(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 356 899 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
09.11.2005 Bulletin 2005/45

(51) Int Cl.[7]: **B26B 13/00**, B26B 13/12

(21) Application number: **03004886.2**

(22) Date of filing: **06.03.2003**

(54) **Metal scissors and production process thereof**

Metallscheren und deren Herstellungsprozess

Ciseaux métalliques et leur procédé de fabrication

(84) Designated Contracting States:
DE GB

(30) Priority: **26.04.2002 JP 2002126478**

(43) Date of publication of application:
29.10.2003 Bulletin 2003/44

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(56) References cited:
WO-A-99/07527
US-A- 5 152 774

EP 1 356 899 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention relates to metal scissors used in a barber shop, a beauty salon and a shop for caring pets such as a dog and a cat and to a production process of the metal scissors.

DESCRIPTION OF THE RELATED ART

[0002] For example, the grips of metal scissors used in a barber shop and a beauty salon are subjected to a variety of surface treatments such as glossing, a hair line finish and plating. Further, recently, metal scissors with plastic insert molded grips or ion plated grips are commercially available.

[0003] However, the grips of all these products feel cold and hard when held in a hand and lack a good fit. Further, they also have a problem that they are liable to be slippery when used by a wet hand.

[0004] To solve these problems, several metal scissors with devised grips have been proposed. However, since all of these metal scissors require separately molded synthetic resin or rubber parts to be attached thereto, they are not suitable for use in a barber shop and a beauty salon where metal scissors with a structurally complicated design are required. Particularly, for an article of this type which is required to make a user feel as if the article were a part of the user's hand, a fit is an important factor which cannot be overlooked, and such an article must be used freely by a user. Further, since a mold is required to form the synthetic resin or rubber molded parts, production of a variety of such metal scissors in small quantities results in relatively high costs and lacks practicability.

[0005] To solve the problems, a first object of the present invention is to provide metal scissors having grips which give a good touch, are not liable to be slippery even when used by a wet hand and are free from the possibility that the surface of a base material is not exposed even when the surface of the grip is abraded or scratched. A second object of the present invention is to provide metal scissors having grips which give an exquisite fit. A third object of the present invention is to provide metal scissors having grips which give a good touch, are not liable to be slippery even when used by a wet hand, are free from the possibility that the surface of a base material is not exposed even when the surface of the grip is abraded or scratched, and are coated with a protective coating film which does not come off easily. A fourth object of the present invention is to provide metal scissors having grips which give an exquisite fit. A fifth object of the present invention is to provide a process capable of mass-producing the above scissors efficiently at low costs.

[0006] WO 99/07527 discloses metal scissors according to the preamble of claim 1, and a process according to the preamble of claim 5.

3. SUMMARY OF THE INVENTION

[0007] To achieve the above objects of the present invention, metal scissors of the present invention have grips each having a titanium coating layer formed on the surface of a base material and a polymer compound coating layer formed on the titanium coating layer, the polymer compound coating layer having excellent abrasion resistance and scratch resistance.

[0008] Further, in the metal scissors of the present invention, the base material in the grip preferably has moderate surface roughness with fine pits and projections on the surface, and the titanium coating layer and the polymer compound coating layer are laminated to such a thickness that does not impair the surface roughness of the base material so as to form fine pits and projections comparable to the surface roughness of the base material, on the surface of the polymer compound coating layer.

[0009] Further, the metal scissors of the present invention preferably comprise a polymer compound foundation layer formed on the titanium coating layer, the foundation layer having excellent adhesion to the titanium coating layer; and said polymer compound coating layer formed on the polymer compound foundation layer.

[0010] In this case, the base material in the grip may have moderate surface roughness with fine pits and projections on the surface, and the titanium coating layer, the polymer compound foundation layer and the polymer compound coating layer are laminated to such a thickness that does not impair the surface roughness of the base material so as to form fine pits and projections comparable to the surface roughness of the base material, on the surface of the polymer compound coating layer.

