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(54) **SLIDE FASTENER**

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(57) **ABSTRACT**

The invention provides a side fastener comprising a fastener element in which a metallic coating layer is formed, the metallic coating layer being never scraped by a sliding of a slider. In a coil-shaped fastener element made of synthetic resin, a metallic coating layer is formed on the surface of a leg portion except an inverted portion and a coupling head with which a guide flange and a guide post of a slider come into contact. Therefore, no metallic coating layer is formed on a portion with which the guide flange and guide post of the slider come into contact. As a result, such an event that the metallic coating layer is scraped and that metallic powder is scattered is prevented, so that a fastener element having a beautiful metallic gloss can be used for a long term and a cheap, fashionable slide fastener is obtained. This invention can be applied to zigzag type, injection molded type and metal type fastener elements.

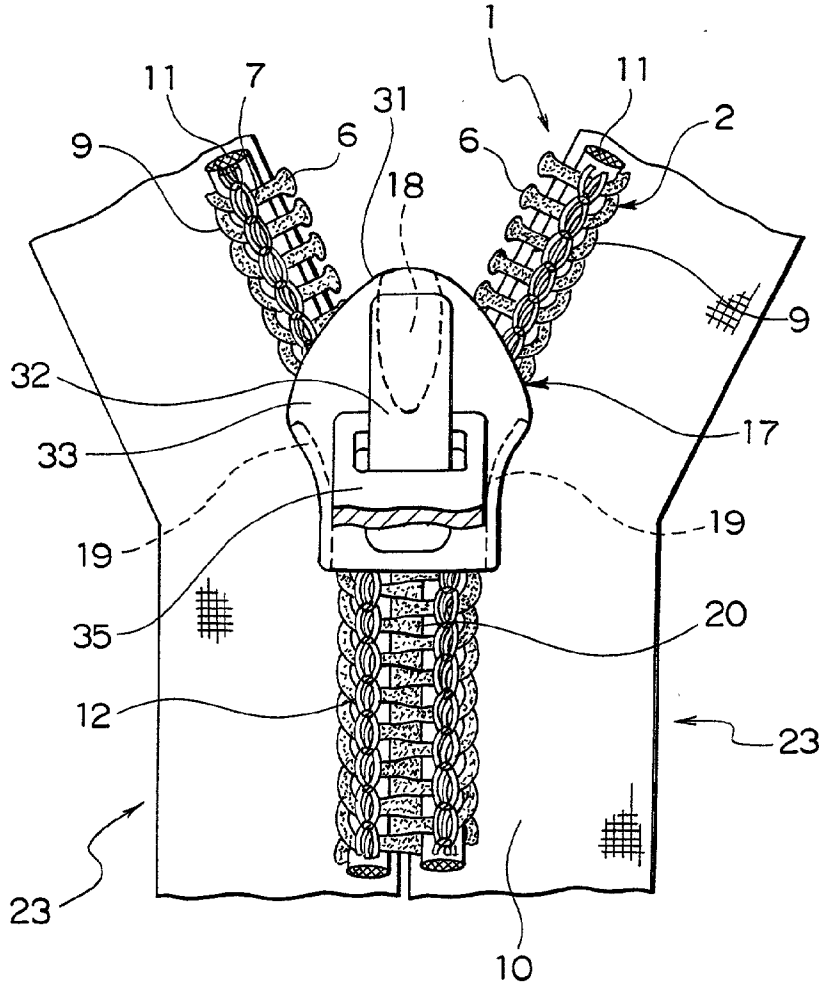


FIG. 1

