



## Description

This invention relates to a roll of wire mesh of the chain-link fencing type formed from successive interengaged wire coils, said roll having the wire coils tightly pushed together in a compact roll and being provided along both opposite borders with a separating strip between the successive windings of the compact roll.

Such a compact roll is known from the French patent No. 2.345.359 of applicant N.V. BEKAERT S.A.

Chain-link fencing wire mesh is formed of a multiplicity of like wire coils or spirals. The wire coils or spirals are interengaged or interlinked with one another on so-called chain-link fencing or weaving machines. Plastic-coated or galvanised steel wire or aluminium wire can be used on the weaving machines. The chain-link web or fabric so produced is generally rolled up into a large diameter roll for storage or transport.

It is already known to use special methods and machines for rolling up such rolls of chain-link fencing wire mesh into compact rolls. Such a method is a.o. described in the British patent No. 1.109.582 and the French patent No. 1.594.975.

The invention described in the British patent No. 1.109.582 learns an improved method and machine for winding up chain-link fencing by mechanically feeding the fencing onto a travelling support and so controlling the speed of the support in relation to the speed at which the fencing is fed towards the support as to condense or compress the fencing in the direction of its travel and so wind it up into a compacted or condensed roll.

The French patent No. 1.594.975 substantially describes the same method as learned in the British patent No. 1.109.582. Moreover, this French patent 1.594.975 also learns that it is possible to twist each pair of successive interengaged wire coils around their common median axis, which leads to a very close approach of each pair of successive interengaged wire coils. By compacting the roll in this special way according to the French patent 1.594.975, the outer surface of the compact roll shows the typical zigzag pattern or accordion form.

Another method of forming such a compact roll showing this typical zigzag pattern or accordion form is described in the U.S.A. patent No. 4.124.183.

It is clear from the cited patent documents that it is already known to use several methods and machines for manufacturing a compact roll of chain link-fencing wire mesh.

A known disadvantage of such a compact roll of chain-link fencing mesh is that the unwinding operation of the compact roll can lead to serious problems, particularly in the case of rolls with a great width ranging between 1,5 m to 4 metres. This is particularly due to the fact that the ends of wire coils of adjacent windings of the roll are hooking into each other or that some wire coils are turning in an undesired direction during the

unwinding operation of the compact roll.

It is already known from the cited French patent No. 2.345.359 of applicant N.V. BEKAERT S.A. to provide such a compact roll along both opposite borders with a separating strip between the successive windings of the roll.

A commonly used material by applicant for this separating strip is a special type of paper with a thickness of at least 0,5 mm.

A first disadvantage of this paper separating strip is that this separating material is not water resisting and can easily be torn to pieces.

Another disadvantage of such a paper separating strip is the fact that it is very difficult to maintain the paper strip into a correct position between the successive windings of the roll. This is the case during the winding up operation of the compact roll, but also during the unwinding operation.

It is an object of the present invention to provide an improved compact roll whereby the separating strip between the successive windings of roll is maintained in a fixed position during the winding up of the roll, but also during the storage and transport of the compact roll, and particularly during the unwinding operation of the roll, whereby the compact roll is expanded again to its normal length.

It is a further object to obtain a compact roll whereby the diameter of the roll is substantially equal over the whole width of the roll.

Other objects and advantages of the invention will be fully understood from the following more detailed description given by way of example with reference to the accompanying drawings in which :

- 35 figure 1 shows a perspective schematic view of the formation of a compact roll of chain-link fencing wire mesh in three consecutive steps I, II and III ;
- figure 2 shows a part of the chain-link fencing in step I or in its normal expanded length ;
- 40 figure 3 shows a part of the chain-link fencing in step II or the result of compressing the chain-link fencing in its longitudinal direction ;
- 45 figure 4 shows a perspective schematic view of applying a stretchable plastic foil strip in a U-form around a border of the chain-link fencing ;
- figure 5 shows a part of the chain-link fencing during the unwinding operation of the compact roll ; and
- 55 figure 6 shows another perspective view of a part of a border of a greatly expanded chain-link fencing with a part of the separating plastic foil strip in a special U-form.

As schematically shown in figure 1, the compact roll 1 of chain-link fencing wire mesh 2 is formed in three

consecutive steps I, II and III.