[0011] Further, a process for producing metal scissors according to the present invention comprises:

a first step of blast-treating the surfaces of base materials in the grips of a pair of scissors parts so as to cause them to have moderate surface roughness with fine pits and projections formed on the surfaces,

a second step of titanium-coating the whole scissors part so as to form a titanium coating layer whose thickness, together with the thicknesses of all other layers to which the titanium coating layer is laminated, does not impair the surface roughness of the base material,

a third step of forming a polymer compound foundation layer on the titanium coating layer in the grip by baking coating, the foundation layer having a thickness which together with the

thicknesses of all other layers to which the foundation layer is laminated does not impair the surface roughness of the base material and also having excellent adhesion to the titanium coating layer,

a fourth step of forming a polymer compound coating layer on the polymer compound foundation layer in the grip by baking coating, the coating layer having a thickness which together with the thicknesses of all other layers to which the coating layer is laminated does not impair the surface roughness of the base material and also having excellent abrasion resistance and scratch resistance, and
a fifth step of joining the pair of scissors parts together.

[0012] The pair of scissors parts in the present invention are made of stainless steel or other known metals. The surface roughness of the base material in the grip is arbitrary. However, in consideration of sense of touch, slipperiness, a fit to a hand, and the like, its lower limit Ry is 12.5, and its upper limit Ry is 50. When the surface roughness is lower than the lower limit, pits and projections are so small that the grip is liable to be slippery, while when it is higher than the upper limit, the pits and projections are so large that the grip irritates skin excessively upon contact and causes pain in a hand. This surface roughness is set at an optimum value according to application purposes as in a barber shop and a beauty salon, individual differences, and other factors.

[0013] The thickness of the titanium coating layer is about 0.8 to 1.2 μm. The color of the titanium coating layer may be any appropriate color in addition to blue, gray, black, gold and a rainbow color.

[0014] The polymer compound foundation layer comprises clear paint such as a polyurethane for a base coat and may be any polymer compound member having excellent adhesion to the titanium coating layer. The thickness of the foundation layer is about 3 to 7 μm, desirably about 5 μm.

[0015] The polymer compound coating layer comprises a synthetic resin material such as a polyurethane resin or an acrylic resin or synthetic rubber and may be any polymer compound having excellent abrasion resistance and scratch resistance. The thickness of the coating layer is about 15 to 25 μm, desirably about 20 μm. The total thickness of the titanium coating layer, the foundation layer and the coating layer when they are laminated together is such a thickness that does not impair the surface roughness of the finely uneven surface of the base material in the grip and allows the surface roughness of the base material to be reflected directly on the surface of the coating layer, i.e., about 19 to 33 μm, desirably about 25 μm.

4. BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Fig. 1 is a front view of an embodiment of metal scissors of the present invention,
Fig. 2 is an enlarged cross-sectional diagram of a portion of the embodiment shown in Fig. 1,
Fig. 3 is an enlarged cross-sectional diagram of a portion of another embodiment of the metal scissors of the present invention,
Fig. 4 is an enlarged cross-sectional diagram of a portion of another embodiment of the metal scissors of the present invention,
Fig. 5 is an enlarged cross-sectional diagram of a portion of another embodiment of the metal scissors of the present invention, and
Figs. 6A-6D are front views of metal scissors in sequential steps in an embodiment of a production process of metal scissors of the present invention. Fig.6A shows the metal scissors in a first step, Fig. 6B shows the metal scissors in a second step, Fig. 6C shows the metal scissors in a third step, and Fig. 6D shows the metal scissors in a fourth step.

5. DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] Figs. 1 and 2 exemplify one embodiment of metal scissors of claim 1 of the present invention. Scissors 1 for use in a barber shop and a beauty salon comprise a pair of stainless steel scissors parts 2 and a shaft 3 which joins the stainless steel scissors parts 2 together.

[0018] The pair of scissors parts 2 are wholly coated with a titanium coating layer 6. Grips 4 each comprise the titanium coating layer 6 which is formed on the smooth surface of a base material 5 and a polyurethane coating layer 7 which is formed on the layer 6 and has excellent abrasion resistance and scratch resistance.

[0019] Fig. 3 exemplifies one embodiment of metal scissors of claim 2 of the present invention. Since its constitution is basically the same as that of the above embodiment of Fig. 1, descriptions on constituents common between them will be omitted, using the same reference numerals, and only constituents different between them will be described.

