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(54) **HIGH-STRENGTH ONE-TOUCH REBAR COUPLER**

(71) Applicants: **Hyun Min Yang**, Gwangju (KR); **Ji Seong Yang**, Gwangju (KR)

(72) Inventors: **Hyun Min Yang**, Gwangju (KR); **Ji Seong Yang**, Gwangju (KR); **An Jong Yang**, Gwangju (KR)

(73) Assignees: **Hyun Min Yang**, Gwangju (KR); **Ji Seong Yang**, Gwangju (KR)

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CPC E04C 5/165; Y10T 403/5733; Y10T 403/5793
(Continued)

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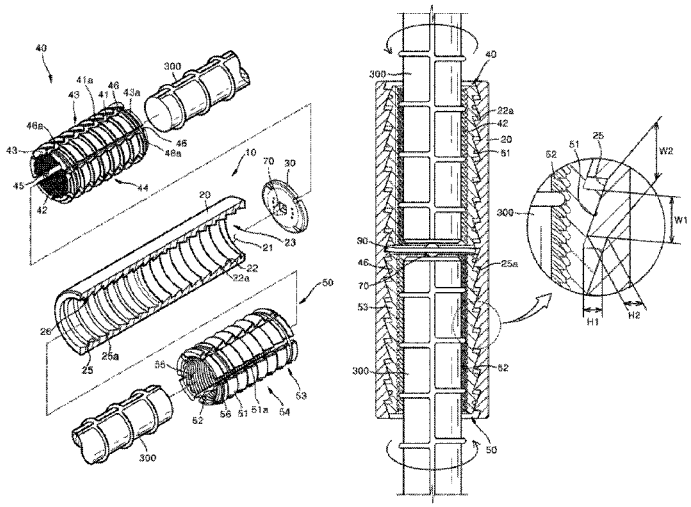
Primary Examiner — Joshua T Kennedy
(74) *Attorney, Agent, or Firm* — Maschoff Brennan

(57) **ABSTRACT**

A high-strength one-touch rebar coupler includes a coupler body having a hollow portion in the longitudinal direction. The coupler body is formed in a helical shape to provide the inner peripheral surface of the hollow portion with a rebar fastening force in the circumferential direction. The coupler body includes a first guide helix coupling portion, which has first guide sloping portions that slope from the center portion of the hollow portion towards the outside of one side thereof, and a second guide helix coupling portion, which has second guide sloping portions that slope from the center portion of the hollow portion towards the outside of the other side thereof. A first fastening unit is screw-coupled to the first guide helix coupling portion and inserted into one side of the hollow portion. The first fastening unit includes first fastening members, which are slidably coupled to the first guide sloping portions.

9 Claims, 12 Drawing Sheets



(58) **Field of Classification Search**
USPC 52/848, 849
See application file for complete search history.

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Fig. 1

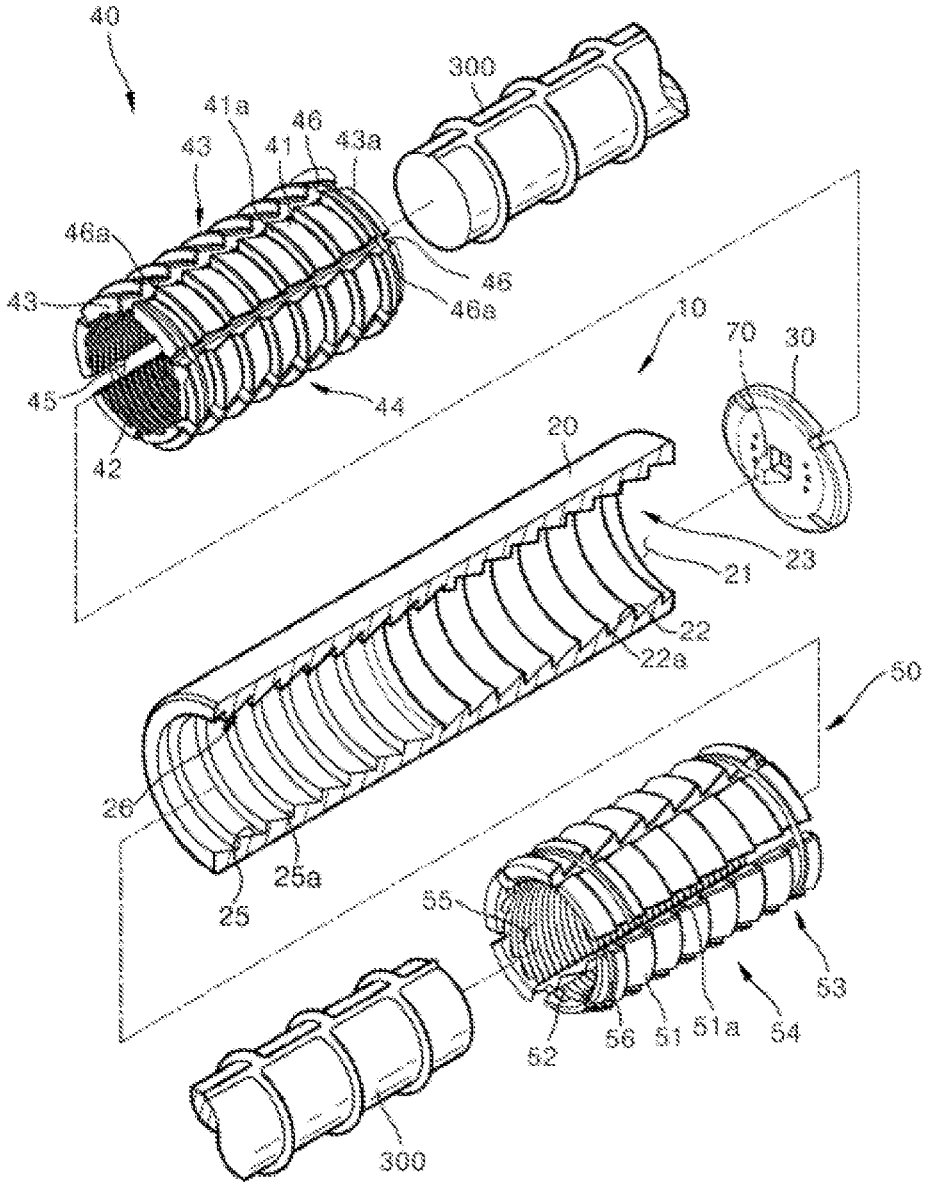
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Fig. 2