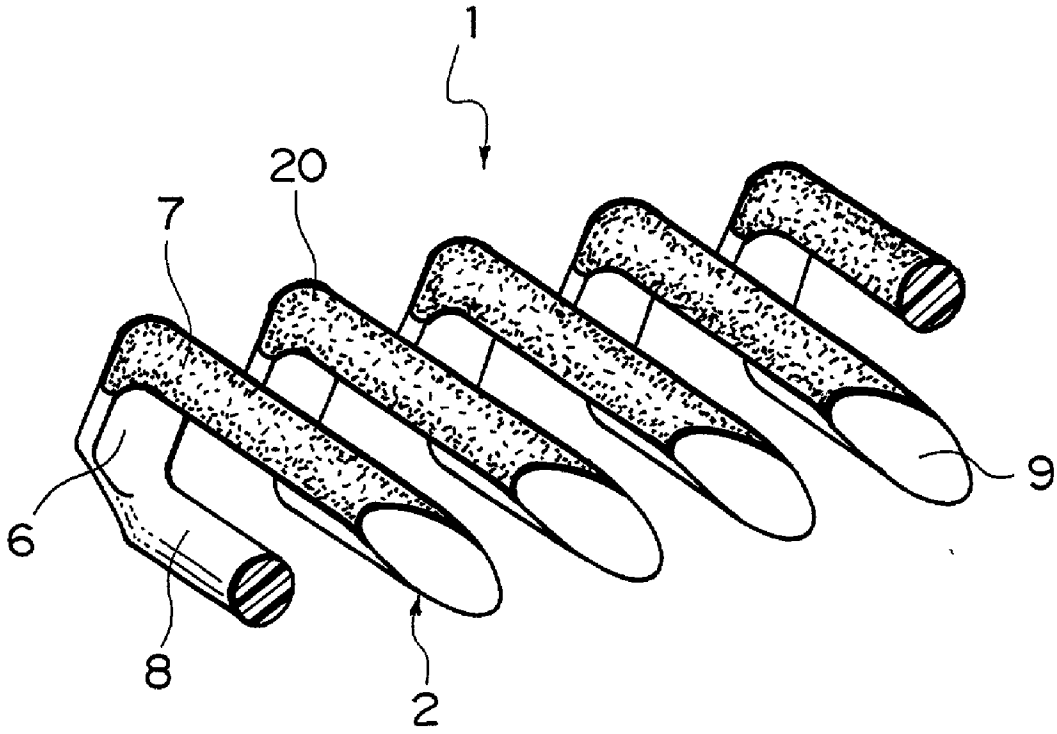


FIG. 2

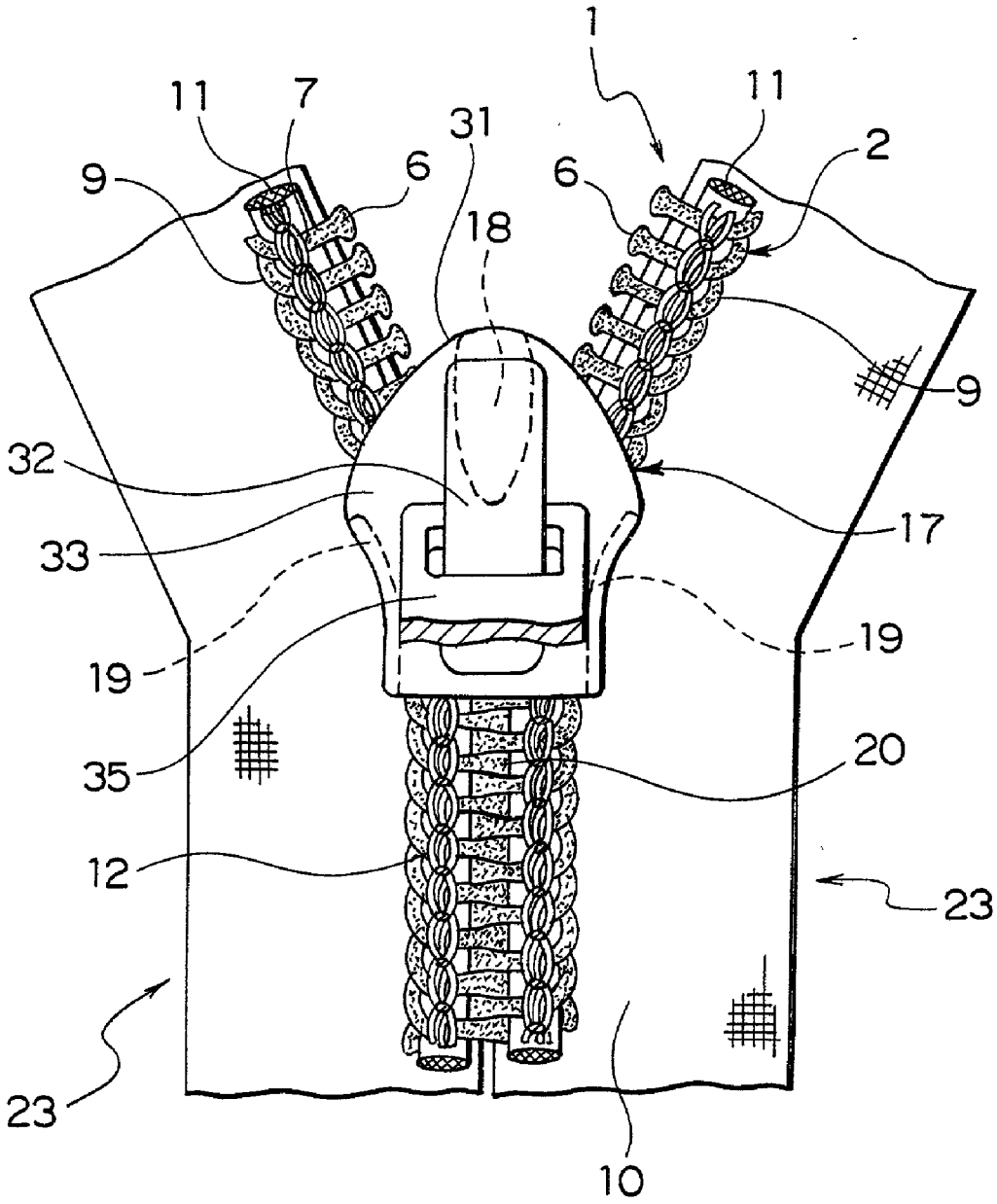


FIG. 3

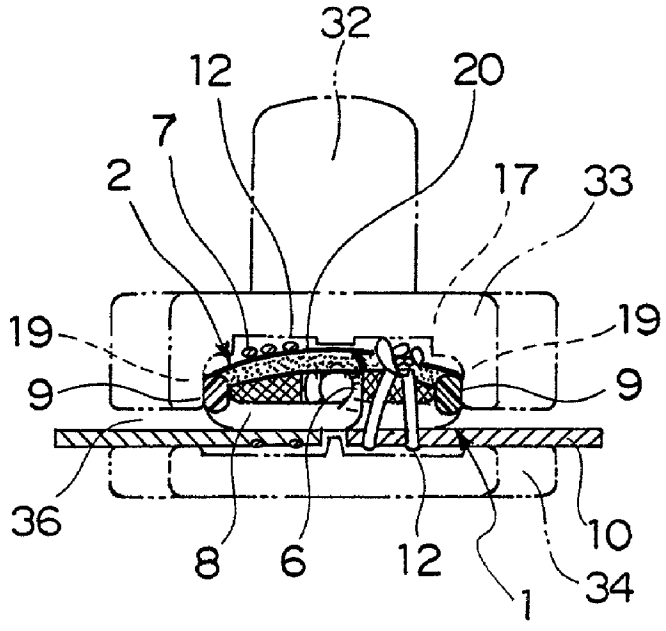


FIG. 4

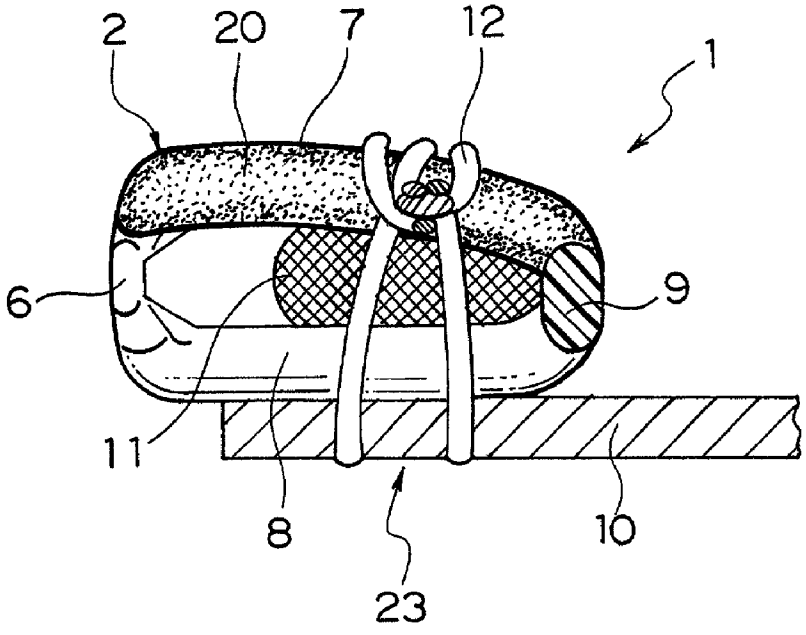


FIG. 5

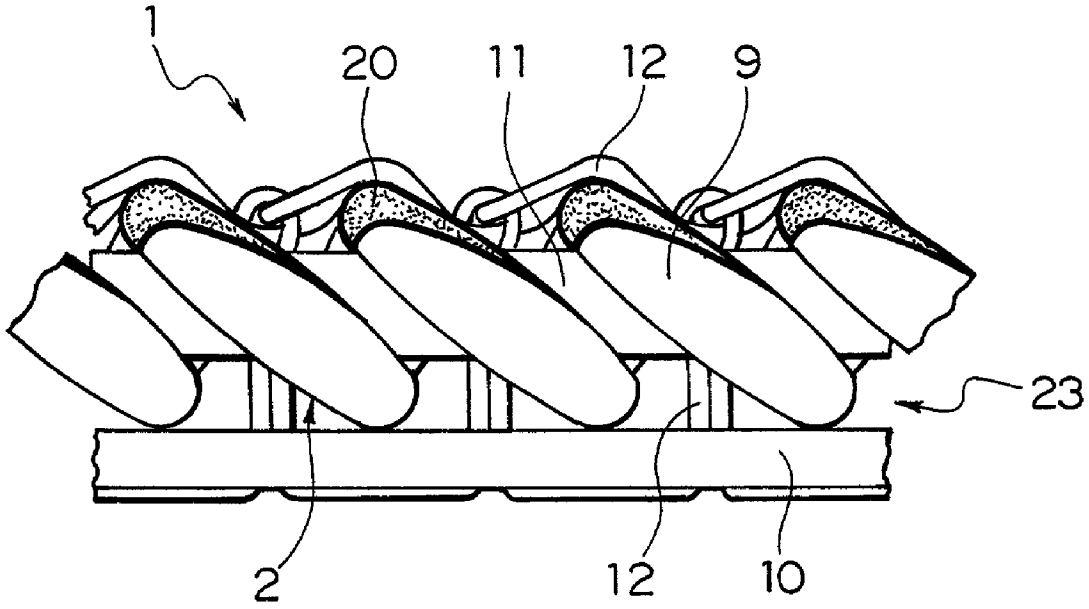


FIG. 6

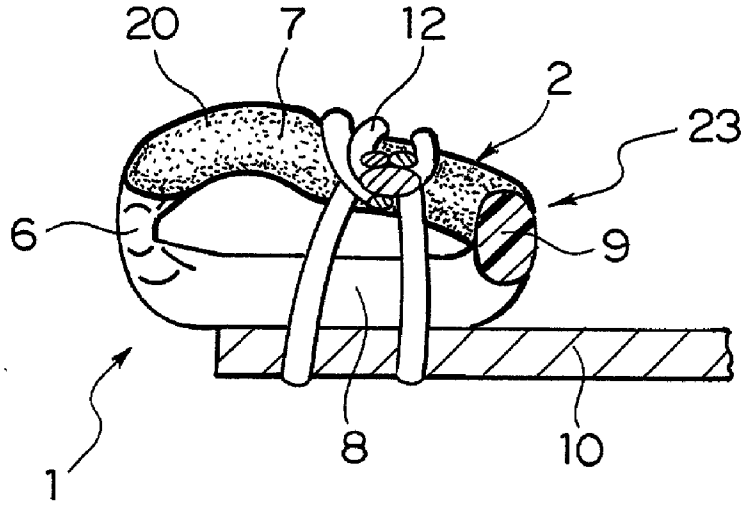


FIG. 7

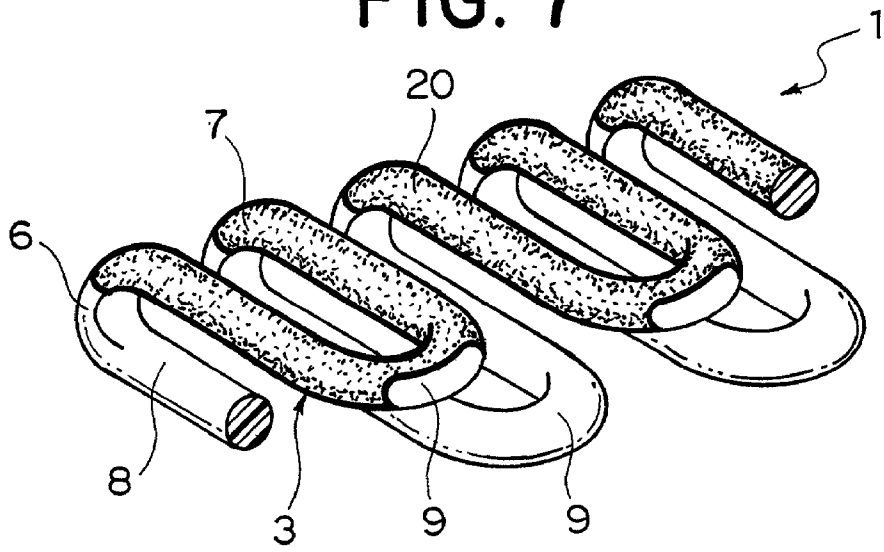


FIG. 8

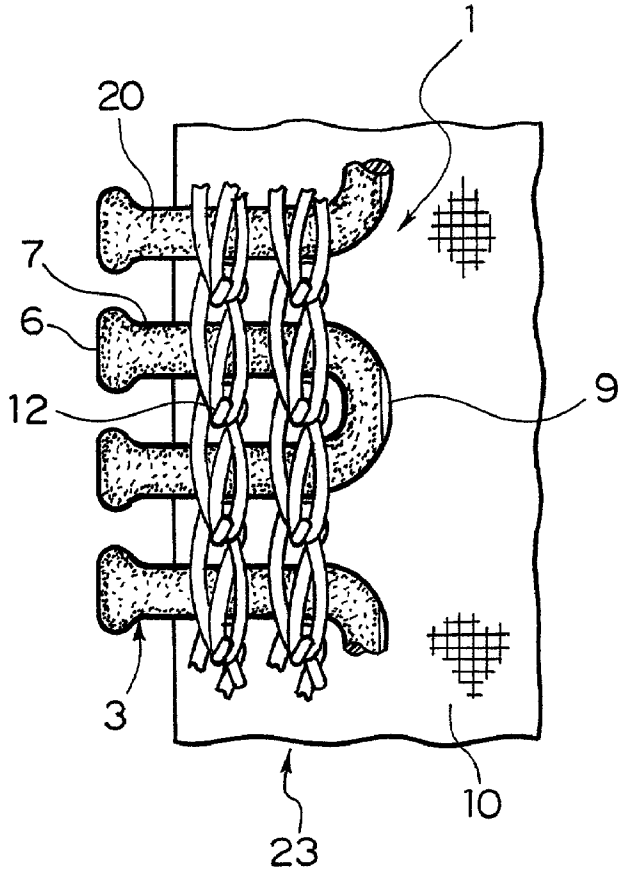


FIG. 9

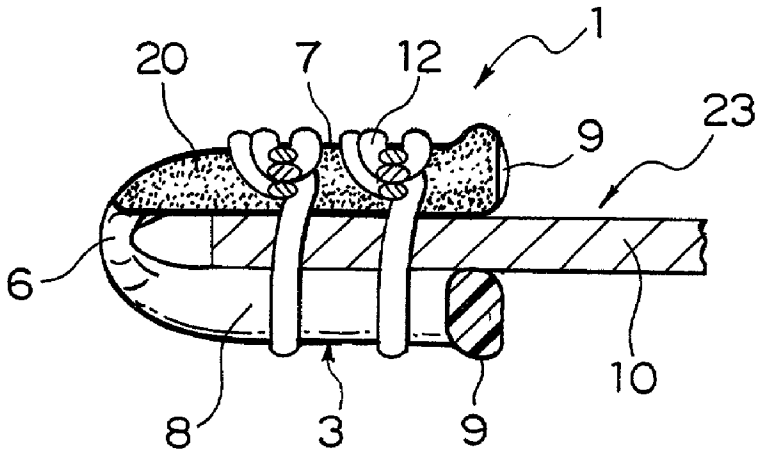


FIG. 10

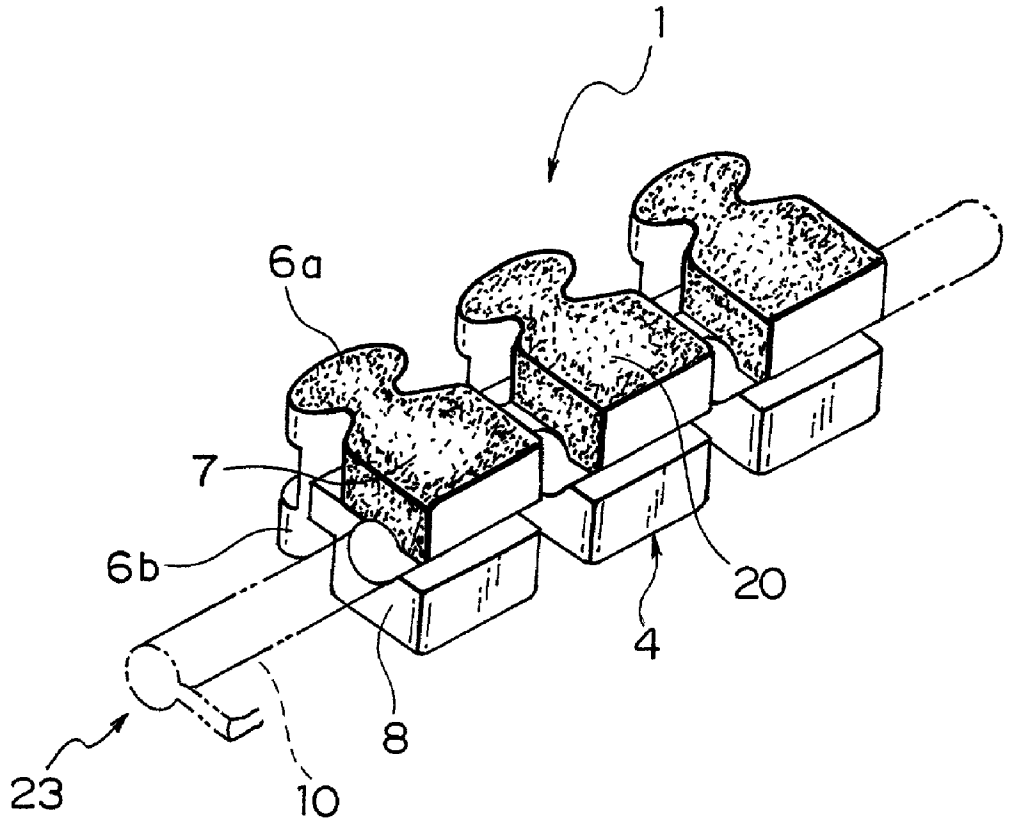


FIG. 11

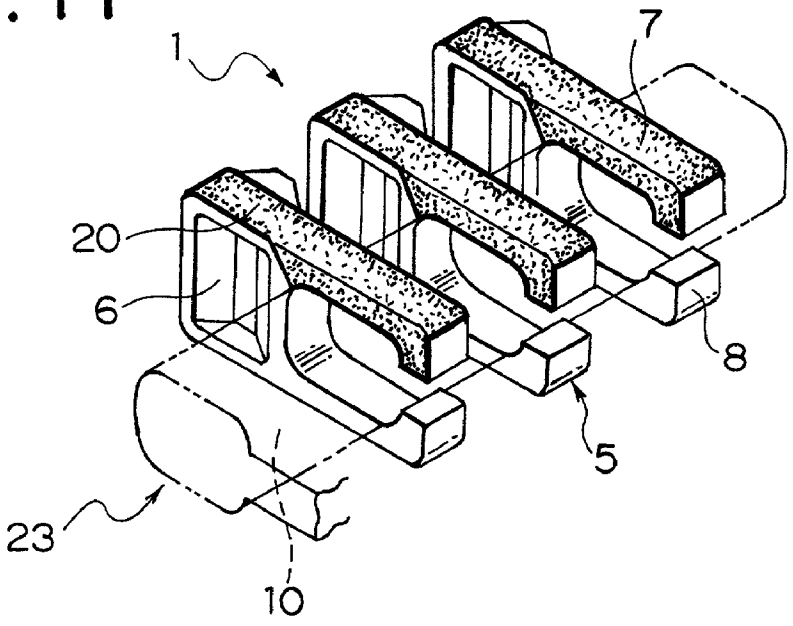


FIG. 12

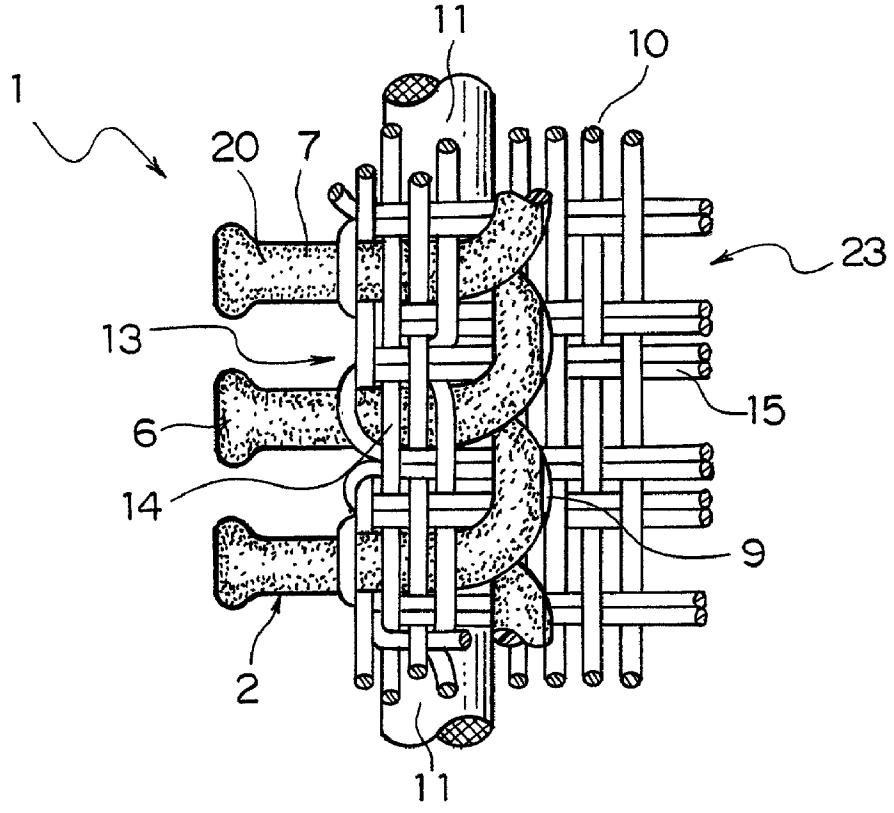
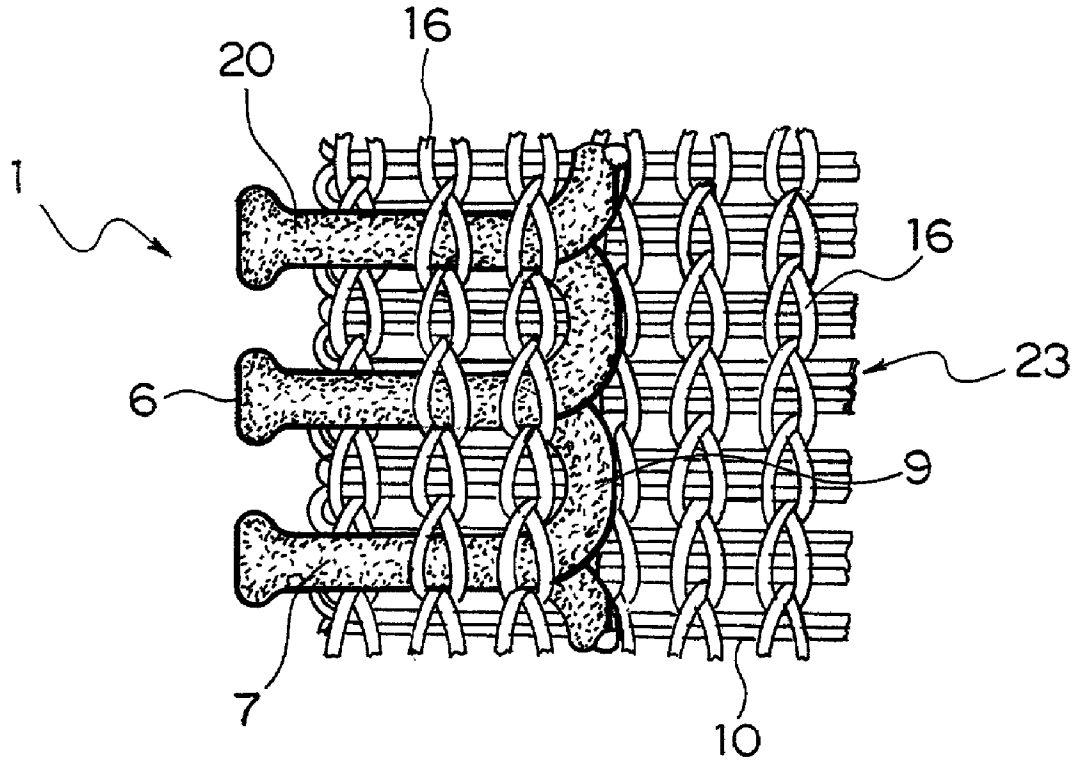


FIG. 13



SLIDE FASTENER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The invention relates to a slide fastener and more particularly to a slide fastener including fastener elements made of synthetic resin or metal having a surface coated with a metallic coating layer so that it is glossy and ornamentally beautiful.

[0003] 2. Description of the Related Art