[0020] Grips 4 each comprise a titanium coating layer 6 which is formed on the surface of a base material 5, a polyurethane foundation layer 8 for a base coat which is formed on the layer 6 and has excellent adhesion to the layer 6, and a polyurethane coating layer 7 which is formed on the layer 8 and has excellent abrasion resistance and scratch resistance.

[0021] Fig. 4 exemplifies one embodiment of metal scissors of claim 3 of the present invention. Since its constitution is basically the same as that of the above embodiment of Fig. 1, descriptions on constituents common between them will be omitted, using the same reference numerals, and only constituents different between them will be described.

[0022] Grips 4 each comprise a base material 5 with a surface 5a which has fine pits and projections thereon with a surface roughness Ry of 12.5 to 50, a titanium coating layer 6 which is formed on the surface of the base material 5, and a polyurethane coating layer 7

which is formed on the layer 6 and has excellent abrasion resistance and scratch resistance. The total thickness of the titanium coating layer 6 and the polyurethane coating layer 7 when they are laminated together is such a thickness that does not impair the surface roughness of the finely uneven surface 5a of the base material 5 so as to form a finely uneven surface 7a of the polyurethane coating layer 7 which is comparable to the surface roughness of the base material surface 5a.

[0023] Fig. 5 exemplifies one embodiment of the metal scissors of claim 3 of the present invention. Since its constitution is basically the same as that of the above embodiment of Fig. 1, descriptions on constituents common between them will be omitted, using the same reference numerals, and only constituents different between them will be described.

[0024] Grips 4 each comprise a base material 5 with a surface 5a which has fine pits and projections thereon with a surface roughness Ry of 12.5 to 50, a titanium coating layer 6 which is formed on the surface of the base material 5, a polyurethane foundation layer 8 for a base coat which is formed on the layer 6 and has excellent adhesion to the layer 6, and a polyurethane coating layer 7 which is formed on the layer 8 and has excellent abrasion resistance and scratch resistance. The total thickness of the titanium coating layer 6, the polyurethane foundation layer 8 for a base coat and the polyurethane coating layer 7 when they are laminated together is such a thickness that does not impair the surface roughness of the finely uneven surface 5a of the base material 5 so as to form a finely uneven surface 7a of the polyurethane coating layer 7 which is comparable to the surface roughness of the base material surface 5a.

[0025] Figs. 6A to 6D show a production example of the above scissors of Fig. 5 as one embodiment of the production process of metal scissors of the present invention. Scissors 1 are prepared in accordance with the following steps.

First Step (refer to Fig.6A)

[0026] The surfaces of base materials 5 in grips 4 of a pair of scissors parts 2 are blast-treated so as to form a finely uneven base material surface 5a with a surface roughness Ry of 12.5 to 50.

Second Step (refer to Fig.6B)

[0027] The scissors part 2 is wholly coated with titanium so as to form a titanium coating layer 6 whose thickness together with the thicknesses of all other layers 7 and 8 to which the layer 6 is laminated does not impair the surface roughness of the base material surface 5a.

Third Step (refer to Fig.6C)

[0028] On the titanium coating layer 6 in the grip 4, the polyurethane foundation layer 8 for a base coat which has excellent adhesion to the layer 6 is formed by baking coating such that the layer 8 has such a thickness that together with the thicknesses of all other layers 6 and 7 to which the layer 8 is laminated does not impair the surface roughness of the base material surface 5a.

Fourth Step (refer to Fig. 6D)

[0029] On the polyurethane foundation layer 8 for a base coat in the grip 4, the polyurethane coating layer 7 which has excellent abrasion resistance and scratch resistance is baking-coated to such a thickness that together with the thicknesses of all other layers 6 and 8 to which the layer 7 is laminated does not impair the surface roughness of the base material surface 5a, thereby forming a finely uneven surface 7a of the polyurethane coating layer 7 which is comparable to the surface roughness of the base material surface 5a.