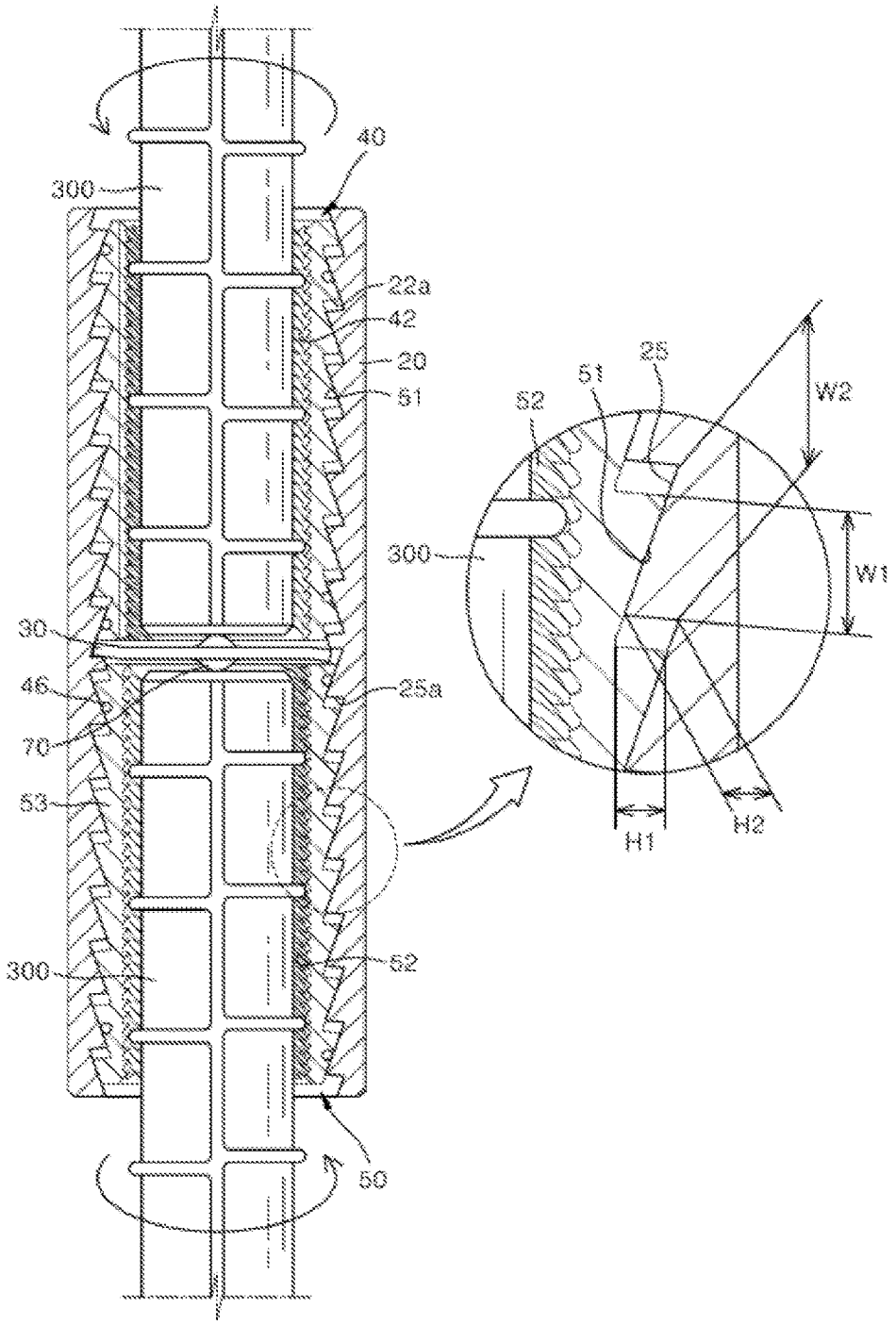

Fig. 3

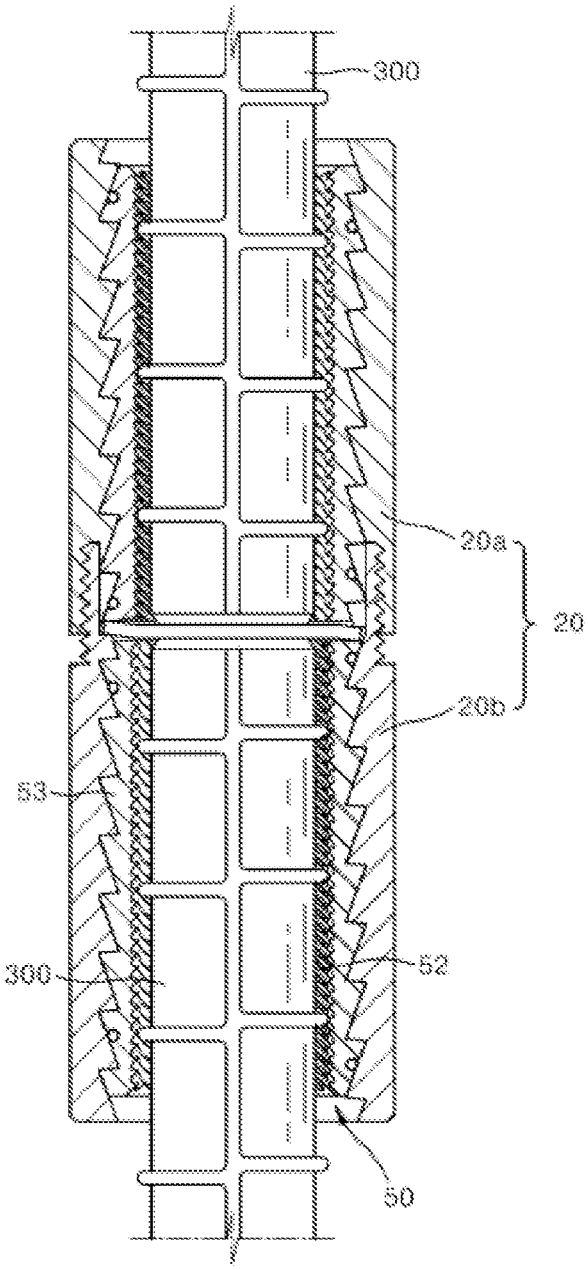

Fig. 4

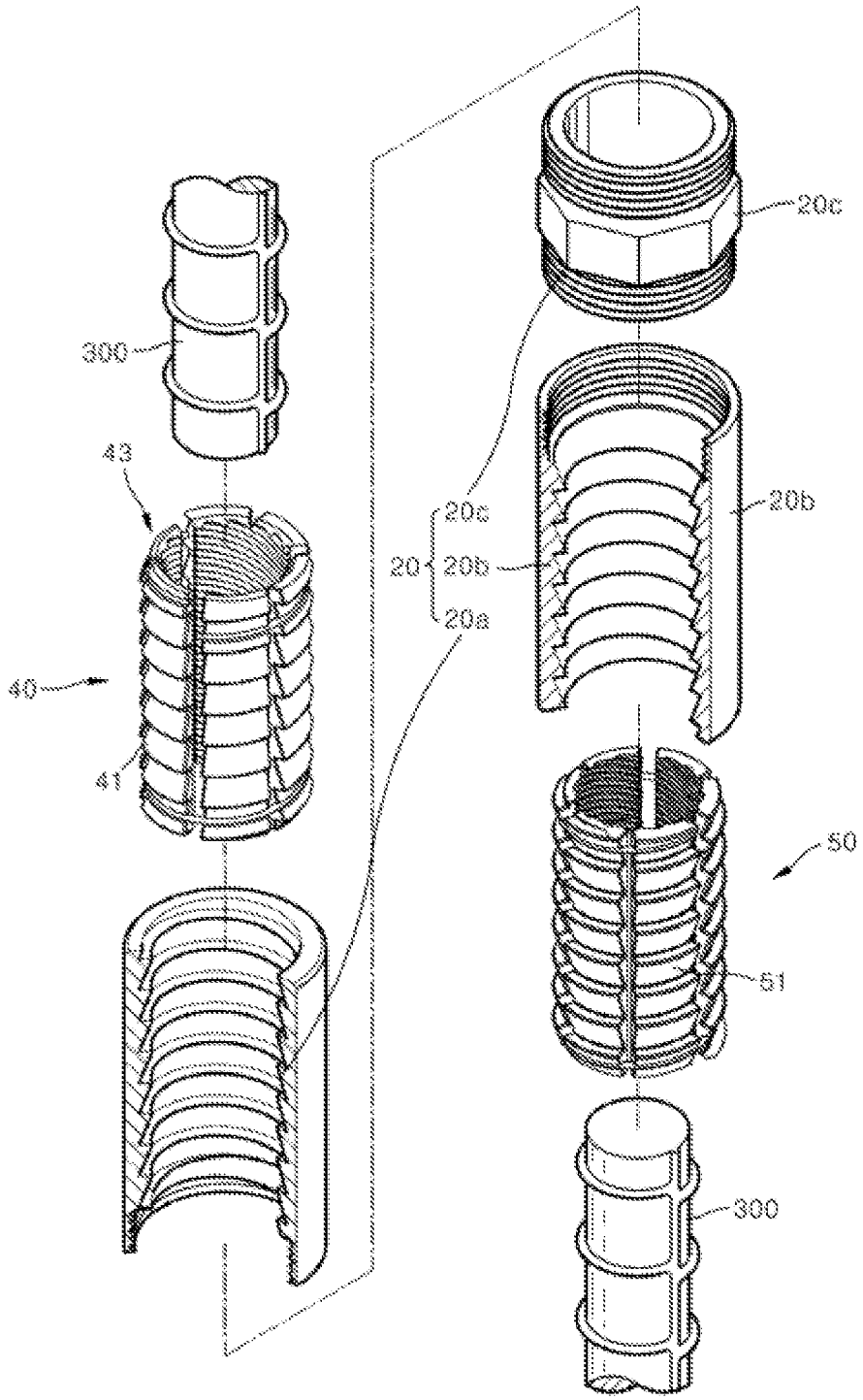

Fig. 5

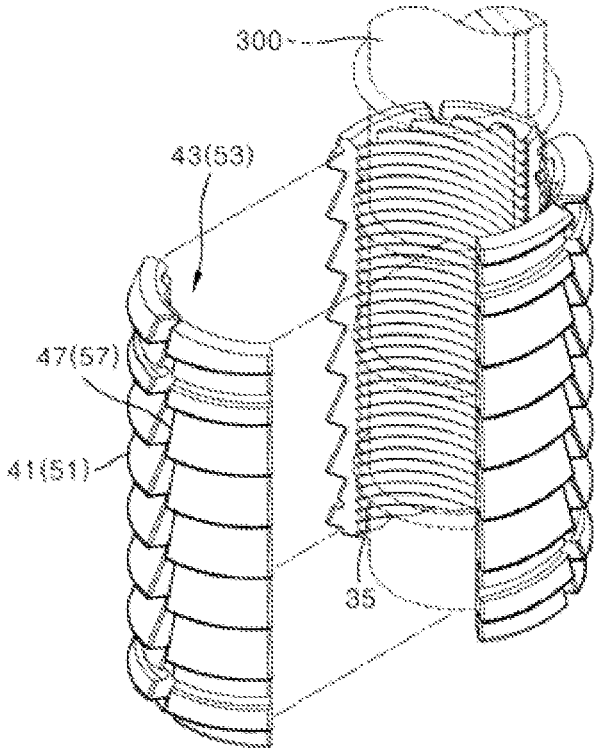

Fig. 6

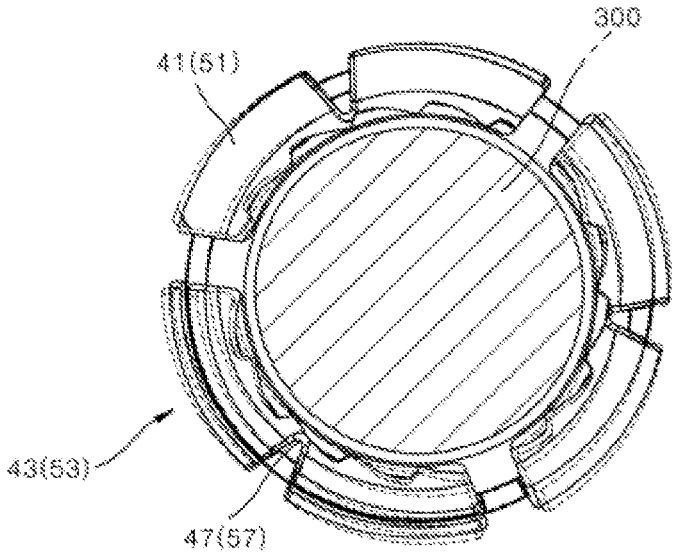