[0004] According to a conventional slide fastener disclosed in Japanese Patent Publication No. 7-110245, an entire surface of a coil-shaped fastener element or zigzag-shaped fastener element made of synthetic resin monofilament is coated with a metallic coating layer having a gloss peculiar to metal. According to a slide fastener disclosed in Japanese Patent No. 261380, a fastener element of synthetic resin mono-filament attached to a fastener tape and an exposed portion of a core cord being seen inserted within the fastener element are coated with a metallic coating layer.

[0005] In the above described latter slide fastener in which the exposed portion of the fastener element being seen is coated with the metallic coating layer as well as the slide fastener in which the entire surface of the coil-shaped fastener element or zigzag-shaped fastener element is coated with the metallic coating layer, the metallic coating layer formed on an outside face of the fastener element is scraped by a guide flange when the slider slides. The reason is that small burrs in a parting line existing in an inner face of the guide flange of a slider formed by die-casting scrapes the metallic coating layer formed on the fastener element and scatters its metallic powder. Therefore, if this slide fastener is used in particularly clothes or bags required to be fashionable, the scraped metallic powder adhere to the clothes or bag. Consequently, some people complain this damages the fashionable appearance value of the clothes or bag. For the reason, improvement of a molding die for manufacturing of the slider has been considered. However, such a molding die capable of solving the above problem has not been invented.

SUMMARY OF THE INVENTION

[0006] The invention has been achieved in views of the above described problems and an object of the invention is to provide a side fastener comprising a fastener element in which when it is intended to form a metallic coating layer on a fastener element made of synthetic resin or metal, such a phenomenon that the metallic coating layer is scraped and that metallic powder is scattered is prevented by canceling formation of the metallic coating layer on an outer side face of the fastener element with which a guide flange of a slider makes contact, thereby securing a metallic coating layer having a beautiful appearance.

[0007] Another object of the invention is to provide a slide fastener comprising a fastener element in which such a fear that the metallic powder are scattered is prevented by also canceling formation of the metallic coating layer on an outer side face of a coupling head, which makes contact with a guide post of the fastener element, thereby securing a metallic coating layer having a beautiful appearance.

[0008] And another object of the invention is to provide a slide fastener comprising a fastener element in which a metallic coating layer having a different beautiful appearance depending thereon is formed by specifying the shape of the fastener element.

[0009] Also another object of the invention is to provide a slide fastener comprising a fastener element in which a metallic coating layer having a different beautiful appearance depending thereon is formed by specifying the shape of the slide fastener.

[0010] Further object of the invention is to provide a slide fastener in which a metallic coating layer formed on the fastener element can be made to function effectively by specifying the configuration of sewing yarn, weaving yarn and warp knitting yarn for attaching and fixing the fastener element onto a fastener tape.