A chain-link fencing wire mesh 2 is formed in step I by means of a conventional chain-link weaving machine. Weaving machines for manufacturing such wire mesh 2 are generally known and a.o. described in the U.S.A. patent 3.512.760. The wire mesh 2 is formed of a multiplicity of like wire coils or spirals 3a and 3b forming a mesh with rhombic or square openings. The successive wire coils or spirals 3a and 3b are interengaged by the weaving machine. When the formed wire mesh leaves the weaving machine it is in its normal expanded condition as shown in detail in figure 2.

In step II of figure 1, the fencing wire mesh 2 is fed onto a travelling support (not shown) and the speed of this support is controlled in relation to the speed at which the wire mesh 2 is fed towards the support as to compress the fencing wire mesh 2 in the direction of its travel. By reduction in speed of this support with respect to the speed at which the wire mesh 2 is fed towards the support, the mesh 2 is compressed or condensed in the direction of its length so that the adjacent interengaged wire coils are pushed together, as shown in detail in figure 3. As already mentioned in the preamble of this application, this method of compressing a chain-link fencing wire mesh is clearly described in detail in the British patent No. 1.109.582.

From figures 2 and 3, it is clear that the distance between successive common median axes  $M_1 - M'_1$ ;  $M_2 - M'_2$ ;  $M_3 - M'_3$ , ... of each pair adjacent interengaged wire coils 3a, 3b is greatly reduced.

In step III of figure 1 is shown how the already condensed wire mesh 2 is wound up into the typical zigzag pattern or accordion form 4. This special zig zag form of the outer surface of the compact roll 1 is obtained by twisting each pair of successive interengaged wire coils or spirals 3a and 3b around their common median axis  $M_1 - M'_1$ ;  $M_2 - M'_2$ ; ... during the winding up operation of the roll around its longitudinal axis A - A'. As already mentioned in the preamble of this application, this special method of compact rolling is already long known and a.o. described in the French patent No. 1.594.975 and U.S.A. patent No. 4.124.183.

Figure 1 also shows how at each border 5 of wire mesh 2, a separating strip 6 is guided between the successive windings of the compact roll 1. The strip 6 has e.g. a width of 20 cm, whereby at least a width of 10 cm of the strip 6 is applied against the outer side of the wire mesh 2 with respect to the axis A - A' of the roll 1 and whereby the remaining width of 10 cm of the strip 6 is protruding at the border of the compact roll. In the preferred embodiment, as shown in figure 1, the protruding part of the strip 6 is plied into a substantial U-form around each border 5 of the compressed mesh 2. As already mentioned in the preamble of this application, such a compact roll of chain-link fencing wire mesh provided with a separating strip between the successive windings along both opposite borders of the compact roll is already known from the French patent No.

2.345.359 of applicant N.V. BEKAERT S.A.

According to the invention, the separating strip 6 is made of a highly stretchable plastic foil material and is maintained in place between the successive windings of the compact roll 1 due to the exerted tension on the strip 6 during the application of the separating strip 6 against each border 5 of the compressed mesh 2. The plastic foil material is supplied on a bobbin 7. The necessary tension for stretching the strip 6 is preferably obtained by applying a braking force on the bobbin 7 and a driving force on the spindle of the roll 1. The exerted tensioning operation on the stretchable plastic foil strip 6 results in a high elongation of at least 30 %, preferably 60 to 100 % or more, over a great part of the width of the strip 6. This high elongation of the applied stretched plastic separating strip 6 results in a certain adhesion or sticking of the applied strip 6 against the border 5 of the mesh 2.

The used plastic foil material according to the invention has a very low thickness ranging between 10 to 70 microns (1 micron = 0,001 mm), preferably between 30 to 50 microns. The width of the plastic foil material strip supplied on a bobbin 7 is ranging between 15 to 50 cm, preferably between 20 to 40 cm.

A plastic foil material which gives very good results for the necessary elongation and additional adhesion is polyethylene. The transparent linear polyethylene, used a.o. for packaging all kinds of food products, can be easily applied against and around the borders of the wire mesh 2. The used linear polyethylene foil is preferably a low density polyethylene. The used plastic foil material can be removed easily without rupture of the foil material. Although, polyethylene is a preferred foil material for the separating strip 6; it is evident that other polymers which have substantially same characteristics for elongation and adhesion can be used for the separating strip 6.