Fig. 7

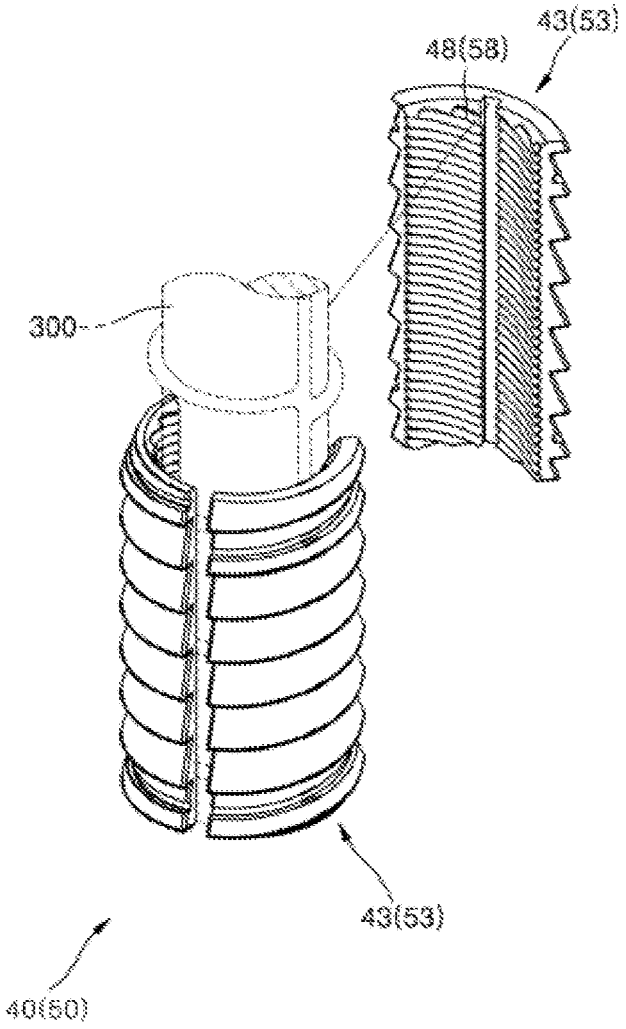

Fig. 8

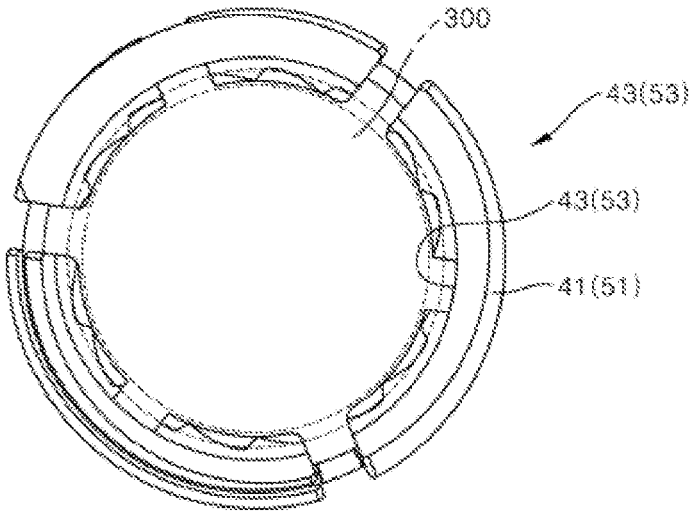

Fig. 9

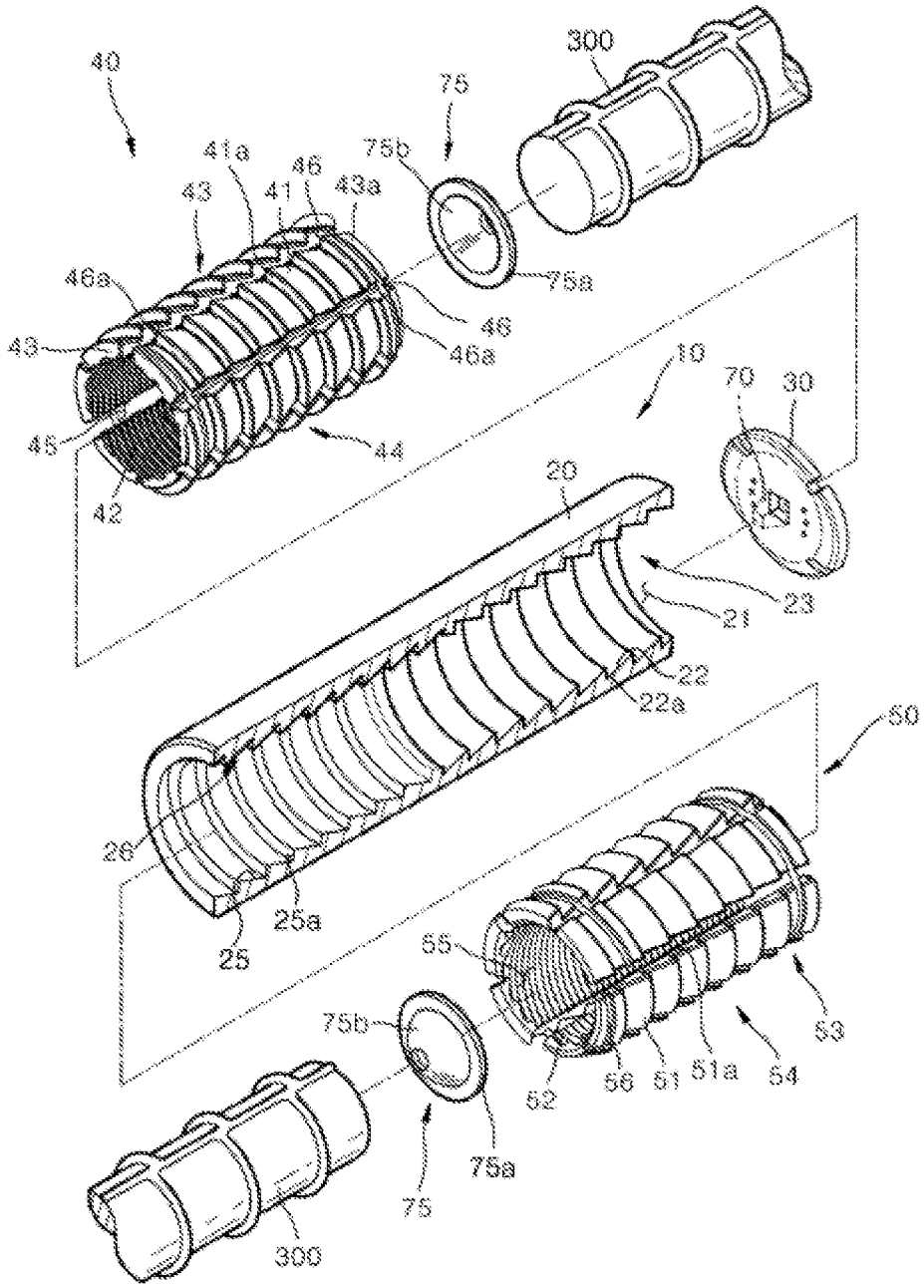
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Fig. 10