[0011] And further object of the invention is to provide a slide fastener in which the metallic coating layer formed on the surface of the fastener element can be protected effectively by using a slider formed by die-casting or injection molding, which has been said to have a defect.

[0012] To achieve the above object, according to the main aspect of the invention, there is provided a slide fastener having a pair of fastener stringers to which fastener elements are attached along facing edge portions of a pair of fastener tapes in the longitudinal direction and a slider which is slidable along the fastener elements and can couple or separate the fastener elements, wherein a metallic coating layer is formed on a top surface of a fastener element except an outer side face thereof in contact with a guide flange of the slider.

[0013] Preferably, the metallic coating layer is formed on the top surface of the fastener element attached to the fastener tape, made of synthetic resin or metal, except an outer side face of a coupling head of the fastener element in contact with a guide post of the slider.

[0014] Preferably, the fastener element, which is to be attached to the fastener tape and comprises the metallic coating layer, is formed of coil-shaped fastener elements formed by winding synthetic resin monofilament in the shape of coil.

[0015] Alternatively, the fastener element, which is to be attached to the fastener tape **10** and comprises the metallic coating layer, is formed of zigzag-shaped fastener elements formed by bending synthetic resin monofilament in the shape of zigzag.

[0016] And alternatively, the fastener element, which is to be attached to the fastener tape and comprises the metallic coating layer, is formed of single-unit injection-molded fastener elements formed by injection molding synthetic resin.

[0017] Further alternatively, the fastener element, which is to be attached to the fastener tape and comprises the metallic coating layer, is formed of single-unit metallic fastener elements formed by shearing or die-casting metal.

[0018] Preferably, the fastener element, comprising the metallic coating layer, is sewed to a side edge of the fastener tape with sewing yarn, thereby securing a metallic gloss.

[0019] Alternatively, the fastener element, comprising the metallic coating layer, is woven into a side edge of the fastener tape with weaving yarn, thereby securing a metallic gloss.

[0020] Still alternatively, the fastener element, comprising the metallic coating layer, is knitted into a side edge of the fastener tape with warp knitting yarn, thereby securing a metallic gloss.

[0021] Preferably, the sewing yarn, weaving yarn and warp knitting yarn, disposed on top of the fastener element comprising the metallic coating layer for fixing the fastener element onto the fastener tape, is formed of a transparent yarn or a yarn having a color similar to that of the metallic coating layer, thereby improving the function of the metallic coating layer.

[0022] Preferably, the slider is formed by die-casting or injection molding using metal or synthetic resin, thereby securing a metallic gloss.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] **FIG. 1** is a perspective view of a coil-shaped fastener element made of synthetic resin.

[0024] **FIG. 2** is a front view of a slide fastener comprising the coil-shaped fastener element.

[0025] **FIG. 3** is a sectional view of the slide fastener comprising the coil-shaped fastener element of **FIG. 2**.

[0026] **FIG. 4** is a sectional view of a fastener stringer comprising the coil-shaped fastener element.

[0027] **FIG. 5** is a side view of a fastener stringer comprising the coil-shaped fastener element of **FIG. 4**.

[0028] **FIG. 6** is a sectional view of a fastener stringer comprising the coil-shaped fastener element having no core cord.

[0029] **FIG. 7** is a perspective view of a zigzag-shaped fastener element made of synthetic resin.

[0030] **FIG. 8** is a front view of a fastener stringer comprising the zigzag-shaped fastener element.

[0031] **FIG. 9** is a sectional view of a fastener stringer comprising the zigzag-shaped fastener element of **FIG. 8**.

[0032] **FIG. 10** is a perspective view of a fastener stringer comprising an injected fastener element made of synthetic resin.

[0033] **FIG. 11** is a perspective view of a fastener stringer comprising a metallic fastener element made of metal.

[0034] **FIG. 12** is a front view of a woven-in fastener stringer.

[0035] **FIG. 13** is a front view of a knitted-in fastener stringer.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0036] Hereinafter, the preferred embodiments of a slide fastener of the invention will be described in detail with reference to the accompanying drawings.

[0037] In the slide fastener of the present invention, as shown in **FIG. 2**, the slide fastener has a pair of fastener stringers **23, 23**, to which fastener elements **1, 1** are attached along facing side edge portions of a pair of fastener tapes **10, 10** in a longitudinal direction, the fastener tapes **10, 10** being woven or knitted with synthetic fiber such as polyester or nylon, or natural fiber such as cotton, and a slider **17** which is slidable along the fastener elements **1, 1** and can couple or separate the fastener elements **1, 1**. And a fastener element **1** for the slide fastener is formed of synthetic resin such as polyamide, polyester and the like. As shown in **FIG. 1**, the fastener element **1** of a first embodiment of the invention forms a coil-shaped fastener element **2** by winding synthetic resin monofilament in the shape of coil. This coil-shaped fastener element **2** is comprised of coupling head **6**, upper leg portion **7**, lower leg portion **8**, and inverted portion **9** for connecting the upper leg portion **7** with the lower leg portion **8**. A metallic coating layer **20** is formed on a surface of the upper leg portion **7** except an outer side face of the coupling head **6**, an outer side face of the inverted portion **9**, and the lower leg portion **8**.

[0038] The metallic coating layer **20** is formed by depositing aluminum, chrome, nickel, stainless, gold, silver, copper, brass or the like in the form of a thin film or creating a metallic coating by vacuum deposition, ion plating, sputtering, chemical plating or the like. Preferably, this metallic coating layer **20** is formed in thickness of 0.001 to 1 μm.

[0039] As shown in **FIGS. 4 and 5**, a core cord **11** is inserted into the coil-shaped fastener element **2** comprising the metallic coating layer **20** and then, the fastener element **2** is sewed to a side edge of a fastener tape **10** with the sewing yarn **12** by double ring sewing system using three yarns by two needles so as to form a fastener stringer **23**. As shown in FIGS. **2** and **3**, a slider **17** is placed to catch right and left fastener stringers **23** and the right and left coupling heads **6** are engaged with each other to form the slider fastener by sliding the slider **17**.

[0040] The slider **17** made of metal is formed by die-casting or made of synthetic resin is formed by injection. As shown in **FIGS. 2 and 3**, in the slider **17** an upper wing plate **33** and a lower wing plate **34** disposed in parallel on the side of a shoulder **31** are connected by a guide post **18**, and an element guide groove **36**, in which the fastener element **2** may be inserted, is provided between respective plates. A long guide flange **19** being protruded toward the lower wing plate **34** is formed on both of side edge portions of the upper wing plate **33**. Although short guide flanges being slightly protruded toward the upper wing plate **33** are also formed on both of side edge portions of the lower wing plate **34** in the shown embodiment, the short guide flange may be omitted, if necessary. And a zipper pull attaching portion **32** is fixed to a surface of the upper wing plate **33**, and a zipper pull **35** is attached thereto so as to swing freely. Above-described guide flange **19** of the slider **17** has a shape suitable for the coil-shaped fastener element **2**, but guide flanges disposed on the upper and lower wing plates **33, 34** are respectively protruded toward the other plate with a same length, in a zigzag-shaped fastener element **3** or single-body fastener elements **4** and **5** made of metal or synthetic resin, which will be described later.

