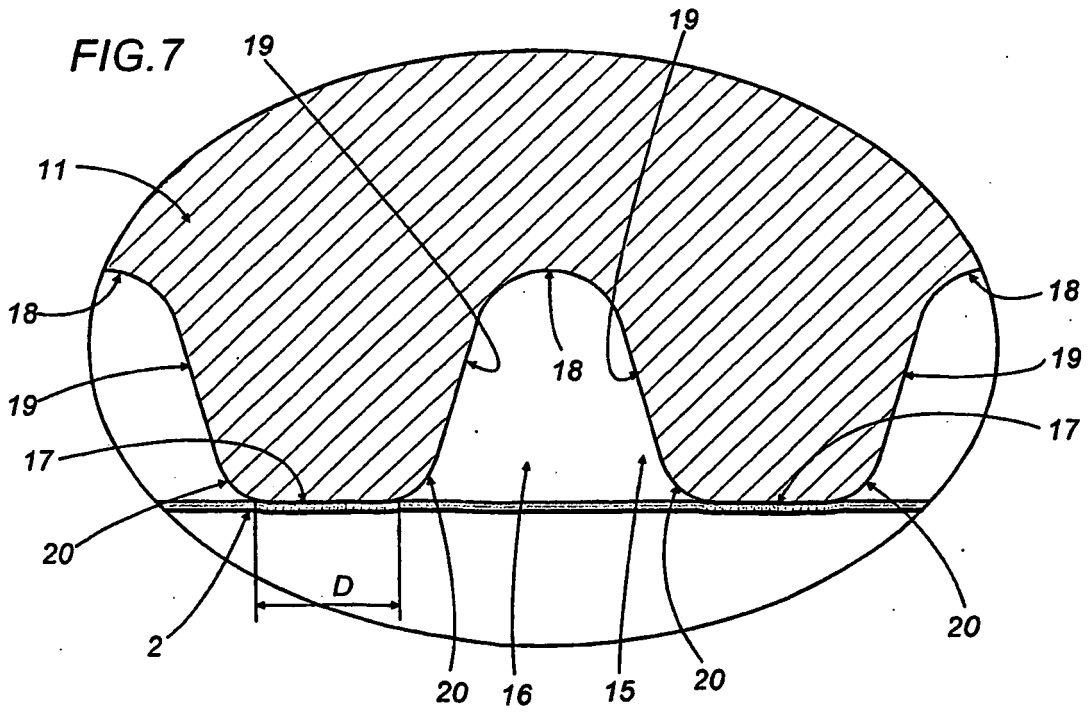


FIG.7



**REFERENCES CITED IN THE DESCRIPTION**

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