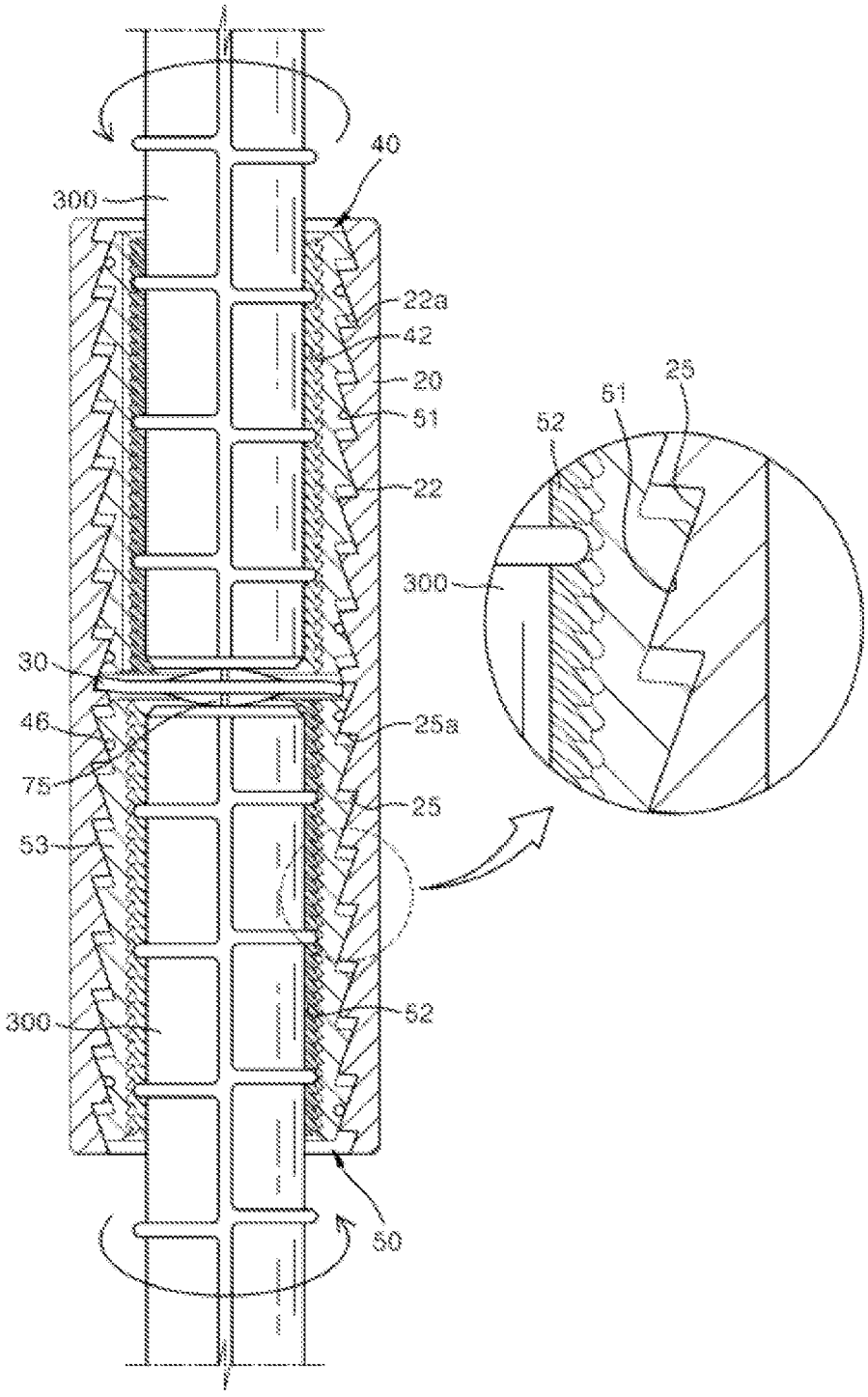


Fig. 11

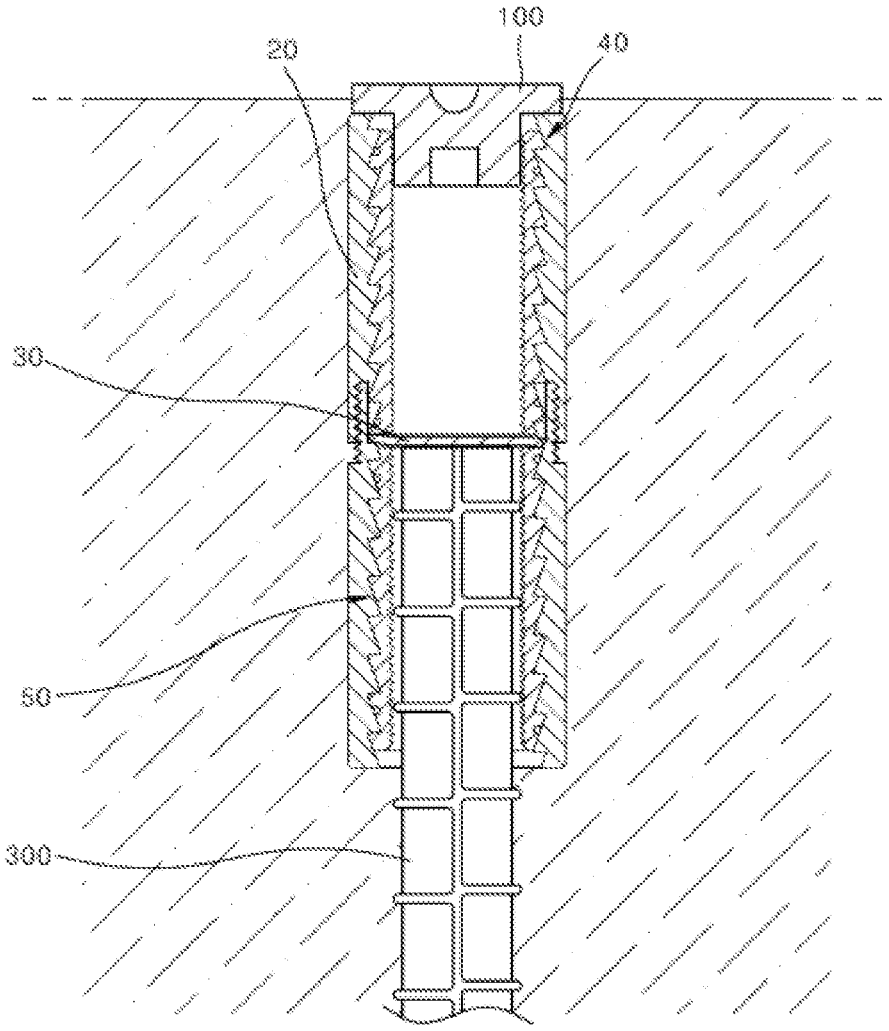


Fig. 12

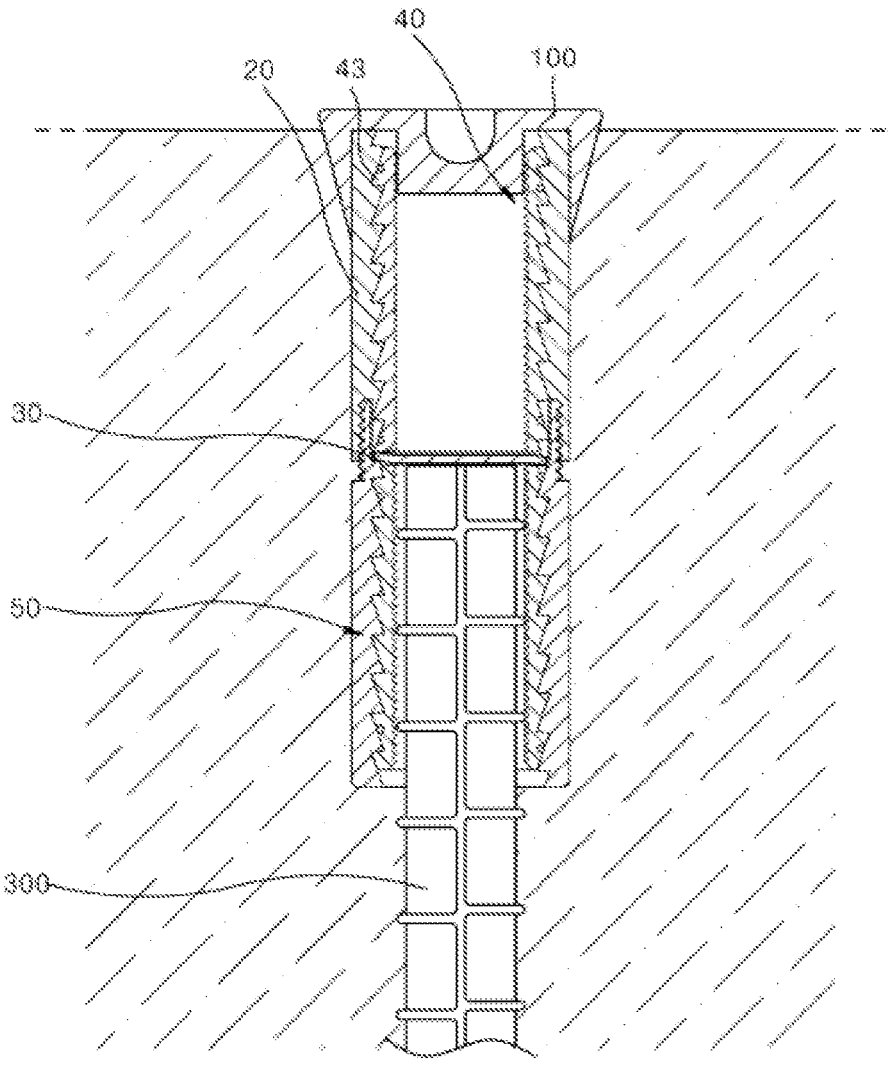
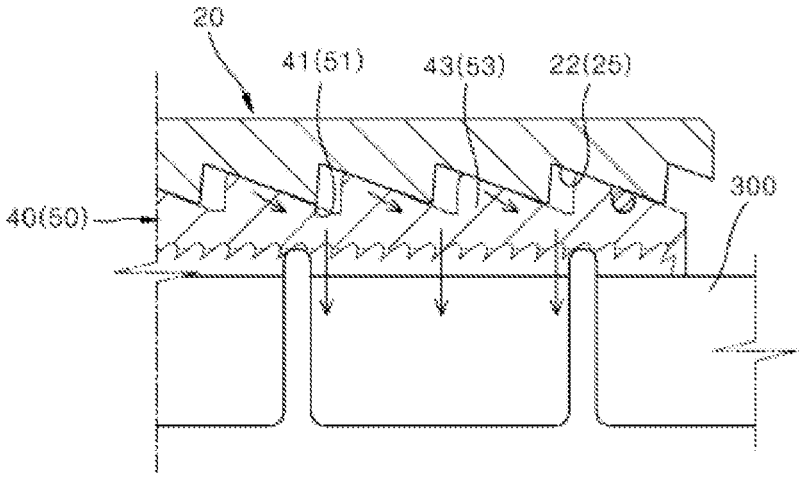


Fig. 13



HIGH-STRENGTH ONE-TOUCH REBAR COUPLER

TECHNICAL FIELD

The present invention relates to a rebar coupler, and more particularly, to a rebar coupler capable of interconnecting rebars during arrangement of rebars for building construction.

BACKGROUND ART

In general, concrete, which is a composite composed of cement, sand, gravel, water, etc. mixed in suitable ratios, has a relatively high compression strength, but has very low tensile strength compared to compression strength and easily cracks. In order to reinforce concrete (to enhance tensile strength), rebars are bound (arranged) inside forms within which the concrete is poured.

These conventional rebar-concrete structures are widely used in various construction and civil engineering works because they have excellent compression and tensile strengths sufficient for use in building various types of structures and have excellent physical properties.

Rebars used in reinforced concrete are reinforcing bars and are divided into round rebars and deformed rebars. Round rebars have a smooth surface, while deformed rebars have sections and ribs.