[0041] The metallic coating layer **20** is formed on the surface of the upper leg portion **7** of the coil-shaped fastener element **2** and not formed positively on the outer side face of the coupling head **6** and the outer side face of the inverted portion **9**. As for the reason, small burrs in a parting line often exists in an inner face of the guide flange **19** of the slider **17** formed by die-casting or injection and even if the metallic coating layer **20** is formed on the surface of the

coil-shaped fastener element **2**, when the slider **17** is slid, the burrs on the guide flange **19** scrapes the deposited metallic coating layer **20** from the inverted portion **9**, thereby scattering metallic powder. Further, the metallic coating layer **20** may be peeled from an outer side face of the coupling head **6**, which comes into contact with the guide post **18** of the slider **17**, so there is a fear that metallic powder may be scattered.

[**0042**] Therefore, when it is intended to provide the metallic coating layer **20** on the surface of the coil-shaped fastener element **2**, unless the metallic coating layer **20** is formed on the outer side face of the inverted portion **9** and the outer side face of the coupling head **6** which the slider **17** comes into contact with when it slides, no metallic powder is scattered. Thus, a desired purpose is achieved, so that this fastener element can be used preferably in products required to have a fashionable performance.

[**0043**] Further, if the fashionable performance of the slide fastener is considered, by sewing the coil-shaped fastener element **2** to the fastener tape **10** with the sewing yarn **12** which is colorless transparent or has a color similar to that of the metallic coating layer **20**, favorably the sewing yarn **12** does not attract much attention in the coil-shaped fastener element **2** having the metallic coating layer **20**.

[**0044**] According to a fastener stringer **23** of a second embodiment shown in **FIG. 6**, the coil-shaped fastener element **2** is formed by winding synthetic resin monofilament in the shape of coil. In this fastener element **2**, the metallic coating layer **20** is formed on the surface of the upper leg portion **7** and not formed on the outer side face of the coupling head **6**, the outer side face of the inverted portion **9**, and the lower leg portion **8**. The coil-shaped fastener element **2** is sewed to the fastener tape **10** by double ring sewing system without core cord, and colorless transparent or white color yarn is used as the sewing yarn **12**. This fastener stringer **23** also prevents the peeling off or scrapping of the metallic coating layer **20** and the scattering of the metallic powder.

[**0045**] The fastener element **1** of a third embodiment of the present invention shown in **FIG. 7** is a zigzag-shaped fastener element **3** formed by bending synthetic resin monofilament in the shape of zigzag and turning back with respect to the center thereof. This zigzag-shaped fastener element **3** is comprised of the coupling head **6**, upper leg portion **7** and lower leg portion **8** connected to the coupling head **6**, and inverted portion **9** for connecting the leg portions **7** and **8** to the adjacent ones. Then, the metallic coating layer **20** is formed on the surface of the upper leg portion **7** except the outer side face of the coupling head **6**, the outer side face of the inverted portion **9** of the upper leg portion **7** and the lower leg portion **8** and inverted portion **9** of the lower leg portion **8**, like the first embodiment.

[**0046**] In this zigzag-shaped fastener element **3**, as shown in **FIGS. 8 and 9**, a side edge of the fastener tape **10** is sandwiched by the upper leg portion **7** and lower leg portion **8** and the upper and lower leg portions **7** and **8** are sewed to the fastener tape **10** with the sewing yarn **12** by arranging the double ring sewing system using two yarns by a single needle in parallel to each other, so as to form the fastener stringer **23**. If the sewing yarn **12** which is colorless transparent or has a color similar to that of the metallic coating layer **20** is used, the metallic gloss of the metallic coating layer **20** looks beautiful. Further, it is permissible to dispose the looper yarn and needle yarn of the double ring sewing system in reverse.

[**0047**] In the zigzag-shaped fastener element **3** also, even if the guide flange **19** comes into contact with the outer side face of the inverted portion **9** of the upper leg portion **7** or the guide post **18** comes into contact with the outer side face of the coupling head **6** when the slider **17** slides, there is no fear that the metallic coating layer **20** may be peeled or scraped by the guide flange **19** or the guide post **18**, because the metallic coating layer **20** is not formed on the outer side face of the inverted portion **9** and the outer side face of the coupling head **6**. Meanwhile, it is permissible to sew the zigzag-shaped fastener element **3** on a side edge of the fastener tape **10** to be placed thereon.

[**0048**] In the fastener element **1** of a fourth embodiment of the invention shown in **FIG. 10, a** single-body injection-molded fastener element **4** is formed on a swollen edge portion of a side edge of the fastener tape **10** by an injection molding means using such synthetic resin as polyamide, polyester, polyacetal, polypropylene and polybutylene terphthalate. The injection-molded fastener element **4** is comprised of the coupling head **6**, upper leg portion **7** and lower leg portion **8**. A concave portion in which the coupling head **6** of a corresponding injection-molded fastener element **4** can engage is formed between the coupling head **6***a*/**6***b* and upper/lower leg portions **7** and **8**.

[**0049**] In this injection-molded fastener element **4**, the metallic coating layer **20** is also formed on the upper leg portion **7** and coupling head **6** except the outer side faces of the upper leg portion **7** and coupling head **6** like the first embodiment. If the slider **17** is placed to catch the right and left fastener stringers **23** and then slid, the outer side face of the upper leg portion **7** of the injection-molded fastener element **4** comes into contact with the guide flange **19** of the slider **17**. Also the outer side face of the coupling head **6** comes into contact with the guide post **18**. However, there is no fear that metallic powder may be scattered because no metallic coating layer **20** is formed on any place of them.

[**0050**] The fastener element **1** of a fifth embodiment of the invention shown in **FIG. 11** is a metallic fastener element **5** formed by die-casting or shearing of metal such as aluminum alloy and zinc alloy. This metallic fastener element **5** is attached to the swollen edge portion on a side edge of the fastener tape **10** by crimping so as to form the fastener stringer **23**.

[**0051**] The metallic fastener element **5** is comprised of the coupling head **6**, upper leg portion **7** and lower leg portion **8**. The metallic coating layer **20** is formed on a top face of the coupling head **6** and the surface of the upper leg portion **7** except the outer side faces of the coupling head **6** and upper leg portion **7**. A base material of the metallic fastener element **5** is formed of relatively cheap metal such as aluminum alloy and zinc alloy and the metallic coating layer **20** is formed with expensive metal such as gold and silver. In the metallic fastener element **5** also, when the slider **17** is slid, there is no fear that the expensive metal on the metallic coating layer **20** may be scraped by sliding of the slider **17**, because no metallic coating layer **20** exists on the outer side face of the upper leg portion **7** which comes into contact with the guide flange **19** or the outer side face of the coupling head **6** which comes into contact with the guide post **18**.