Figure 4 shows a perspective view of applying the stretchable plastic foil strip 6 into a substantially U-form around a border 5 of the mesh 2. Special guiding elements (not shown), such as rolls or plates or the like for bending the strip into the U-form are placed between the bobbin 7 and the mesh 2.

According to the invention, the stretchable plastic foil material strip 6 is permanently or plastically deformed by means of special tools 8 in the areas between the legs 9 and the body 10 of this U-form so that the U-formed strip 6 is permanently fixed onto the border 5 of the condensed wire mesh 2.

Once the winding up operation of the compact roll 1 is finished, the compact roll 1 is maintained in the typical compact accordion form by wrapping helically around the roll over the whole width of the roll several layers of the same plastic foil material as used for the separating strip 6 along the two opposite borders of the finished roll. This packaging or wrapping operation is preferably achieved according to a certain programme so that at both ends or borders of the roll, more layers of the used

foil material fully or partly overlap each other than in the middle of the roll. An important advantage is that the same foil material, such as polyethylene, is used as separating strip for the borders and for packaging the finished compact roll 1.

Another important advantage of the finished compact roll 1 according to the invention is that the diameter of the compact roll is substantially equal over the whole width of the roll because the diameter of the ends of the roll is substantially equal to the diameter of the whole middle of the roll due to the very low thickness of the used separating foil material for the strip 6.

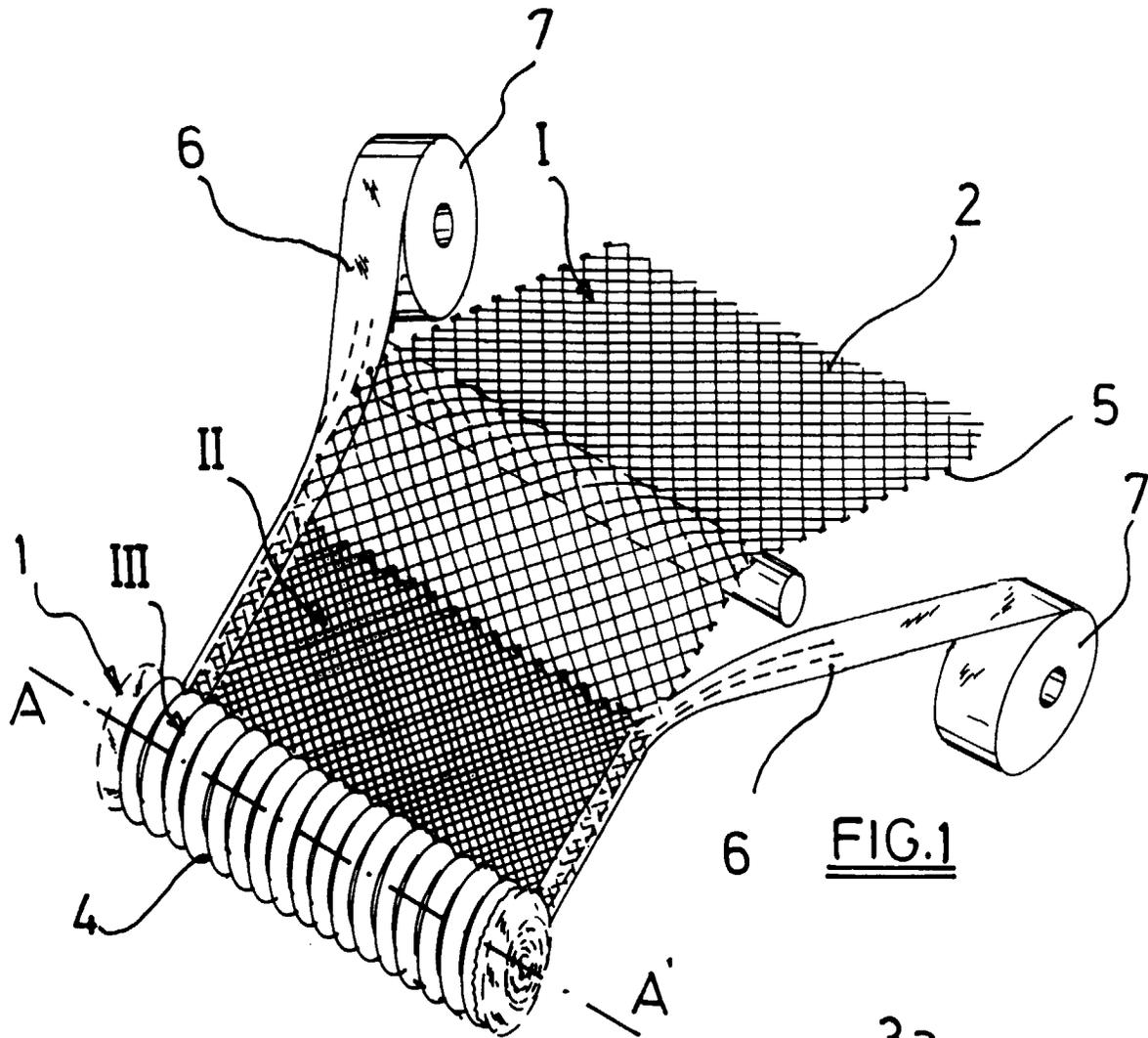
Figure 5 shows a part of the chain-link fencing mesh 2 in a condensed or compressed position during the unwinding operation of the compact roll 1 on the ground. This figure 5 clearly shows that the two separating strips 6 formed into the special U-form are maintained or fixed around each border 5 of the mesh 2 during the unwinding operation of the roll 1 on the ground. This leads to a fixation of all the wire coils or spirals 3a and 3b between the two U-formed strips 6 or it is possible to unwind the whole compact roll 1 in a condensed or compressed position of the mesh on the ground, whereby all the wire coils or spirals 3a and 3b are blocked in a fixed position. It means that the spirals 3a, 3b cannot turn around their longitudinal axis because these spirals 3a, 3b are maintained between both U-formed strips 6. It means that an axial relative displacement of each spiral 3a, 3b is completely eliminated by using these U-formed strips 6.