Fifth Step

[0030] The pair of scissors parts 2 are joined together by means of a shaft 3, thereby producing the scissors 1 with the grips 4 that each comprise the finely uneven base material 5 which has a surface roughness Ry of 12.5 to 50, the titanium coating layer 6 which is formed on the finely uneven base material surface 5a, the polyurethane foundation layer 8 for a base coat which is formed on the layer 6 and has excellent adhesion to the layer 6, and the polyurethane coating layer 7 which is formed on the layer 8 and has excellent abrasion resistance and scratch resistance. The titanium coating layer 6, the foundation layer 8 and the polyurethane coating layer 7 are formed in such a total thickness that does not impair the surface roughness of the finely uneven base material surface 5a of the base material 5 so as to form the finely uneven surface 7a of the polyurethane coating layer 7 which is comparable to the surface roughness of the base material surface 5a.

A. According to claim 1, metal scissors of the present invention provide a unique, favorable touch, are not liable to be slippery even when used by a wet hand and are highly useful in practical use. Further, even when the surface of a grip is abraded or scratched, the surface of a base material is not exposed since it is protected by a titanium coating layer. In addition, the surfaces of the grips have a unique color ascribable to the titanium coating layer and a polymer compound coating layer. Further, allergy to metals can be prevented completely due to the presence of the polymer compound coating layer.

B. According to claim 2, since a foundation layer

serves as a medium for joining the titanium coating layer and the coating layer together, the protective coating on the surface of the grip does not come off easily, resulting in high usefulness in practical use. Further, the metal scissors of the present invention have a two-tone color ascribable to the foundation layer and the coating layer and are therefore excellent in design as well.

C. According to claim 3, metal scissors of the present invention provide a good touch, are not liable to be slippery even when used by a wet hand and provide an exquisite fit, due to the finely uneven surfaces of grips. Further, even when the surface of the grip is abraded or scratched, the surface of a base material is not exposed since it is protected by a titanium coating layer, resulting in high usefulness in practical use. In addition, the surfaces of the grips show a unique color due to irregular reflection caused by pits and projections on the surfaces and have a unique color ascribable to the titanium coating layer and a polymer compound coating layer. Furthermore, allergy to metals can be prevented completely due to the presence of the polymer compound coating layer.

D. According to claim 4, since a foundation layer serves as a medium for joining the titanium coating layer and the coating layer together, the protective coating on the surface of the grip does not come off easily, resulting in high usefulness in practical use. Further, the metal scissors of the present invention have a two-tone color ascribable to the foundation layer and the coating layer and are therefore excellent in design as well.

E. According to claim 5, scissors having the effects of the invention of claim 4 can be mass-produced efficiently at low costs. Further, since a polymer compound foundation layer and a polymer compound coating layer on the surface of a grip are formed by baking coating, no expensive mold is required. In addition, in general, when blades are to be coated with titanium, a step of masking grips and then removing masking materials after titanium coating is necessary. The step is obviated in the present invention, resulting in high productivity.

[0031] Having described specific preferred embodiments of the invention with reference to the accompanying drawings, it will be appreciated that the present invention is not limited to those precise embodiments, and that various changes and modifications can be effected therein by one of ordinary skill in the art without departing from the scope of the invention as defined by the appended claims.

Claims

1. Metal scissors (1) with grips (4) each having a titanium coating layer (6) formed on the surface of a base material (5), **characterized by** a polymer compound coating layer (7) formed on the titanium coating layer (6), the polymer compound coating layer (7) having excellent abrasion resistance and scratch resistance.

2. The metal scissors (1) of claim 1, wherein the base material (5) in the grip (4) has moderate surface roughness with fine pits and projections on the surface, and the titanium coating layer (6) and the polymer compound coating layer (7) are laminated to such a thickness that does not impair the surface roughness of the base material (5) so as to form fine pits and projections comparable to the surface roughness of the base material (5), on the surface of the polymer compound coating layer (7).

3. The metal scissors (1) of claim 1, further comprising a polymer compound foundation layer (8) formed on the titanium coating layer (6), the foundation layer having excellent adhesion to the titanium coating layer (6), said polymer compound coating layer (7) being formed on the polymer compound foundation layer (8).

4. The metal scissors (1) of claim 3, wherein the base material (5) in the grip (4) has moderate surface roughness with fine pits and projections on the surface, and the titanium coating layer (6), the polymer compound foundation layer (8) and the polymer compound coating layer (7) are laminated to such a thickness that does not impair the surface roughness of the base material (5) so as to form fine pits and projections comparable to the surface roughness of the base material (5), on the surface of the polymer compound coating layer (7).

