

TOY

This invention relates to a toy which is formed of a plurality of elements that can be assembled together.

Such a toy is usually composed of a plurality of elements that can be assembled to form an integral unit which is entirely different from the individual elements. A conventional toy of this sort does not allow as alteration of the individual elements by themselves, and has the drawback that the toy is readily tired of within short playing time.

This invention provides an improved toy of the above type in which the above-mentioned drawbacks and disadvantages are eliminated.

According to the invention a toy comprising a plurality of different reconfigurable elements each comprising a plurality of movable elements and capable of being reconfigured between at least two ~~different~~ ^{reconfigurable} toy states, at least some of said ~~elements~~ ^{reconfigurable} also being capable of being reconfigured to a third state, each ~~element~~ ^{reconfigurable} being capable of being assembled with the other ~~elements~~ ^{reconfigurable} either in one of its toy states or in the third state to form a further toy.

The two toy states are preferably a toy vehicle state and a toy robot state.

The invention will now be described in greater detail by way of example with reference to the accompanying drawings in which

Figs. 1(a) to 1(g) are explanatory views showing various states of a first reconfigurable element in a variety of positions according to an embodiment of the present invention;

Figs. 2(a) to 2(f), 3(a) to 3(e), 4(a) to 4(e), 5(a) to 5(f) and 6(a) to 6(e) are explanatory views similar to those of Figs. 1(a) to 1(g) but showing second, third, fourth, fifth and sixth reconfigurable elements in a variety of positions.

Fig. 7 is an explanatory view showing how the six integrating elements of Figs. 1 to 6 can be associated one with another to form an integral structure

As shown in the drawings the toy of the invention is composed of a plurality of elements. The respective elements will be described with reference to Figs. 1 to 6.

In Fig. 1, reference character A1 designates reconfigurable element which in a first state represents a truck crane. Movable parts can be moved to alter the element to provide a representation of a robot. In addition the element can be transformed by moving the movable parts thereof to provide one part of a larger robotic figure. As shown in Fig. 1, the element A1 in truck crane form has a front base which has a pair of holding legs 10, and a pair of front bodies 11, a rear base 2 which has a rear body 12 on its top surface and wheel retaining members 13 and 13 on each side. The front base 1 is formed on its back surface to represent the legs of a robot and on one side with an engaging groove 14 as shown in Fig. 1(e). The bodies 11 are rotatable about the ends of the legs 10 and 10. The rear base 2 is formed on its back surface to represent the body of the robot. The rear body 12 carries on its top surface a crane-like member 15 and a holding projection 16 as shown in Fig. 1(d). Wheel retaining members 13 at each side of the base 2 are formed to be pulled outwardly therefrom. A robot head 17 is telescopically provided at the rear end of the base 2. The front base 1 and the rear base 2 are coupled through a connecting link 18, and can be pulled apart or swivelled through the link 18.

To change element A1 from the truck crane into a robot (its second state) as shown in Figs. 1(b) and 1(c), the front bodies 11 of the base 1 are rotated through half a revolution to form feet, and the wheel retaining members 13 of the base 2 and the robot head 17 are pulled out to form arms and a head, respectively. When these movable parts are returned to the original position, the element A1 again forms a truck crane.

The element A1 can also be altered from the truck crane form to the third form as shown in Figs. 1(d) to 1(g) if the front and rear bases 1 and 2 are first separated by pulling them apart as shown in

Fig. 1(d), and then one part is rotated through 90° to the position shown in Fig. 1(e). The projection 16 on the rear base 2 can then be rotated so that it projects outwardly. Then, an additional member 70 comprising a robot head is affixed as shown in Fig. 1(f), 1(g). This additional member 70 has robot head 72 provided on the top of a U-shaped insert 71, having an engaging hole 73 and a holding projection 74 on its underside as shown in Fig. 1(g). When the insert 71 is affixed at the rear of the element A1, the element A1 and the robot head member 70 become coupled together to form head and shoulder portions of a larger robot shown in Fig. 7. The holding projection 16 and the engaging groove 14 extend one on each side of the transformed element A1, and the hole 73 and the projection 74 are both on the lower side of the head and shoulder portions.

Second element A2, as shown in Figs. 2(a) to 2(f) in a first state represents a power shovel. Movable parts can be moved to convert the element to a second robot state. Element A2 has arm-like members 21 and 21 mounted telescopically on each side of a truck body base 3 having a power shovel member 20, an engaging projection 22 formed on the upper surface at one end, a pair of crawler members 23 and 23 rotatably mounted on each side, an engaging arm 24 pivotally provided on the underside between crawler members 23 and a robot head member 25 provided at the rear end. Ends 26 of crawler members 23 are rotatably arranged to be rotated through 90° relative to the remainder of the members 23 and 23.