Figure 6 shows a perspective view of a part of the border 5 of the partly expanded mesh 2 with a corresponding part of the separating strip 6 in the special U-form with legs 9 and body 10. As can be seen from figure 6, the edges between the legs 9 and the body 10 are permanently deformed. This figure 6 tries to show that all the wire coils or spirals 3a, 3b can expand from a rather compressed position to an open position without any axial relative displacement of each spiral 3a, 3b. All the spirals 3a, 3b can only twist along their common median axis  $M_1 - M'_1$ ;  $M_2 - M'_2$ ; ..., but without any axial relative displacement with respect to the mesh 2.

## Claims

1. A roll of wire mesh of the chain-link fencing type formed from successive interengaged wire coils, said roll having the wire coils tightly pushed together is wound into a compact roll and is provided along both opposite borders with a separating strip between the successive windings of the compactly wound roll, characterized in that the separating strip (6) is made of a highly stretchable plastic foil material and is maintained in place between the successive windings of the compact roll (1) due to the exerted tension on the strip during the application of the separating strip.

2. A compact roll according to claim 1, characterized in that the thickness of the plastic foil strip (6) is ranging between 10 to 70 microns.
3. A compact roll according to claim 2, characterized in that the thickness of the plastic foil strip (6) is ranging between 30 to 50 microns.
4. A compact roll according to one or more of the claims 1 - 3, characterized in that the width of the plastic foil strip (6) is ranging between 10 to 60 cm.
5. A compact roll according to claim 4, characterized in that the width of the strip (6) is ranging between 20 to 40 cm.
6. A compact roll according to one or more of the claims 1 - 5, characterized in that the exerted tension on the strip (6) results in an elongation of at least 30 % of the separating plastic foil over a great part of the strip (6).
7. A compact roll according to claim 6, characterized in that the elongation of the applied plastic foil strip is ranging between 60 to 100 %.
8. A compact roll according to one or more of the claims 1 - 7, whereby both opposite borders are provided with a separating strip plied in a substantially U-form around each border of the compacted wire mesh, characterized in that the stretchable plastic foil material of each U-form (6) is permanently deformed in the areas between the legs (9) and the body (10) of the U-form (6).
9. A compact roll according to one or more of the claims 1 - 8, characterized in that the plastic foil strip (6) is made of linear polyethylene.
10. A compact roll according to claim 9, characterized in that the linear polyethylene is a linear low density polyethylene.