5. A process for producing metal scissors (1), which is **characterized by**:

a first step of blast-treating the surfaces of base materials (5) in the grips (4) of a pair of scissors parts (2) so as to cause them to have moderate surface roughness with fine pits and projections formed on the surfaces,

a second step of titanium-coating the whole scissors part (2) so as to form a titanium coating layer (6) whose thickness, together with the thicknesses of all other layers to which the titanium coating layer (6) is laminated, does not impair the surface roughness of the base material (5),

a third step of forming a polymer compound foundation layer (8) on the titanium coating layer (6) in the grip (4) by baking coating, the foundation layer (8) having a thickness which together with the thicknesses of all other layers

to which the foundation layer (8) is laminated does not impair the surface roughness of the base material (5) and also having excellent adhesion to the titanium coating layer (6),
a fourth step of forming a polymer compound coating layer (7) on the polymer compound foundation layer (8) in the grip (4) by baking coating, the coating layer (7) having a thickness which together with the thicknesses of all other layers to which the coating layer (7) is laminated does not impair the surface roughness of the base material (5) and also having excellent abrasion resistance and scratch resistance, and
a fifth step of joining the pair of scissors parts (2) together.

Patentansprüche

1. Metallschere (1) mit Griffen (4), die jeder eine auf der Oberfläche eines Basismaterials (5) ausgebildete Titan-Beschichtung (6) haben,
gekennzeichnet durch eine Polymerverbindungsbeschichtung (7), die auf der Titan-Beschichtung (6) ausgebildet ist, welche Polymerverbindungsbeschichtung (7) einen exzellenten Abriebwiderstand und Kratzwiderstand hat.

2. Metallschere (1) nach Anspruch 1, bei welcher das Basismaterial (5) in dem Griff (4) eine gemäßigte Oberflächenrauhigkeit mit feinen Gruben und Vorsprüngen auf der Oberfläche hat, und die Titanbeschichtung (6) und die Polymerverbindungsbeschichtung (7) auf eine solche Dicke laminiert sind, dass sie die Oberflächenrauhigkeit des Basismaterials (5) nicht beeinträchtigen, um so feine Gruben und Vorsprünge vergleichbar mit der Oberflächenrauhigkeit des Basismaterials (5) auf der Oberfläche der Polymerverbindungsbeschichtung (7) auszubilden.

3. Metallschere (1) nach Anspruch 1, weiter mit einer Polymerverbindungsgrundierung (8), die auf der Titanschicht (6) ausgebildet ist, welche-Grundierung eine exzellente Anhaftung an der Titanbeschichtung (6) hat, wobei die Polymerverbindungsbeschichtung (7) auf der Polymerverbindungsgrundierung (8) ausgebildet ist.

4. Metallschere (1) nach Anspruch 3, bei welcher das Basismaterial (5) in dem Griff (4) eine gemäßigte Oberflächenrauhigkeit mit feinen Gruben und Vorsprüngen auf der Oberfläche hat, und die Titanbeschichtung (6), die Polymerverbindungsgrundierung (8) und die Polymerverbindungsbeschichtung (7) auf eine solche Dicke laminiert sind, die die Oberflächenrauhigkeit des Basismaterials (5) nicht beeinträchtigt, um so feine Gruben und Vorsprünge vergleichbar mit der Oberflächenrauhigkeit des Basismaterials (5) auf der Oberfläche der Polymerverbindungsbeschichtung (7) auszubilden.