Deformed rebars are more adhesive to concrete than round rebars and reduce crack width when concrete cracks. As main rebars, deformed rebars are generally used instead of round rebars. The modulus of elasticity of deformed rebars is 2,040,000 kg/cm^2 and the coefficient of linear expansion is about 1.2×10-5/°C, which is almost the same as that of concrete.

These rebars are arranged in fabricating concrete structures for building construction and various civil engineering works. Since rebars are manufactured in standardized lengths, rebars of a predetermined length need to be interconnected in arranging the rebars.

Methods for connecting rebars during a typical rebar arrangement operation include a lap joint method, a welding joint method, a screw joint method, and a joining method with a joining device. In the lap joint method, wires are wound around ends of mutually overlapping deformed rebars to interconnect the same. With this method, rebar arrangement is relatively easily performed. However, this method is inconvenient since wires should be wound around each rebar. Moreover, the bending strength of the connecting portion is weak, which poses a safety problem. In the welding joint method, the end portions of the rebars are welded to each other, and the strength of the connection portion is good. However, the work is very inconvenient and takes a long time, causing construction delays. In the screw joint method, the connecting ends of deformed bars are screwed and interconnected. Thus, this method requires equipment for machining the connecting ends.

In view of the above, Korean Patent No. 1030579 (Apr. 21, 2011) discloses a reinforcing bar coupler. In this document, a pair of reinforcing bars is inserted into a hollow cylindrical tube from the outer ends of both sides of the hollow cylindrical tube and the reinforcing bars are arranged so as to be symmetrical about the center in the longitudinal direction, and the coupler includes a coupler cap provided with threads and a fastening spring coupled to the threads.

With this rebar coupler, each portion contacting the fastening spring is subjected to intense stress and the gripping portion is likely to be sheared.

Korean Patent No. 1003302 (Dec. 22, 2010) discloses a high strength steel reinforcement coupler. The disclosed reinforcement coupler includes a plurality of coupler housings having tapered portions and coupled to each other, and a plurality of coupler locks provided inside the coupler housings and having tapered portions corresponding to the respective tapered portions of the coupler housings.

In the conventional couplers configured as described above, the gripping portions of the rebars are supported by the respective coupler locks, and thus the supporting force is distributed over the gripping portions and displacement of the rebars is relatively large while the connected rebars are gripped.

In addition, manufacturing costs of the conventional couplers are relatively high. Further, there are many parts to tighten in using the coupler in the field, and thus it takes a lot of time to assemble the reinforcing bars.

Korean Patent Registration No. 0977658 (Aug. 17, 2010) discloses a bar connecting apparatus. The bar connecting apparatus includes a pair of bodies each having a cylindrical shape facing each other and adapted to receive an object such as a bar, a plurality of stoppers provided in the pair of bodies and having two or more steps to hold the object such as a bar tightly; a spring provided on a bottom surface of the plurality of stoppers to elastically support the plurality of stoppers in a longitudinal direction of the pair of bodies; and an elastic ring provided on the inner periphery of the plurality of stoppers to elastically support the plurality of stoppers in a radial direction of the pair of bodies.

The conventional bar connecting apparatus configured as described above has collet type stoppers stacked inside the body in the longitudinal direction, and accordingly tightening force is concentrated on parts corresponding to the respective collets. Particularly, as described above, since the body has a complex structure in which a plurality of stoppers is stacked in the longitudinal direction, it is difficult to manufacture the apparatus and rebars are interfered with by the stoppers in connecting the rebars to be coupled. In addition, since a plurality of stoppers is stacked in the longitudinal direction, displacement of the rebars becomes severe when the coupled rebars are tensioned as described above.

DISCLOSURE

Technical Problem

Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide a high-strength one-touch rebar coupler capable of causing a uniform gripping force to act relatively strongly on the rebar coupling portions for coupling rebars to prevent shearing of the rebars at a specific portion of the coupling portions when the connected rebars are tensioned.

Another object of the present invention is to provide a high-strength one-touch rebar coupler capable of increasing the gripping force to rebars by using a turning force in connecting the rebars, minimizing the displacement of the rebars when the connected rebars are tensioned, and minimizing troubles caused by coupling between the rebars and tightening members in coupling the rebars.

Technical Solution

In accordance with one aspect of the present invention, provided is a high-strength one-touch rebar coupler including:

a coupler body provided with a hollow portion formed in a longitudinal direction, the coupler body including a first guide screw coupling portion having a first guide slope formed in a helical shape on an inner circumferential surface of the hollow portion to provide tightening force to a rebar in a circumferential direction and inclined from an inside of the hollow portion to an outside of the hollow portion, and

a tightening unit screw-coupled with the first guide screw coupling portion of the coupler body and inserted into the hollow portion, the tightening unit including a plurality of first tightening members each being provided with a first tightening screw coupling portion of a helical shape having a first tightening slope formed on an outer circumferential surface thereof so as to be slidably engaged with the first guide slope and provide tightening force to a rebar to be connected by moving in a direction opposite to a radial direction when a tensile force acts on the rebar and a gripping portion formed on an inner circumferential surface thereof to grip an outer circumferential surface of the rebar.

The outer circumferential surfaces of the first tightening members are provided with at least one elastic support ring for maintaining the first tightening members in an assembled state when the first tightening members are inserted into the coupler body.

In accordance with another aspect of the present invention, provided is a high-strength one-touch rebar coupler including: a coupler body provided with a hollow portion formed in a longitudinal direction, the coupler body including a first guide screw coupling portion having a plurality of first guide slopes formed in a helical shape on an inner circumferential surface of the hollow portion to provide tightening force to a rebar in a circumferential direction and outwardly inclined from a central portion of the hollow portion to one side and a second guide the screw coupling portion having a plurality of second guide is slopes outwardly inclined from the central portion of the hollow portion to an opposite side;

a first tightening unit screw-coupled with the first guide screw coupling portion of the coupler body and inserted into one side of the hollow portion, the first tightening unit including a plurality of first tightening members each being provided with a first tightening screw coupling portion having a first tightening slope formed on an outer circumferential surface thereof so as to be slidably engaged with each of the first guide slopes and provide tightening force to a rebar to be connected by moving in a direction opposite to a radial direction when a tensile force acts on the rebar and a first gripping portion formed on an inner circumferential surface thereof to grip an outer circumferential surface of the rebar; and

a second tightening unit screw-coupled with the second guide screw coupling portion of the coupler body and inserted into an opposite side of the hollow portion, the second tightening unit including a plurality of second tightening members each being provided with a second tightening screw coupling portion having a second tightening slope formed on an outer circumferential surface thereof so as to be slidably engaged with each of the second guide slopes and provide tightening force to a rebar to be connected by moving in the radial direction when a tensile force acts on the rebar and a second gripping portion formed on an inner circumferential surface thereof to grip an outer circumferential surface of the rebar.

The first tightening unit including the first tightening members and the second tightening unit including the second tightening members are provided with at least one elastic support ring for maintaining the first tightening unit and the second tightening unit in an assembled state when the first tightening unit and the second tightening unit are inserted into the coupler body. The high-strength one-touch rebar coupler further includes a stopper plate for defining coupling positions of the rebars provided to a boundary portion of the coupler body between the first guide screw coupling portion and the second guide screw coupling portion. The inner circumferential surfaces of the first tightening members and the second tightening members are provided with a first coupling groove and a second coupling groove, respectively, to allow the first tightening members or the second leading members to be coupled with the rebar and rotated when the rebar rotates. The outer circumferential surfaces of the first tightening members and the second tightening members are provided with a first elastic deformation groove and a second elastic deformation groove, respectively, the first elastic deformation groove and the second elastic deformation groove being elastically or plastically deformed to allow the first tightening members or the second leading members to closely contact the outer circumferential surface of the rebar when the first tightening members or the second tightening members are brought into close contact with the outer circumferential surface of the rebar.

The high-strength one-touch rebar coupler further includes an elastic member provided between the stopper plate and the first tightening unit and between the stopper plate and the second tightening unit, respectively.

Advantageous Effects

As apparent from the foregoing description, a high-strength one-touch coupler according to embodiments of the present invention may facilitate coupling of rebars to be connected, minimize displacement of the rebars in the direction in which the rebars are tensioned when tensile force acts on the rebars, and have a relatively simple structure. Therefore, productivity may be improved.

DESCRIPTION OF DRAWINGS

FIG. **1** is an exploded perspective view illustrating a high strength one-touch reinforced concrete couple according to an embodiment of the present invention.

FIG. **2** is a cross-sectional illustrated the high-strength one-touch rebar coupler shown in FIG. **1**.

FIG. **3** is a cross-sectional view illustrating a high-strength one-touch rebar coupler according to another embodiment of the present invention.

FIG. **4** is an exploded perspective view illustrating a high-strength one-touch rebar coupler according to still another embodiment of the present invention.

FIG. **5** is an exploded perspective view illustrating a tightening unit.

FIG. **6** is a cross-sectional view of the tightening unit shown in FIG. **5**.

FIG. **7** is an exploded perspective view illustrating a tightening unit according to another embodiment of the present invention.

FIG. **8** is a cross-sectional view of the tightening unit shown in FIG. **7**.

FIG. **9** is an exploded perspective view illustrating a high-strength one-touch rebar coupler according to other embodiments of the present invention.

FIG. **10** is a cross-sectional view of the high-strength one-touch rebar coupler shown in FIG. **9**.

FIGS. **11** and **12** are cross-sectional views illustrating installation of a protective cap on a high-strength one-touch coupler of the present invention.

FIG. **13** is a cross-sectional view illustrating operation of a high-strength one-touch rebar coupler according to the present invention.