To convert the element A2 into a robot state as shown in Figs 2(b) and 2(c), the crawler members 23 and 23 are rotated by half a revolution relative to the base 3 to form legs. Then, the arm-like members 21 and 21 are telescopically projected to form arms, and the head-like member 25 is pulled out. Portions 26 and the ends of members 23 are rotated to form feet. Reversal of these moves return the element to the power shovel form.

The element A2 can also be altered from the power shovel state to a third state, as shown in Figs. 2(d) to 2(f). The engaging projection 22 of the base 3 can then be engaged with an engaging hole 81 formed at the base end of an auxillary arm member 80, and the engaging arm 24 be erected and laterally projected. When the

element A2 in its third state is coupled to the arm member 80, one robot arm for the larger robot of Fig. 7 is produced.

Element A3 as shown in Figs. 3(a) to 3(e) in a first state represents a bulldozer. Movable parts can be moved to convert the element A3 into a robot state. Element A3 has a base 4, a bucket member 30, two crawler members 31 rotatably mounted one on each side of base 4, a pair of upper body cover members 32 pivotally mounted on the upper surface of base 4, a robot head member 33 telescopically mounted within base 4 and a rotatably mounted roof member 34. The cover members 32 each comprise three joint members 35, 36, 37, coupled so that first and second joint members 35 and 36 are relatively rotatable on a common axis and second and third joint members 36 and 37 are pivotable relative to each other. The ends 31a of crawler members 31 are telescopically mounted on the remainder of members 31 and when pulled can be rotated through 90° relative to the remainder of members 31. An engaging projection 38 is formed at the rear end of the base 4, and a boss 39 having an axial bore is formed at the centre of base 4.

To alter the element A3 into a robot state, as shown in Figs. 3(b) and 3(c), the head member 33 is pulled out from the base 4, the roof member 34 is raised, the cover members 32 are laterally rotated and the second joint member 36 is rotated with respect to the first joint member 35, and the third joint member 37 is bent to form the arm of the robot. Then, the bucket member 30 is raised and the bucket 30a is turned towards the surface of the base 4 to form a breast. Further, the pair of crawler members 31 are each rotated through a half a revolution and the ends 31a are pulled out and turned at right angles to form legs and feet. When these movable parts are moved reversely to the above, the element A3 can be returned to the bulldozer state.

The element A3 can also be altered from the bulldozer state to a third state as shown in Figs. 3(d) and 3(e), in which the engaging projection 38 of the base 4 is engaged with the hole 81 of the end of the arm an auxilliary arm member 80 to form the other arm for the larger robot of Fig. 7 and the engaging hole of the boss 39 is laterally opened.

Element A4 as shown in Figs. 4(a) to 4(e), provides in a first state a shovel dozer. When the movable parts are moved, the shovel dozer state can be altered into a robot state. Element A4 has, as shown, a pair of holding legs 42 backwardly extending from a front body 41 carrying the rotatable shovel member 40, a rear body 43 carrying rear wheels rotatably mounted on the legs 42 and laterally split into right and left halves, wheel retaining members 44 on each side carrying front wheels at both sides of the body 41, and a robot head-like member 45 mounted telescopically within the front body 41.

The A4 thus constructed can be altered into a robot state, as shown in Figs. 4(b) and 4(c). The rear bodies 43 are turned through half a revolution with respect to the legs 42 and 42 to form feet, and the head-like member 45 at the end of the front body 41 is pulled out. The front body 41 is formed its back side surface to simulate a robot body, and the wheel retaining members 44 are formed as arms. When these parts are moved reversely to the above, the element A4 can be again returned to the shovel dozer state.

The element A4 can also be altered from the first state to a third state, as shown in 4(d) and 4(e), if the wheel retaining members 44 are rotated and projected forwardly, the shovel member 40 is raised and the members 44 are moved downwardly. In this manner, one robot leg of layer robot form of Fig. 7 is constructed.

Element A5, as shown in Figs 5(a) to 5(f), in a first state represents a concrete mixer truck. When the movable parts are moved, the concrete mixer truck can be altered into a robot. The element A5 has, as shown, a rear body member 50, as a pair of holding legs 51 provided at one end of the rear body member 50, wheel retaining members 52 bearing wheels are pivotally mounted on both sides, a front body retaining member 53 slidably mounted on the legs 51 and a front body member 54 pivotally mounted with respect to the front body retaining member 53.