6 FIG. 1

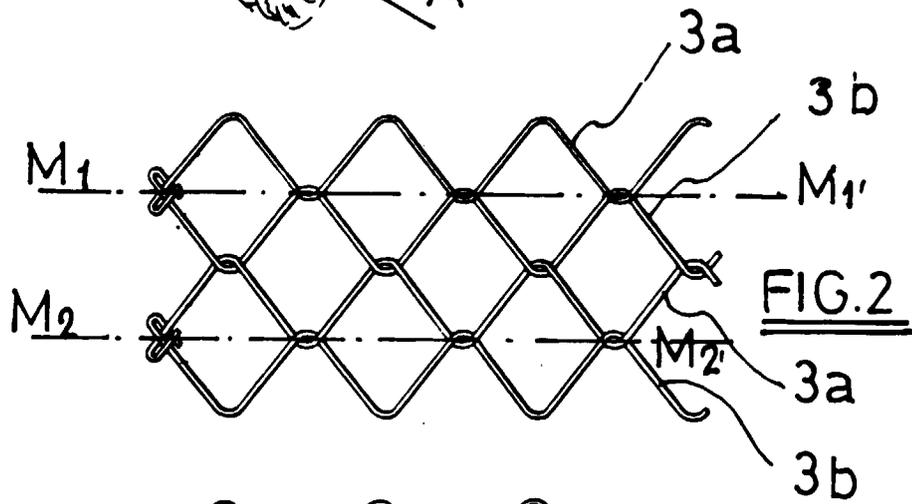


FIG. 2

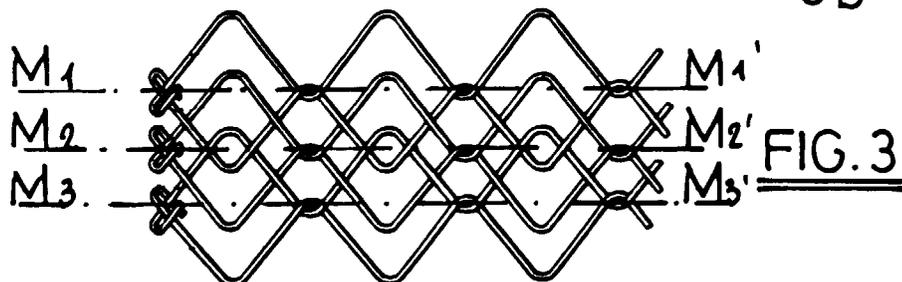
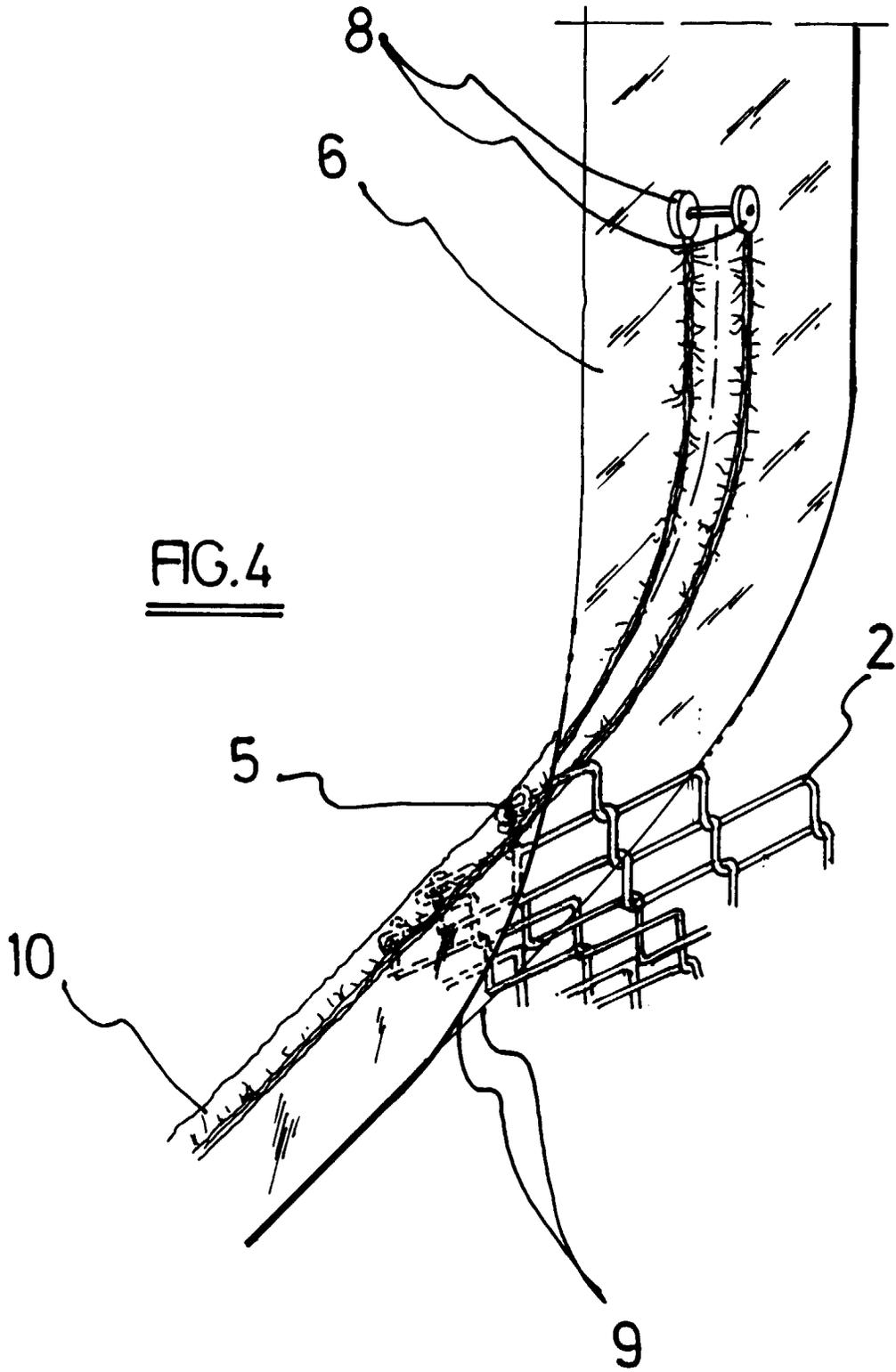