5. Verfahren zur Herstellung einer Metallschere (1), **gekennzeichnet durch**:

einen ersten Schritt zum Blasbehandeln der Oberflächen von Basismaterialien (5) in den Griffen (4) von zwei Scherenteilen (2) so, dass diese eine gemäßigte Oberflächenrauhigkeit mit feinen Gruben und Vorsprüngen auf den Oberflächen bekommen,
einen zweiten Schritt zum Beschichten des gesamten Scherenteils (2) mit Titan, um so eine Titanbeschichtung (6) auszubilden, deren Dikke zusammen mit den Dicken aller anderen Schichten, mit welchen die Titanbeschichtung (6) laminiert wird, die Oberflächenrauhigkeit des Basismaterials (5) nicht beeinträchtigt,
einen dritten Schritt zum Ausbilden einer Polymerverbindungsgrundierung (8) auf der Titanbeschichtung (6) in dem Griff (4) **durch** Backbeschichten, welche Grundierung (8) eine Dikke hat, die zusammen mit den Dicken aller anderen Schichten, mit welchen die Grundierung (8) laminiert wird, die Oberflächenrauhigkeit des Basismaterials (5) nicht beeinträchtigt, und wobei die Grundierung (8) auch eine exzellente Anhaftung an der Titanbeschichtung (6) hat,
einen vierten Schritt zum Ausbilden einer Polymerverbindungsbeschichtung (7) auf der Polymerverbindungsgrundierung (8) in dem Griff (4) **durch** Backbeschichten, wobei die Beschichtung (7) eine Dicke hat, die zusammen mit den Dicken aller anderen Schichten, mit welchen die Beschichtung (7) laminiert wird, die Oberflächenrauhigkeit des Basismaterials (5) nicht beeinträchtigt und auch einen exzellenten Abriebswiderstand und Kratzwiderstand hat, und
einen fünften Schritt zum Verbinden der beiden Scherenteile (2).

Revendications

1. Ciseaux métalliques (1) avec des poignées (4) ayant chacun une couche de revêtement en titane (6) formée sur la surface d'un matériau de base (5), **caractérisés par** une couche de revêtement de composé de polymère (7) formée sur la couche de revêtement en titane (6), la couche de revêtement de composé de polymère (7) ayant une excellente résistance à l'abrasion et excellente résistance aux rayures.

2. Ciseaux métalliques (1) selon la revendication 1,

dans lesquels le matériau de base (5) dans la poignée (4) présente une rugosité en surface modérée avec des petits creux et des petites protubérances sur la surface, et la couche de revêtement en titane (6) et la couche de revêtement de composé de polymère (7) sont stratifiées à une épaisseur telle qu'elle ne détériore pas la rugosité en surface du matériau de base (5) de façon à former des petits creux et des petites protubérances comparables à la rugosité en surface du matériau de base (5), sur la surface de la couche de revêtement de composé de polymère (7).

3. Ciseaux métalliques (1) selon la revendication 1, comprenant, en outre, une couche de fond de composé de polymère (8) formée sur la couche de revêtement en titane (6), la couche de fond ayant une excellente adhérence à la couche de revêtement en titane (6), ladite couche de revêtement de composé de polymère (7) étant formée sur la couche de fond de composé de polymère (8).

4. Ciseaux métalliques (1) selon la revendication 3, dans lesquels le matériau de base (5) dans la poignée (4) présente une rugosité en surface modérée avec des petits creux et des petites protubérances sur la surface, et la couche de revêtement en titane (6), la couche de fondation de composé de polymère (8) et la couche de revêtement de composé de polymère (7) sont stratifiées à une épaisseur telle qu'elle ne détériore pas la rugosité en surface du matériau de base (5) de façon à former des petits creux et des petites protubérances comparables à la rugosité en surface du matériau de base (5), sur la surface de la couche de revêtement de composé de polymère (7).