BEST MODE

The high-strength one-touch rebar coupler according to the present invention interconnects rebars when the rebars are arranged for civil engineering works, construction of buildings and the like. One embodiment thereof is shown in FIGS. **1** to **3**.

Referring to FIGS. **1** to **3**, a high-strength one-touch rebar coupler **10** according to the present invention serves to connect rebars or circular rods to each other in the longitudinal direction and includes a coupler body **20** for connecting rebars **300**, and first and second tightening units **40** and **50** for providing gripping force to coupling portions of the rebars **300** inserted into and supported by the hollow portion of the coupler body **20**.

The coupler body **20** has a hollow portion **21** formed in the longitudinal direction thereof. A first guide screw coupling portion **23** having a first guide slope **22** for providing gripping force to a rebar and formed in a helical shape is provided on an inner circumferential surface of the hollow portion **21** at one side of the center portion of the coupler body **20**, and a second guide screw coupling portion **26** having a plurality of second guide slopes **25** for providing tightening force to a rebar and formed in a helical shape is formed on an inner circumferential surface of the hollow portion **21** at the opposite side of the coupler body **20** corresponding to the one side.

The first and second guide slopes **22** and **25** provided to the first and second guide screw coupling portions **23** and **26** formed on the inner circumferential surface of the coupler body **20** are formed in opposite directions. The first and second guide slopes **22** and **25** are formed from the inner circumferential surface toward the outer circumferential surface of the coupler body **20** so as to have a uniform inclination angle. The inclination angle is preferably set to be in a range between 10° and 45° with respect to the central axis of the hollow portion of the coupler body **20**. The first and second guide slopes **22** and **25** are formed to be inclined from the inside of the coupler body **20** toward the center of the hollow portion **21** in the outward direction. That is, the slopes are inclined so as to gradually protrude from the inside to the outside.

A first support step **22***a* is formed at boundary portions of the first guide slopes **22** in a normal direction with respect to the center of the hollow portion **21**, and a second support step **25***a* is formed at boundary portions of the second guide slopes **25** in a normal direction with respect to the center of the hollow portion **21**. The first guide slope **22** and the second guide slope **25** are formed in a helical shape. The first guide slope **22** and the second guide slope **25** have a continuous spiral structure in the longitudinal direction.

When the first guide screw coupling portion **23** and the second guide screw coupling portion **26** are formed on both sides of the coupler body **20** with respect to the longitudinal center of the coupler body **20** as described above, a stopper plate **30** integrated with the coupler body **20** or formed of a separate member is provided therebetween.

The stopper plate **30** restricts the insertion length of the rebar coupling portions of rebars to be coupled. That is, the stopper plate **30** installed inside the central portion of the coupler body **20** may define a length by which the two rebars **300** to be coupled are inserted through the rebar insertion portions **45** and **55** of the first and second tightening units **40** and **50**, such that the lengths of the coupling portions of the two rebars are substantially equal to each other.

As shown in FIGS. **1** and **2**, the stopper plate **30** may be formed in a disc shape so as to be screw-coupled to one side of the first or second guide screw coupling portions **23**, **26** and positioned at the central portion of the coupler body **20**. The edge of the disc-shaped stopper plate **30** is bent according to the angle of the helix of the first or second guide screw coupling portion **23**, **26**, such that the stopper plate **30** can remain perpendicular to the longitudinal direction of the coupling body **20** when coupled with the coupling body **20**. In this process, a part of the disc-shaped stopper plate **30** is preferably cut away from the edge toward the center, such that bending can be smoothly maintained.

The first and second guide screw coupling portions **23** and **26** formed on the inner circumferential surface of the coupler body **20** may be provided by machining, forging, or shaping the inner circumferential surface of the coupler body **20**. As shown in FIG. **3**, the coupler body **20** may include first and second body members **20***a* and **20***b* which are screw-coupled to each other with respect to the central portion thereof. Alternatively, as shown in FIG. **4**, the first and second body members **20***a* and **20***b* may be screw-coupled to a connecting member **20***c*, respectively.

The coupler body is not limited to the above-described embodiment, only a first guide screw coupling portion having a first guide slope may be formed in the hollow portion of the coupler body, and one first tightening unit may be installed in the coupler body. In this case, although not shown in the figures, the first guide screw coupling portion of the coupler body and the first tightening unit have substantially the same structures as those of the above-described embodiment. A flange for coupling the coupler body to rebar or a building structure may be formed on one side of the coupler body.

The first and second tightening units **40** and **50** are screw-coupled to the first and second guide screw coupling portions **23** and **26** formed on both sides of the central portion of the coupler body **20** to provide gripping force to the rebars **300**. The first and second tightening units **40** and **50** have substantially the same configuration.

As shown in FIGS. **1** and **2**, the first tightening unit **40** is slidably engaged with the first guide slope **22** of the first guide screw coupling portion **23**, and is moved in a direction opposite to the radial direction to provide tightening force to the coupled rebars **300** when force is exerted on the rebars. The first tightening unit **40** includes a plurality of first tightening members **43**, which are provided with a plurality of first tightening slopes **41** formed on the outer circumferential surface thereof so as to form a helix corresponding to the first guide slope **22** of the first guide screw coupling portion **23** and with a first gripping portion **42** formed on the inner surface thereof to grip an outer circumferential surface of a rebar to be connected. The first tightening members **43** are arranged in the circumferential direction such that the first tightening slopes **41** of the first tightening members **43** form a continuous helix in contact with the first guide slope **22**. That is, as shown in FIGS. **1** and **2**, the first tightening members **43** constituting the first tightening unit **40**, namely, two to six (substantially three) tightening members **43**, are arranged in the circumferential direction to form a first tightening screw coupling portion **44** having the first tightening slopes **41** on the outer circumferential surface thereof. When the rebars are inserted into the first tightening unit **40**,

the first tightening members **43** forming the first tightening screw coupling portion **44** are separated while being moved in the radial direction. The first tightening slope **41** formed on the outer circumferential surface of the first tightening member **43** is guided along the first guide slope **22** formed on the inner circumferential surface of the coupler body **20**, thereby maintaining a circular arrangement.

As the first tightening members **43** are arranged in a circumferential direction, the first gripping portions **42** formed on the inner circumferential surface of each first tightening member **43** form a rebar insertion portion **45** into which the rebars **300** to be coupled are inserted. The first tightening members **43** are supported by an elastic support ring **46** so as to maintain the arrangement thereof in the circumferential direction. The outer circumferential surfaces of the first tightening members **43** constituting the first tightening unit **40** are provided with support grooves **46***a* for preventing the elastic support rings **46** from being supported when the first tightening members **43** are displaced. The support groove **46***a* may be formed in an extended portion **43***a* extending from both ends of the first tightening member **43** by a predetermined length. However, the present invention is not limited thereto, and a support groove **46***a* may be formed between the first tightening slopes **41** in the circumferential direction.

As shown in FIGS. **1** and **2**, the first tightening slopes **41** formed on the first tightening members **43** have a structure gradually drawn in from the inside to the outside such that the first tightening member **43** can be moved to the outer circumferential surface of the connected rebar **300** when the first tightening slopes **41** slide in contact with the first guide slope **22**. The height H1 of the first tightening slopes **41** is set to be substantially equal to the height H2 of the first guide slope **22**. The width W1 of each of the first tightening slopes **41** is set to be substantially equal to the width W2 of the first guide slope **22**.

The first tightening slopes **41** formed on the first tightening members **43** are formed in the circumferential direction or in an oblique direction with respect to the central axis of the coupler body.

A third support step **41***a* is formed at a boundary portion between the first tightening slopes **41** in a direction normal to the center of the hollow portion **21** by being inclined with respect to the first tightening slopes **41**. The first gripping portion **42** of the first tightening member **41** may be formed with bumps or helical protrusions to increase frictional interaction with the rebar **300** coupled to the first gripping portion **42**. The helical protrusions may be formed of a double helix or multiple helixes. However, the present invention is not limited thereto.

The second tightening unit **50** is slidably engaged with the second guide slope **25** of the second guide screw coupling portion **26**, and is moved in the opposite direction to the radial direction to provide tightening force to the coupled rebars **300** when force is exerted on the rebars. The second tightening unit **50** includes a plurality of second tightening members **53**, which are provided with a plurality of second tightening slopes **51** formed on the outer circumferential surface thereof so as to form a helix corresponding to the second guide slope **25** of the second guide screw coupling portion **26** and with a second gripping portion **52** formed on the inner surface thereof to grip an outer circumferential surface of a rebar to be connected. The second tightening members **53** are arranged in the circumferential direction such that the second tightening slopes **51** of the second tightening members **53** form a continuous helix in contact with the second guide slope **25**. That is, as shown in FIGS. **1** and **2**, the second tightening members **53** constituting the second tightening unit **50**, namely, two to six (substantially three) tightening members **53** are arranged in the circumferential direction to form a second tightening screw coupling portion **54** having the second tightening slopes **51** on the outer circumferential surface thereof. When rebars are inserted into the second tightening unit **50**, the second tightening members **53** forming the second tightening screw coupling portion **54** are separated while being moved in the radial direction. The second tightening slope **51** formed on the outer circumferential surface of the second tightening member **53** is guided along the second guide slope **25** formed on the inner circumferential surface of the coupler body **20**, thereby maintaining a circular arrangement.

As the second tightening members **53** are arranged in a circumferential direction, the second gripping portions **52** formed on the inner circumferential surface of each second tightening member **53** form a rebar insertion portion **55** into which the rebars **300** to be coupled are inserted. The second tightening members **53** are supported by an elastic support ring **56** so as to maintain the arrangement thereof in the circumferential direction.