FIG. 3



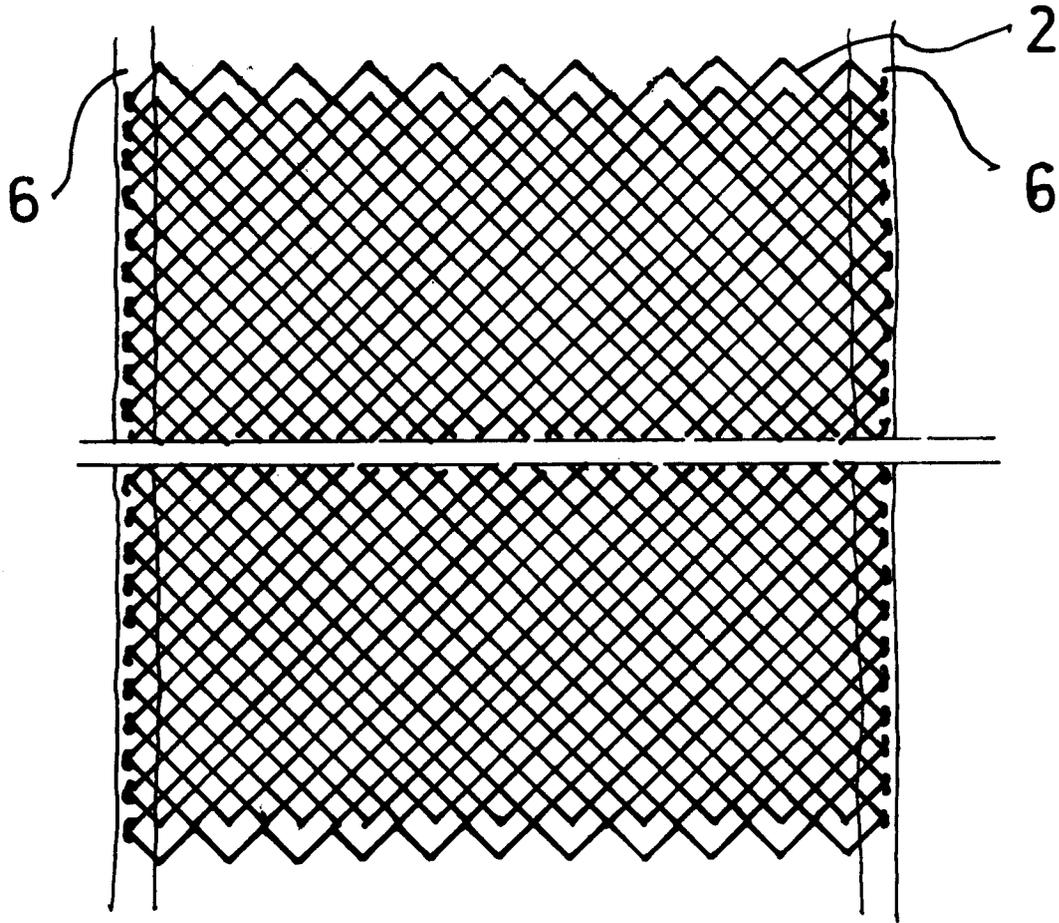


FIG. 5

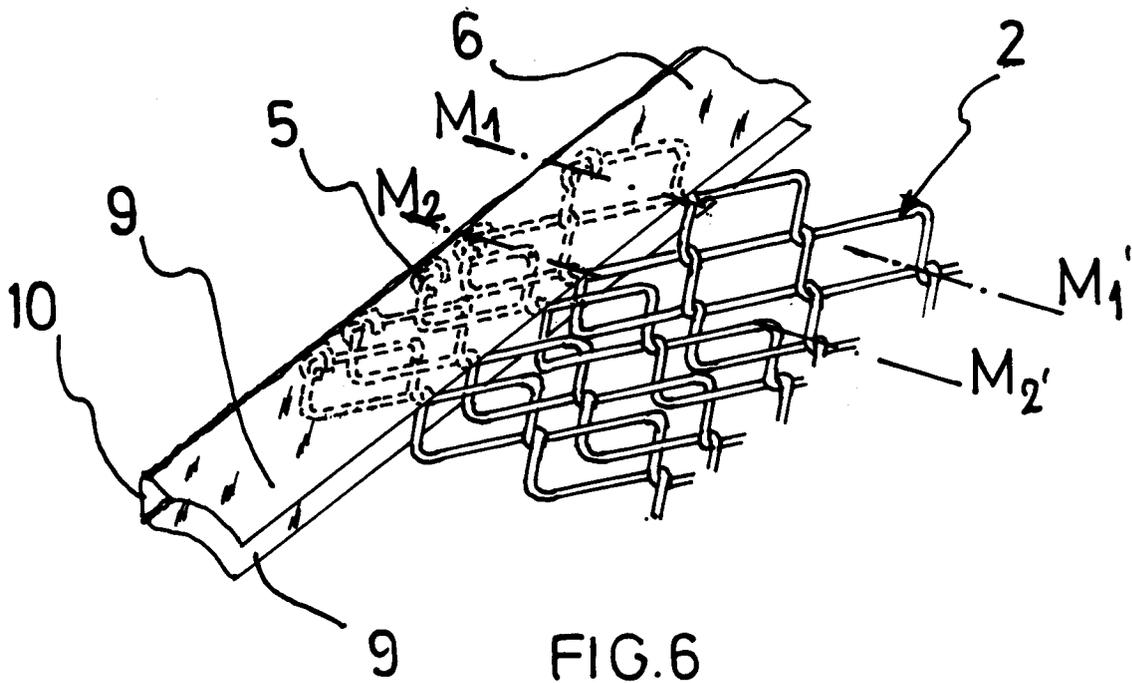


FIG. 6



European Patent Office

EUROPEAN SEARCH REPORT

Application Number  
EP 97 20 0645

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.6)
D,A	FR 2 345 359 A (BEKAERT SA NV) 21 October 1977 * claims 1-7; figures * ---	1-5,8-10	B21F33/00
A	NL 82 750 C (COMPAGNIE GENERALE D'ELECTRICITE S.A.) ---	1,8	
A	DE 29 40 053 A (ROESLER DRAHT AG) 9 April 1981 ---		
D,A	US 4 124 183 A (HERRIG KLAUS ET AL) 7 November 1978 -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B21F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		11 August 1997	Barrow, J
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