When the element A5 thus constructed is to be altered into the robot state, as shown in Figs 5(b), 5(c) and 5(d), the front body retaining member 53 is slid away from rear body member 50 along legs 51 and front body member 54 is rotated through 180° with respect to the retaining member 53. In this manner, a robot state is constructed with the rear body member 50 as upper body, the wheel

retaining member 52 as arms, the holding legs 51 as legs, and the front body member 54 as feet. When these movements are reversed, the integrating element A5 may be returned to the concrete mixer truck state.

The element A5 can also be altered from the concrete mixer truck state to a third state, as shown in Figs. 5(b), 5(e) and 5(f). The front body retaining member 53 is slid to the ends of the legs 51, and turned through 90°. Thus, the other leg of the larger robot shown in Fig. 7 is constructed.

Finally, element A6, as shown in Figs 6(a) to 6(e) in a first state represents a dump truck. When the movable parts are moved, the dump truck can be altered into a robot. In the dump truck state, the element A6 has, as shown, a front body member 60 and a rear body member 61 rotatable perpendicularly to each other. A front body portion 60a is formed on the upper surface of the front body member 60, and a robot head-like member 62 is tiltably formed. A roof member 63 is rotatably provided. Similarly, wheel retaining members 64 bearing wheels are pivotally mounted on both sides of the front body member 60. The rear body member 61 has a pair of holding legs 65 pivoted to the front body 60, and a longitudinally split load carrier 66 pivoted at the ends of the legs 65. A holding projection 67 and an engaging hole 68 are formed in parallel on the upper surface of the body member 60, and the projection 67 and the hole 68 are disposed underneath the roof member 63. Further, engaging holes 69 are formed on the front and lower surfaces of the front body member 60, and an engaging space S is formed at the rear end of the rear body member 61.

When the element A6 thus constructed is altered to the robot state, as shown in Figs. 6(b), 6(c) and 6(d), the front body member 60 is rotated at right angles to the rear body member 61, and the head-like member 62 is erected to form a robot upper body. Then, load carrier 66 is rotated through 180° with respect to the legs 65 and 65 of the rear body member 61 to form legs. The wheel retaining members 64 are constructed as the arms of the robot. When these movements are reversed, the element A6 is returned to the dump truck state.

The element A6 can also be altered from the first state to a third state, as shown in Figs. 6(b) and 6(e). The front and rear body members 60 and 61 are rotated through 90°, a decorative members 85 which represent the body front and waist of the larger robot are engaged with the engaging holes 69 on the front and lower surfaces of the front body 60, and further waist coupling member 90 is mounted on the lower part of the rear body member 61.

The waist coupling member 90 has an engaging projection 91 at its upper centre and engaging portions 92 and 93 on each lower side in such a manner that the projection 92 can be engaged with the space S formed at the lower end of the rear body member 61. When the decorative members 85 and waist coupling member 90 are engaged with the various engaging holes 69 and space S of the integrating element A6, the element is held firmly together. In this manner, the body of the larger robot shown in Fig.7 is constructed.

The elements A1 to A6 thus constructed can be used when in their third state to form the larger robot, as shown in Fig. 7, as follows :-

The end of the engaging arm 24 of element A2 is engaged with the groove 14 formed at one side of the element A1, and the projection 16 formed at the other side of the element A1 is engaged within the hole formed at the boss 39 of the element A3. Then, the engaging hole 68 and the holding projection 67 formed on the upper surface of the element A6 are respectively engaged with the holding projection 74 and the engaging hole 73 formed on the lower portion of the head-like member 70 mounted on the element A1, thereby coupling the elements A1 and A6. Next, the engaging holes 92, 93 on the lower sides of the waist coupling member 90 mounted on the element A6 are engaged with the rear ends of the elements A4 and A5. Thus, the elements A1 to A6 are combined, thereby altering them into a large-sized robot of entirely different appearance from either the construction toy states or the robot states of the elements.

In the embodiments described above, the first states of the elements are civil engineering trucks, and the second states are robots, in the third state the elements are components of a larger robot body, and in the fourth state the elements are combined to

form a large-sized robot. However, the present invention is not limited to the particular embodiments, and the first, second, third and fourth states can be arbitrarily selected.

As described above, the toy of the invention is composed of a plurality of elements, which have a plurality of movable elements to be altered from the first state to the second state and further to the third state, and integrated with each other when in the third states, and an integral modification is formed in the fourth state. Therefore, the toy of the invention can give pleasure in the alteration from the first states to the second states or to the third states and in combining the third states to form the fourth state. Particularly, when the toy is altered to the fourth state the integrated toy is of entirely different scale from the first and second states. Since the toys of the invention can also be played in the first or second states as a plurality of toys, or in combination of the first and second states, the toy of the invention gives a large variety of play possibilities, thereby remarkably increasing the range of the conventional assemblable toy.

