Claims

1. An extensible and retractable arm mechanism, comprising;

a first structure group formed by coupling a plurality of first structures and a second structure group formed by coupling a plurality of second structures,

wherein each of the first structures comprises a lock part for fixing the second structures to the first structures, and when the first structure group and the second structure group extend, the lock part fixes the second structures to the first structures; and

wherein the lock part restrains the first structure from moving relative to the second structure in an extending direction of the first structure group and the second structure group, and

wherein the lock part restrains the first structure from moving apart from the second structure in a direction perpendicular to a counterface surface of the first structure against the second structure.

2. The extensible and retractable arm mechanism of Claim 1, wherein

the first structure group and the second structure group are bendable downward,

when the first structure group and the second structure group extend, the first structure group linearly extends, and the second structure group extends following the first structure group.

3. The extensible and retractable arm mechanism of Claim 2, wherein

a top of the first structure group and a top of the second structure group are fixed by a common block.

4. The extensible and retractable arm mechanism of Claim 3, wherein

the lock part of each of the first structures comprises a front inclined surface and an approximately rear vertical surface relative to an extension

direction.

5. The extensible and retractable arm mechanism of Claim 4, wherein each of the second structures comprises a fitting part which is provided around an upper front corner and is fitted into the lock part, and a lock part receiver which is provided around an upper rear corner and is brought into contact with the front inclined surface of the first structures, and the fitting part and the lock part receiver are relative to the extension direction.

6. The extensible and retractable arm mechanism of Claim 5, wherein the lock part of each of the first structures comprises at least one lock part which is perpendicularly to an extension and retraction direction.

7. The extensible and retractable arm mechanism of Claim 6, wherein each of the first structures comprises a concave-convex structure which is continuously to a coupled direction of the first structures.

8. The extensible and retractable arm mechanism of Claim 7, wherein a moving mechanism for moving the first structure group is a gear engaged with the concave-convex structure.

9. The extensible and retractable arm mechanism of Claim 8, wherein each of the first structures is a flat-shaped, and the first structures are bendably coupled to one another in a direction perpendicular to the extension and retraction direction.

10. The extensible and retractable arm mechanism of Claim 9, wherein the second structures are bendably coupled to one another in a coupling direction.

11. The extensible and retractable arm mechanism of Claim 10, wherein each of the second structures has a hollow block structure.

12. The extensible and retractable arm mechanism of Claim 11, wherein the lock part comprises a concave part in a rear surface relative to the extension direction, and

each of the second structures comprises a fitting part which is a projection fitted into the concave part when the first structure group and the second structure group extends.

13. The extensible and retractable arm mechanism of Claim 11, wherein the lock part of the first structures comprises a curve part facing a rear direction to the extension direction, and

the fitting part of the second structures is a columnar body fitted into the curve part when the first structure group and the second structure group extend.

14. The extensible and retractable arm mechanism of Claim 11, wherein the lock part of the first structure comprises a curve part facing a rear direction to the extension direction, and

the fitting part of the second structure has a hemispherical shape fitted into the curve part when the first structure group and the second structure group extend.

15. The extensible and retractable arm mechanism of Claim 11, wherein when the second structure group is arranged in line, one of the second structures comprises a concave at a contact positions of adjacent second structures of the second structures, the other of the second structures includes an elastic projection fitted into the concave at the corresponding

contact positions.

16. The extensible and retractable arm mechanism of Claim 11, wherein

when the first structure group is arranged in line, one of the first structures comprises a concave at a contact positions of adjacent first structures of the first structures, the other of the first structures includes an elastic projection fitted into the concave at corresponding contact positions.

17. The extensible and retractable arm mechanism of Claim 11, wherein

when the first structure group is engaged with the second structure group, one of the first or second structures includes a concave at a contact positions of adjacent fitting parts between the first structures and the second structures, the other of the first structures or the second structures includes an elastic projection fitted into the concave at corresponding contact positions.