The second tightening slopes **51** formed on the second tightening members **53** have a structure gradually drawn in from the inside to the outside such that the second tightening member **53** can be moved to the outer circumferential surface of the connected rebar **300** when the second tightening slopes **51** slide in contact with the second guide slope **22**. The second tightening slopes **51** formed on the second tightening members **53** are formed in the circumferential direction or in an oblique direction with respect to the central axis of the coupler body.

A fourth support step **51***a* is formed at a boundary portion between the second tightening slopes **51** in a direction normal to the center of the hollow portion **21** by being inclined with respect to the second tightening slopes **51**. The second gripping portion **52** of the second tightening member **51** may be formed with bumps or helical protrusions to increase frictional interaction with the rebar **300** coupled to the second gripping portion **52**. The helical protrusions may be formed in a double helix or multiple helixes. However, the present invention is not limited thereto.

As shown in FIGS. **5**, **6** and **7**, in order to prevent the rebar insertion portion **45**, **55** formed by the first tightening member **43** or the second tightening members **53** from being maintained in a non-circular shape, the first tightening member **43** and the second tightening member **53** may be provided with elastic deformation grooves **47** and **57** for deformation in the longitudinal direction on the outer circumferential surfaces thereof, such that, when the gripping force is applied to the rebars, the first tightening member **43** and the second tightening member **53** can be elastically deformed or plastically deformed to closely contact the outer circumferential surfaces of the rebars according to the curvature of the outer circumferential surfaces of the rebars. When rebars having a diameter larger or smaller than the diameters of the rebar insertion portion **45** formed by the first tightening members **43** and the rebar insertion portion **55** formed by the second tightening members **53** are connected, the first and second elastic deformation grooves **47** and **57** formed on the outer side of the first and second tightening members **43** and **53** in the longitudinal direction ensure smooth deformation such that the first tightening member **43** or the second tightening members **53** can closely contact the outer circumferential surfaces of the reinforcing bars **300**.

As shown in FIGS. **7** and **8**, at least one of the first tightening members **43** and the second tightening members **53** constituting the first tightening unit **40** and the second tightening unit **50** is provided at the inner side thereof with first or second coupling grooves **48**, **58** coupled to the bead or the lead of the rebar **300** to allow the first tightening members **43** or the second tightening members **53** to rotate when the rebar **300** rotates. The first and second coupling grooves **48** and **58** are formed on the inner circumferential surfaces of the first and second tightening members **43** and **54** in the longitudinal direction, and are preferably formed to be wider than the width of the bead formed in the longitudinal direction of the rebar **100**.

The inner circumferential surfaces of the first tightening member **43** and the second tightening member **53** are not limited to the circular shape, but may be formed in a polygonal shape. That is, they may vary depending on the cross-sectional shape of the rebars or connecting members to be connected (round bar, square bar, octagonal bar, hexagonal bar, etc.).

In the high-strength one-touch rebar coupler as described above, the number of threads of the first guide screw coupling portion **23** formed on the inner circumferential surface of the hollow portion of the coupler body **20** is substantially equal to or larger than the number of threads of the first tightening screw coupling portion **44** formed on the first tightening member **43** of the first tightening unit **40**, and the number of threads of the second guide screw coupling portion **25** formed on the inner circumferential surface of the hollow portion of the coupler body **20** is substantially equal to or larger than the number of threads of the second tightening screw coupling portion **55** formed on the second tightening member **53** of the second tightening unit **50**. However, the present invention is not limited thereto.

The number of the first guide slopes **22**, the number of the first tightening slopes **51**, the number of the second guide slopes **25** and the number of the second tightening slopes **51** are set to be equal to each other, gripping force may uniformly act on each part of the coupling portions of the rebars to be interconnected.

In the above embodiment, the first and second guide screw coupling portions **23** and **26** formed on the coupler body and the spiral threads of the first and second fastening screw coupling portions **44** and **54** may be formed as a double helix or multiple helixes.

Although not shown in the figures, an elastic member for elastically biasing the first tightening unit **40** and the second tightening unit **50** in the outward direction is preferably interposed between the stopper plate **30** and the first tightening unit **40** and between the stopper plate **30** and the second tightening unit **50** to allow rebars to be smoothly inserted into the rebar insertion portions **45** and **55** to be coupled with the first tightening members **43** of the first tightening unit **40** and the second tightening members **53** of the second tightening unit **50**. The elastic member may be formed of an elastic spring, elastic rubber, or a resin having elasticity.

In addition, cushioning members **70** for supporting the rebars may be installed between the stopper plate **30** and the connected rebars **300**, as shown in FIGS. **1** and **2**.

The cushioning members **70** may be fixed to the stopper plate. In this case, the elastic member preferably protrudes from both surfaces of the stopper plate **30** through the stopper plate.

As shown in FIGS. **9** and **10**, the elastic pieces **75** may be provided between the stopper plate and the ends of the rebar.

Referring to the figures, each of the elastic pieces **75** is formed of a plate-shaped member and includes an elastic body portion **75***a* supported by the stopper plate **50** and an elastic support **75***b* that protrudes upward from the elastic body portion **75***a* to support the lower surface of the rebars **300** such that the rebars can rotate smoothly. The elastic support **75***b* is preferably provided with a conical deforming projection which is deformable so as to allow the ends of the rebars **300** to closely contact the upper surface of the stopper place **30** as the first tightening unit **40** or the second tightening unit **50** moves according to rotation of the rebars and the rebars **300** are lowered.

Although not shown in the figures, the elastic supports may be formed by beading the elastic body portions or formed of elastic pieces bent upward by providing a plurality of cut portions extending from the central portion in the radial direction. Further, the elastic supports may be formed by causing the plate-shaped elastic body portions to protrude to an upper portion through lancing. In addition, the elastic body portion is preferably provided with coupling pieces (not shown) coupled to the first tightening member **43** or the second tightening member **53** at the edge thereof such that the elastic body portion can be inserted into the coupler body **20** while being coupled to the first tightening unit **40** or the second tightening unit **50**.

Meanwhile, the coupler body may be formed in a cross shape according to the connection purpose as shown in the figure, but the present invention is not limited thereto. The coupler body may have a T-shape, multiple outlets having branch portions branched from the main body, or an elbow shape.

As shown in FIGS. **10** and **11**, when it is necessary to connect the rebars after concrete mortar is laid, the end of the coupling body exposed from the concrete mortar may be provided with a protective cap **100** for preventing introduction of the concrete mortar into the coupling body. The outer circumferential surface of the protective cap **100** may be inclined inward toward the end side, thereby facilitating detachment of the concrete mortar when the concrete mortar is cured. A handle (not shown) for separating the cap may be formed on the upper surface of the protective cap **100**.

The shape of the protective cap is not limited to the above-described embodiment, but the protective cap may have any shape as long as it can prevent the concrete mortar from being introduced into the exposed coupling body.

Hereinafter, operation of the high-strength one-touch coupler of the present invention configured as described above will be described.

First, in order to interconnect rebars using the one-touch coupler **10** according to the present invention, rebar to be coupled is inserted into the hollow portion **21** at one side of the coupler body **20**. During insertion operation through the hollow portion **21**, the rebar **300** is inserted into the rebar insertion portion **45** of the first tightening unit **40**. At this time, the first tightening slopes **42** of the first tightening members **43** slide along the first guide slope **22** formed on the inner circumferential surface of the coupler body **20** as the first tightening members **43** are spread outward. In the process of inserting the rebar **300** for coupling as described above, insertion of the rebar **300** is restricted as an end of the rebar contacts the stopper plate **30** located at the center of the coupler body **20**.

As shown in FIG. **10**, with the rebars **300** to be connected inserted into the first and second tightening units **40** and **50**, the ends of the rebars **300** are supported by the elastic supports **75***b* of the elastic pieces **75** supported by the stopper plate **50**.

In this state, the first tightening member **30** and the second tightening member **40** rotate the coupled rebars **300** to tighten the coupled rebars **300**. That is, since helical protrusions are formed on the inner circumferential surfaces of the first and second gripping portions **42** and **52**, the elastic supports **75***b* of the elastic pieces **75** are collapsed as the first and second tightening units **40** and **50** move toward the stopper plate **30**. In this process, the elastic supports **75***b* support the rebars **300** such that the rebars **300** can be smoothly rotated.

In this process, the ribs formed on the outer circumferential surfaces of the rebars **300** are inserted into the first coupling grooves **48** or the second engaging grooves **58** and the protrusions formed on the first and second gripping portions **42** and **52** will pierce the rebars since the first coupling grooves **48** are formed in the longitudinal direction on the inner surface of each first tightening member **43** constituting the first tightening unit **40**, and the second coupling grooves **58** are formed in the longitudinal direction on the inner surface of each first tightening member **43** constituting the second tightening unit **50**. In particular, as the rebars **300** coupled with the first coupling grooves **48** or the second coupling grooves **58** rotate the first tightening unit **40** and the second tightening unit **50**, the first and second tightening units **40** and **50** may be raised with respect to the coupler body **20** and the coupling force to the rebars may be increased.

As described above, the first tightening members **43** or the second tightening members **53** closely contact the outer circumferential surface of the rebar **300** during the movement of the first and second tightening units **40** and **50**. Since the elastic deformation grooves **47** and **57** are formed on the outer circumferential surfaces of the first tightening members **43** and the second tightening members **53** in the longitudinal direction, the first tightening members **43** or the second tightening members **53** may be elastically or plastically deformed so as to be brought into close contact with the gripping portion of the rebar **300**, thereby increasing the gripping force to the rebar.

By coupling rebar to be connected to the second tightening unit **50** through the hollow portion at the other side of the coupler body **20** using the method described above, connection of the rebars **300** is completed.