[0052] In the fastener stringer **23** of a sixth embodiment of the invention shown in **FIG. 12**, when the fastener element **1** is attached and fixed to the fastener tape **10**, the fastener element **1** is woven into a side edge of the fastener tape **10** with the weaving yarn **13**. More specifically, the core cord **11** is inserted within the coil-shaped fastener element **2** shown in **FIG. 1** and this coil-shaped fastener element **2** is woven into the fastener tape **10** with warp yarn **14** for weaving the fastener tape **10** and weft yarn **15** of double pick. In this case, if a colorless transparent yarn or a yarn having a color similar to that of the metallic coating layer **20** is used for the warp yarn **14** to be disposed on top face of the metallic coating layer **20** of the coil-shaped fastener element **2**, the metallic gloss of the metallic coating layer **20** is not lost. Because the metallic coating layer **20** does not affect the sliding of the slider **17** directly, there is no fear that no metallic powder may be scattered.

[0053] In a fastener stringer **23** of a seventh embodiment of the invention shown in **FIG. 13**, when the fastener element **1** is attached and fixed to the fastener tape **10**, the fastener element **1** is knitted into a side edge of the fastener tape **10** with the warp knitting yarn **16**. More specifically, the coil-shaped fastener element **2** shown in **FIG. 1** is knitted into a side edge of the fastener tape **10** having warp knitting structure with warp knitting yarn **16** such as chain knitting yarn, two needle stitch yarn, tricot yarn or the like. If colorless transparent yarn or a yarn having a color similar to that of the metallic coating layer **20** is used for the warp knitting yarn **16** to be disposed on the top face of the metallic coating layer **20** of the coil-shaped fastener element **2**, the metallic gloss of the metallic coating layer **20** is not lost. Because the metallic coating layer **20** does not affect the sliding of the slider **17** directly, there is also no fear that the metallic powder may be scattered.

[0054] Further, by forming the fastener element **1** with colorless transparent material, it does not attract much attention that there is no metallic coating layer **20** on the outer face of the fastener element **1**, thereby improving the good appearance of the slide fastener.

[0055] The slider fastener of the present invention has the above-described structure, and the following effects are exerted with this structure.

[0056] According to the invention, the metallic coating layer **20** is formed on the top side surface of the fastener element **1**, except the outer side face thereof which makes contact with the guide flange **19** of the slider **17** and the outer side face of the coupling head **6** which makes contact with the guide post **18** of the slider **17**. As a result, such a phenomenon that the metallic coating layer **20** is scraped and metallic powder is scattered by contact with small burrs existing in the guide flange **19** or the guide post **18**, is prevented. Thus, the fastener element **1** having a beautiful metallic gloss can be used for a long term and a cheap, fashionable slide fastener can be provided to meet user's demands.

[0057] And the invention can be applied to various types of the fastener elements **1**, such as the coil-shaped fastener element **2**, zigzag-shaped fastener element **3**, injection-molded fastener element **4**, made of synthetic resin and metallic single-unit fastener elements **5**. As a result, in addition to the effect of the first or second aspect, there is an effect that various types of fastener elements **1** having a beautiful metallic gloss can be supplied to satisfy user's demands.

[0058] Further, the fastener element **1** is sewed to a side edge of the fastener tape **10** with sewing yarn **12** or woven into with weaving yarn **13** or knitted into with warp knitting yarn **16**. As a result, the fastener element **1** having a beautiful metallic gloss can be applied to various types of the slide fasteners easily, so that a beautiful slide fastener can be produced.

[0059] And further, the sewing yarn **12**, weaving yarn **13** and warp knitting yarn **16** to be disposed on top of the fastener element **1** for fixing the fastener element **1** onto the fastener tape **10** is formed of a transparent yarn or a yarn having a color similar to that of the metallic coating layer **20**. As a result, the yarn does not attract much attention, so that without hampering the function of the metallic coating layer **20** of the fastener element **1**, the beautiful metallic gloss can look more beautiful.

[0060] Still further, the slider **17** is formed by die-casting or injection molding using metal or synthetic resin. As a result, even if a conventional slider is used, there is no fear that the metallic coating layer **20** formed on the fastener element **1** may be damaged, so that the beautiful metallic gloss can be maintained for a long term. Therefore, the effects which the present invention exerts are very conspicuous.

What is claimed is (US):

1. A slide fastener having a pair of fastener stringers to which fastener elements are attached along facing edge portions of a pair of fastener tapes in the longitudinal direction and a slider which is slidable along the fastener elements and can couple or separate the fastener elements, wherein a metallic coating layer is formed on a top surface of a fastener element except an outer side face thereof in contact with a guide flange of the slider.

2. A slide fastener comprising a fastener element for slide fastener according to claim 1, wherein the metallic coating layer is formed on the top surface of the fastener element except an outer side face of a coupling head in contact with a guide post of the slider.

3. A slide fastener comprising a fastener element for slide fastener according to claim 1, wherein the fastener element is formed of coil-shaped fastener elements formed by winding synthetic resin monofilament in the shape of coil.

4. A slide fastener comprising a fastener element for slide fastener according to claim 1, wherein the fastener element is formed of zigzag-shaped fastener elements formed by bending synthetic resin monofilament in the shape of zigzag.

5. A slide fastener comprising a fastener element for slide fastener according to claim 1, wherein the fastener element is formed of injection-molded single-unit fastener elements formed by injection molding synthetic resin.

6. A slide fastener comprising a fastener element for slide fastener according to claim 1, wherein the fastener element is formed of single-unit metallic fastener elements formed by shearing or die-casting metal.

7. A slide fastener according to claim 1, wherein the fastener element is sewed to a side edge of a fastener tape with sewing yarn.

8. A slide fastener according to claim 1, wherein the fastener element is woven into a side edge of the fastener tape with weaving yarn.

9. A slide fastener according to claim 1, wherein the fastener element is knitted into a side edge of the fastener tape with warp knitting yarn.

10. A slide fastener according to claim 1, wherein the sewing yarn, weaving yarn and warp knitting yarn to be disposed on top of the fastener element for fixing the fastener element onto the fastener tape is formed of a transparent yarn or a yarn having a color similar to that of the metallic coating layer.

11. A slide fastener according to claim 1, wherein the slider is formed by die-casting or injection molding using metal or synthetic resin.

12. A slide fastener according to claim 1, wherein the fastener element is formed of colorless transparent material.

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