18. An extensible and retractable arm mechanism, comprising:

a first structure group formed by coupling a plurality of first structures and a second structure group formed by coupling a plurality of second structures, wherein

the first structures comprise concave-convex structures continuous along a moving direction and lock parts for fixing the second structures on right and left sides of the concave-convex structures,

each of the second structures is coupled to an adjacent second structure at a lower part in a coupling direction, and comprises a fitting part fitted into one of the lock parts around one upper corner and a lock part receiver including an inclined surface around the other upper corner,

a gear is forwardly rotated when the first and second structures assembly extend, the rotation of the gear for engagement with the concave-convex structures moves the first structures to the coupling direction, and the second structures are fixed to the first structures by the fitting part and the

lock part receiver of the second structures; and

wherein the lock part restrains the first structure from moving relative to the second structure in an extending direction of the first structure group and the second structure group, and

wherein the lock part restrains the first structure from moving apart from the second structure in a direction perpendicular to a counterface surface of the first structure against the second structure.

19. The extensible and retractable arm mechanism of Claim 18, wherein

one of the lock parts of the first structures comprises a concave in a rear surface relative to the extension direction, and

the fitting part of the second structure comprises a projection fitted into the concave when the first structure group and the second structure group extend.

20. The extensible and retractable arm mechanism of Claim 18, wherein

one of the lock parts of the first structures comprises a curve part facing a rear direction to the extension direction, and

the fitting part of the second structures is a columnar body fitted into the curve part when the first structure group and the second structure group extend.

21. The extensible and retractable arm mechanism of Claim 18, wherein

one of the lock parts of the first structures comprises a curve part facing rearward a rear direction to the extension direction, and

the fitting part of the second structures has a hemispherical shape fitted into the curve part when the first structure group and the second structure group extend.

22. The extensible and retractable arm mechanism of Claim 18, wherein

when the second structure group is arranged in line, one of the second structures comprises a concave at a contact positions of adjacent second structures of the second structures, the other of the second structures includes an elastic projection fitted into the concave at the corresponding contact positions.

23. A robot arm, comprising:

a first structure group formed by coupling a plurality of first structures and a second structure group formed by coupling a plurality of second structures,

wherein each of the first structures comprises a lock part for fixing the second structures, and when the first structure group and the second structure group extend, the lock part fixes the second structures to the first structures; and

wherein the lock part restrains the first structure from moving relative to the second structure in an extending direction of the first structure group and the second structure group, and

wherein the lock part restrains the first structure from moving apart from the second structure in a direction perpendicular to a counterface surface of the first structure against the second structure.

24. An extensible and retractable arm mechanism, comprising:

a first structure group comprising a plurality of first structures which has bendably coupled and flat-shaped;

a second structure group comprising a plurality of second structures which has bendably coupled and has a U-shaped section wherein a tip first structure of the plurality of first structures is connected to a tip second structure of the plurality of second structures, an arm part as a columnar

body having predetermined rigidity is formed by bending parts between the first structure group and the second structure group are locked by keeping a connected state of the first structure group and the second structure group, and the columnar body is released when the first structure group and the second structure group are separated and the first structures and the second structures return to a bent state by the released columnar body;

a lock structure for keeping the connected state of the first structure group and the second structure group, wherein the lock structure comprises a lock part provided on each of the first structures, and a pair of lock part receivers provided at a front and rear of each of the second structures,

when the first structures and the second structures are extended, the lock part of each of the first structures is interposed between the pair of lock part receivers of an adjacent second structure and the connected state of the first structures and the second structures is kept, when the first structures and the second structures are retracted, the lock part of each of the first structure is released from the pair of lock part receivers of the adjacent second structure, the connected state of the first structures and the second structures are canceled, and each of the first structures and each of the second structures return to the bent state; and

wherein the lock part restrains the first structure from moving relative to the second structure in an extending direction of the first structure group and the second structure group, and

wherein the lock part restrains the first structure from moving apart from the second structure in a direction perpendicular to a counterface surface of the first structure against the second structure.

25. The extensible and retractable arm mechanism of Claim 24, wherein

the lock part or the lock part receiver comprises a lock pin, and the other of the lock part or the lock part receiver comprises a lock pin hole, the connected state of the first structures and the second structures is kept by inserting the lock pin into the lock pin hole, and the connected state of first structures and the second structure returns to the bent state by pulling the lock pin from the lock pin hole.