When tensile force is applied to the rebars **300** with connection of the rebars **300** completed as described above, the first and second tightening slopes **41** and **51** are supported along the first and second guide slopes **22** and **25**, and the force causing sliding movement serves to cause the first and second tightening members **43** and **53** to closely contact the outer circumferential surfaces of the rebars, as shown in FIG. **13**. Therefore, the gripping force applied to the rebars by the first and second tightening members **43** and **53** increases according to the tensile force applied to the rebars.

Thereby, the gripping force acting on the coupling portions of the rebars **300** acts uniformly on the respective portions of the first and second tightening members **43** and **53** and the coupler body **20** since a plurality of first and second guide slopes **22** and **25** is formed on the inner circumferential surfaces of the hollow portions of the coupler body **20** in the longitudinal direction, and the first and second tightening slopes **41** and **51** engaged with the first and second guide slopes **22** and **25** are formed on the outer circumferential surfaces of the first and second tightening members **43** and **53** of the first and second tightening units **40** and **50**.

In particular, when the coupled rebars are rotated in the tightening direction, the first and second tightening members **43** and **53** are moved outward in the process of assembling the rebars to complete the coupling operation since the first and second guide slopes **22** and **25** formed on the inner circumferential surface of the coupler body **20** and the first and second tightening slopes **41** and **51** formed on the first and second tightening members **43** and **53** are formed in a helical shape. Accordingly, even if a tensile force is applied to the coupled rebars **300**, no displacement of the rebars occurs.

As described above, the high-strength one-touch rebar coupler according to the present invention causes the gripping force to the rebar to uniformly act on the respective parts of the coupled portion of the rebars and the reaction force thereof to uniformly act on the coupler body in the longitudinal direction. Accordingly, the coupling portions of the rebars may be prevented from being abnormally deformed or sheared due to the gripping force acting on a specific portion, in contrast with the conventional cases.

While this invention has been described in conjunction with the various exemplary embodiments outlined above, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, the exemplary embodiments of the invention, as set forth above, are intended to be illustrative, not limiting.

Accordingly, the true scope of the present invention should be determined by the technical spirit of the appended claims.

INDUSTRIAL APPLICABILITY

The high-strength one-touch rebar coupler apparatus of the present invention is widely applicable not only to connection of rebars at the time of installation of rebars but also to connection of pipes, bolts, sections, rods, etc. used in various industrial facilities.

The invention claimed is:

1. A high-strength one-touch rebar coupler comprising:

a coupler body provided with a hollow portion formed in a longitudinal direction, the coupler body comprising a first guide screw coupling portion having a plurality of first guide slopes formed in a helical shape on an inner circumferential surface of the hollow portion to provide tightening force to a rebar in a circumferential direction and outwardly inclined from a central portion of the hollow portion to one side and a second guide the screw coupling portion having a plurality of second guide is slopes outwardly inclined from the central portion of the hollow portion to an opposite side;

a first tightening unit screw-coupled with the first guide screw coupling portion of the coupler body and inserted into one side of the hollow portion, the first tightening unit comprising a plurality of first tightening members each being provided with a first tightening screw coupling portion having a first tightening slope formed on an outer circumferential surface thereof so as to be slidably engaged with each of the first guide slopes and provide tightening force to a rebar to be connected by moving in a direction opposite to a radial direction when a tensile force acts on the rebar and a first gripping portion formed on an inner circumferential surface thereof to grip an outer circumferential surface of the rebar;

a second tightening unit screw-coupled with the second guide screw coupling portion of the coupler body and inserted into an opposite side of the hollow portion, the second tightening unit comprising a plurality of second tightening members each being provided with a second

tightening screw coupling portion having a second tightening slope formed on an outer circumferential surface thereof so as to be slidably engaged with each of the second guide slopes and provide tightening force to a rebar to be connected by moving in the radial direction when a tensile force acts on the rebar and a second gripping portion formed on an inner circumferential surface thereof to grip an outer circumferential surface of the rebar; and

a stopper plate for defining coupling positions of the rebars provided to a boundary portion of the coupler body between the first guide screw coupling portion and the second guide screw coupling portion,

wherein the stopper plate is formed in a disc shape so as to be screw-coupled to one side of the first guide screw coupling portion or the second guide screw coupling portion and installed inside a central portion of the coupler body, and an edge of the disc-shaped stopper plate is bent according to an angle of helix of the first or second guide screw coupling portion, such that the stopper plate remains perpendicular to a longitudinal direction of the coupling body, and

wherein the first tightening unit comprising the first tightening members and the second tightening unit comprising the second tightening members are provided with at least one elastic support ring for maintaining the first tightening unit and the second tightening unit in an assembled state when the first tightening unit and the second tightening unit are inserted into the coupler body, and

wherein outer circumferential surfaces of the first tightening members constituting the first tightening unit are provided with support grooves for preventing the elastic support rings from being supported when the first tightening members are displaced.

2. The high-strength one-touch rebar coupler according to claim **1**, wherein the inner circumferential surfaces of the first tightening members and the second tightening members are provided with a first coupling groove and a second coupling groove, respectively, to allow the first tightening members or the second leading members to be coupled with the rebar and rotated when the rebar rotates.

3. The high-strength one-touch rebar coupler according to claim **1**, wherein the outer circumferential surfaces of the first tightening members and the second tightening members are provided with a first elastic deformation groove and a second elastic deformation groove, respectively, the first elastic deformation groove and the second elastic deformation groove being elastically or plastically deformed to allow the first tightening members or the second leading members to closely contact the outer circumferential surface of the rebar when the first tightening members or the second tightening members are brought into close contact with the outer circumferential surface of the rebar.

4. The high-strength one-touch rebar coupler according to claim **1**, wherein the coupler body is divided into a first body member having the first guide screw coupling portion and a second body member having the second guide screw coupling portion, and is formed by screw coupling between the first body member and the second body member.

5. The high-strength one-touch rebar coupler according to claim **1**, further comprising:

an elastic member provided between the stopper plate and the first tightening unit and between the stopper plate and the second tightening unit, respectively.

6. The high-strength one-touch rebar coupler according to claim **1**, wherein the inner circumferential surfaces of the first tightening members having the first gripping portion of the first tightening unit and the inner circumferential surfaces of the second tightening members having the second gripping portion of the second tightening unit are provided with protrusions.

7. The high-strength one-touch rebar coupler according to claim **1**, further comprising:

a protective cap coupled to an end of the coupler body to prevent foreign substances from being introduced into the coupler body when concrete is laid.

8. The high-strength one-touch rebar coupler according to claim **1**, wherein the coupler body is divided into a first body member having the first guide screw coupling portion and a second body member having the second guide screw coupling portion, and is formed by screw coupling between the first body member and the second body member.

9. A high-strength one-touch rebar coupler comprising:

a coupler body provided with a hollow portion formed in a longitudinal direction, the coupler body comprising a first guide screw coupling portion having a plurality of first guide slopes formed in a helical shape on an inner circumferential surface of the hollow portion to provide tightening force to a rebar in a circumferential direction and outwardly inclined from a central portion of the hollow portion to one side and a second guide the screw coupling portion having a plurality of second guide is slopes outwardly inclined from the central portion of the hollow portion to an opposite side;

a first tightening unit screw-coupled with the first guide screw coupling portion of the coupler body and inserted into one side of the hollow portion, the first tightening unit comprising a plurality of first tightening members each being provided with a first tightening screw coupling portion having a first tightening slope formed on an outer circumferential surface thereof so as to be slidably engaged with each of the first guide slopes and provide tightening force to a rebar to be connected by moving in a direction opposite to a radial direction when a tensile force acts on the rebar and a first gripping portion formed on an inner circumferential surface thereof to grip an outer circumferential surface of the rebar; and

a second tightening unit screw-coupled with the second guide screw coupling portion of the coupler body and inserted into an opposite side of the hollow portion, the second tightening unit comprising a plurality of second tightening members each being provided with a second tightening screw coupling portion having a second tightening slope formed on an outer circumferential surface thereof so as to be slidably engaged with each of the second guide slopes and provide tightening force to a rebar to be connected by moving in the radial direction when a tensile force acts on the rebar and a second gripping portion formed on an inner circumferential surface thereof to grip an outer circumferential surface of the rebar;

a stopper plate for defining coupling positions of the rebar provided to a boundary portion of the coupler body between the first guide screw coupling portion and the second guide screw coupling portion, wherein the stopper plate is formed in a disc shape so as to be screw-coupled to one side of the first guide screw coupling portion or the second guide screw coupling portion and installed inside a central portion of the coupler body, and an edge of the disc-shaped stopper plate is bent according to an angle of helix of the first or second guide screw coupling portion, such that the

stopper plate remains perpendicular to a longitudinal direction of the coupling body, and

an elastic member provided between the stopper plate and the first tightening unit and between the stopper plate and the second tightening unit, respectively,

wherein the first tightening unit comprising the first tightening members and the second tightening unit comprising the second tightening members are provided with at least one elastic support ring for maintaining the first tightening unit and the second tightening unit in an assembled state when the first tightening unit and the second tightening unit are inserted into the coupler body, wherein the elastic member is formed of a plate-shaped member and includes an elastic body portion **75***a* supported by the stopper plate **50** and an elastic support **75***b* that protrudes upward from the elastic body portion **75***a* to support a lower surface of the rebar **300** such that the rebar can rotate smoothly, and the elastic support **75***b* is provided with a conical deforming projection which is deformable so as to allow ends of the rebar **300** to closely contact an upper surface of the stopper plate **30** as the first tightening unit **40** or the second tightening unit **50** moves according to rotation of the rebars and the rebars **300** are lowered.

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