5. Procédé pour produire des ciseaux métalliques (1), lequel est **caractérisé par** :

une première étape de traitement par grenaillage des surfaces des matériaux de base (5) dans la poignée (4) d'une paire de parties de ciseaux (2) de façon à les amener à avoir une rugosité en surface modérée avec des petits creux et des petites protubérances formés sur les surfaces,
une seconde étape de revêtir en titane la partie des ciseaux complets (2) de façon à former une couche de revêtement en titane (6) dont l'épaisseur, associée à l'épaisseur de toutes les autres couches sur lesquelles la couche de revêtement en titane (6) est stratifiée, ne détériore pas la rugosité en surface du matériau de base (5),
une troisième étape de formation d'une couche de fond de composé de polymère (8) sur la couche de revêtement en titane (6) dans la poignée (4) par dépôt au recuit, la couche de fond (8) ayant une épaisseur qui associée aux épaisseurs de toutes les autres couches sur lesquelles la couche de fond (8) est stratifiée ne détériore pas la rugosité en surface du matériau de base (5) et présente également une excellente adhérence à la couche de revêtement en titane (6),
une quatrième étape de formation d'une couche de revêtement de composé de polymère (7) sur la couche de fond de composé de polymère (8) dans la poignée (4) par dépôt au recuit, la couche de revêtement (7) ayant une épaisseur qui associée aux épaisseurs de toutes les autres couches sur lesquelles la couche de revêtement (7) est stratifiée ne détériore pas la rugosité en surface du matériau de base (5) et présente également une excellente résistance à l'abrasion et une excellente résistance aux rayures, et
une cinquième étape de joindre la paire de parties de ciseaux (2) ensemble.