C L A I M S

1. A toy comprising:

a plurality of different reconfigurable elements each comprising a plurality of movable elements and capable of being reconfigured between at least two ^{different} toy states, at least some of said ~~reconfigurable~~ ^{reconfigurable} elements also being capable of being reconfigured to a third state, each ~~element~~ ^{reconfigurable} being capable of being assembled with the other ~~elements~~ ^{reconfigurable} either in one of its toy states or in the third state to form a further toy.

2. A toy according to claim 1, also including additional elements for use in locking the reconfigurable elements together and/or for forming appendages of the further toy.

3. A toy according to claim 1 to or claim 2 wherein the reconfigurable elements are reconfigurable between a toy vehicle state, and toy robot state.

4. A toy according to claim 3, wherein one reconfigurable element in its first state is a toy truck crane, and said movable elements comprise a front base which has a pair of holding legs and a pair of front bodies, and a rear base which has a rear body on the top face and wheel retaining members at both sides, said front base is formed on the back surface with movable elements to form legs of a robot and on one side with an engaging groove, said front bodies are rotatably provided at the ends of the legs, said rear base is formed on its back surface with the representation of the body of a robot, said rear body is provided on its top surface face with a crane-like member and a holding projection, said wheel retaining members at both sides of the base are formed to be pulled outwardly, a robot head is telescopically provided at the rear end of the rear base and the front base and the rear base are coupled through a connecting link, and can be pushed together or slid apart through the link.

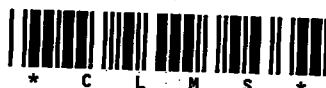


5. A toy according to claim 3, wherein one reconfigurable element in its first state is a toy power shovel, and said movable elements comprise arm-like members telescopically at both sides of a truck body-like base having a power shovel-like member; an engaging projection being formed on the top of one end, a pair of crawler-like members rotatably provided at both sides, an engaging arm tiltably provided at the under side, and a robot head-like member provided at the other end, the crawler-like members being formed such that the ends at the opposite end to the point of rotation are rotatable relative to the rest of the members.

6. A toy according to claim 3, wherein one reconfigurable element in its first state is a toy bulldozer, and said movable elements comprise a bucket member and crawler members rotatably provided at one side of a base, a pair of upper body cover members laterally pivotably secured to the upper surface of the other side of the base, a telescopic robot head-like member and a rotatable roof member, the cover members being respectively composed of three joint members in such a manner that the first and second joint members are rotatable about the same axis and the second and third joint members are bendable relative to each other, the ends of the crawler member are telescopically mounted on the rest of the crawler members and when pulled out can be rotated relative to the rest of the members, and an engaging projection is formed at the side of the head-like members on the back surface of the base, and a boss having an engaging hole is formed at the centre of the base.

7. A toy according to claim 3 wherein one configurable element in its first state is a toy shovel dozer and said movable elements comprise a shovel member, a pair of holding legs backwardly protruding from a front body carrying the rotatable shovel member, a rear body rotatably mounted on the legs and laterally divided into the right and left halves, rotatable wheel retaining members having wheels mounted on both sides of the front body and a robot head-like member formed telescopically at the end of the front body.

8. A toy according to claim 3, wherein one reconfigurable element



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in its first state is a toy concrete mixer truck state and said movable elements comprise a rear body member formed with a concrete mixer element on the upper surface and the representation of a robot upper half body on the back surface, a pair of holding legs provided at one side of the rear body member, wheel retaining members having wheels rotatable at both sides of the rear body, a front body retaining member slidable on the legs, and a front body member rotatable on the front body retaining member.

9. A toy according to claim 3, wherein one reconfigurable element in its first state is a toy dump truck and said movable elements comprise a front body member and a rear body member rotatable perpendicularly to each other, a front body portion on the upper surface of the front body member, and a tiltable robot head-like member, a rotatable roof member, rotatable wheel retaining members having wheels on both sides of the front body member, the rear body member having a pair of holding legs, and a longitudinally split load carrier at the ends of the legs and rotatable relative thereto, a holding projection and an engaging hole being formed in parallel on the upper surface of the body member the projection and the hole being disposed beneath the roof member, engaging holes being formed on the front and lower surfaces of the front body member, and an engaging space being formed at the rear end of the rear body member.

10. A toy according to any of claims 1 to 9, wherein when the reconfigurable elements are altered between their toy states or to a third state, various projections and engaging holes and/or spaces are exposed allowing the various elements to be coupled with each other and/or with various additional elements to form the further toy.

11. A toy according to claim 1, comprising elements A1 to A6 substantially as described herein with reference to Figs.1 to 6, respectively, of the drawings that can be combined to form a further toy substantially as described herein with reference to Fig.7 of the drawings.



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