Fig. 1

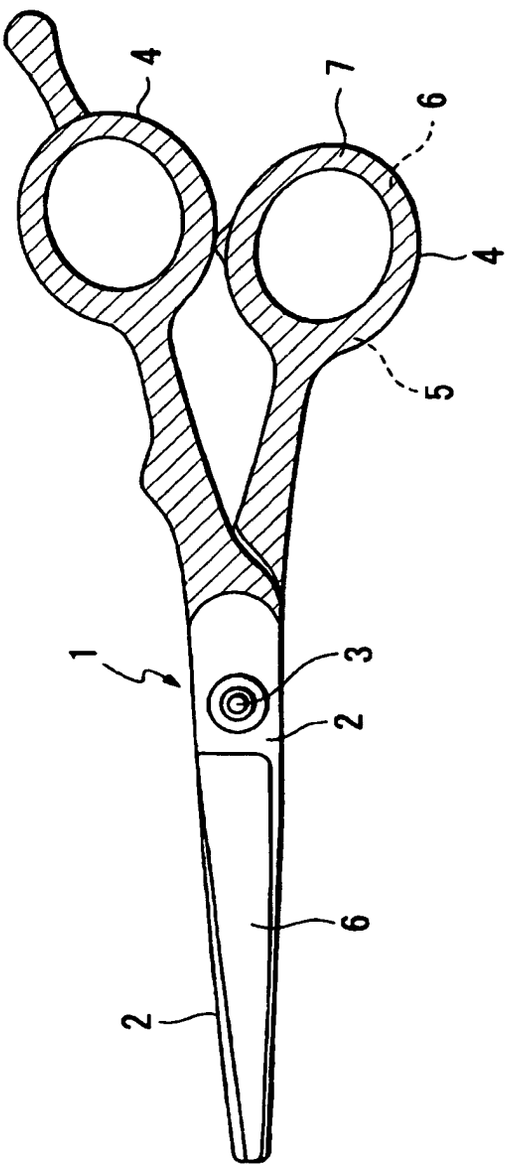

Fig. 2

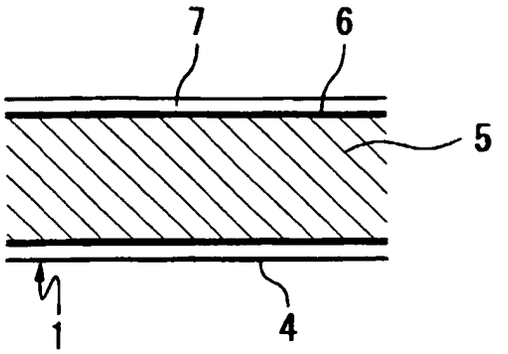

Fig. 3

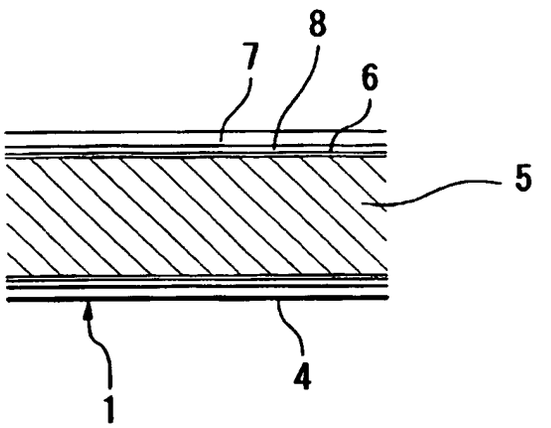

Fig. 4

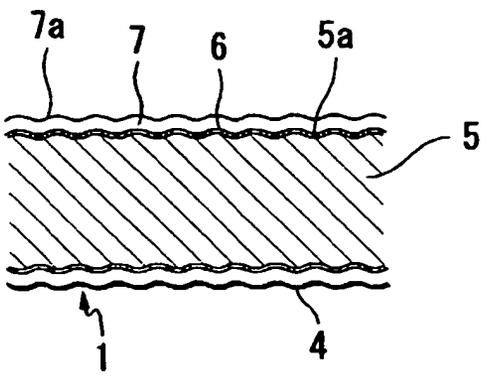

Fig. 5

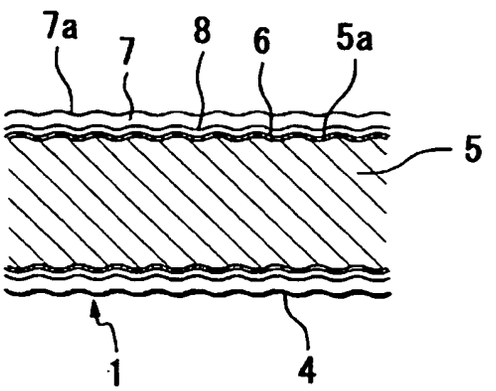

Fig. 6A

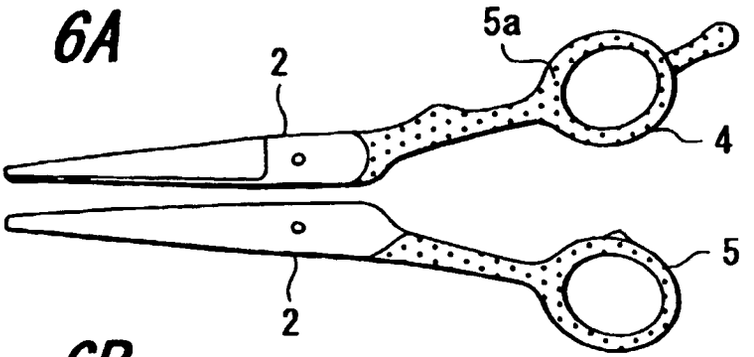

Fig. 6B

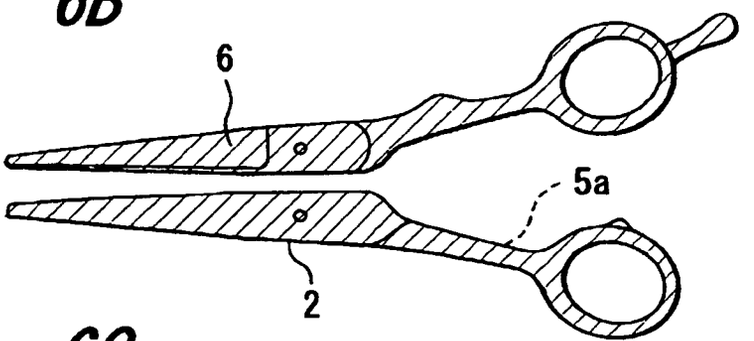

Fig. 6C

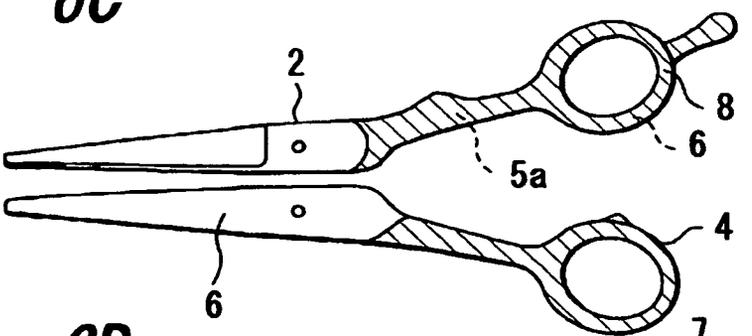

Fig. 6D