(12) UK Patent Application (19) GB (11) 2 076 302 A

(21) Application No **8113936**
(22) Date of filing
7 May 1981
(30) Priority data
(31) **8015199**
8107091
(32) **8 May 1980**
6 Mar 1981
(33) **United Kingdom (GB)**
(43) Application published
2 Dec 1981
(51) **INT CL³ A63H 33/08**
(52) Domestic classification
A6S 6A6 6C1B 6E2
(56) Documents cited
GB 1543913
US 4144669A
(58) Field of search
A6S
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(54) **A space toy system**

(57) A space toy system comprises a first component (1) constituting by itself a separate space vehicle and having a rotatable member (10) usable as a ground-engaging wheel and a unitary frame (9) supporting the rotatable member, and at least one further component. The unitary frame (9) and the or each further component (2) are provided with interlocking means (20*a* to 20*d*, 21*d*, 21*e*, 23, 24*a*, 24*b*;) for enabling the or any one of the further components to be releasably interlocked to the unitary frame respectively in each of any one of three mutually perpendicular directions (A, B,).

Fig.1.

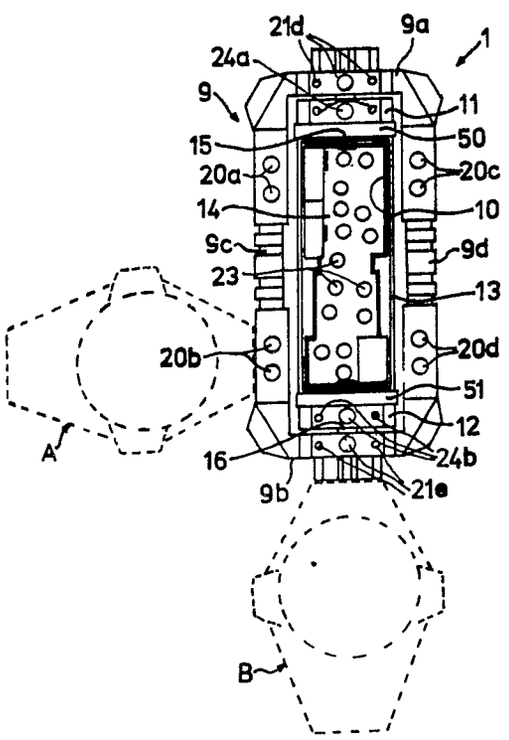

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Fig.1.

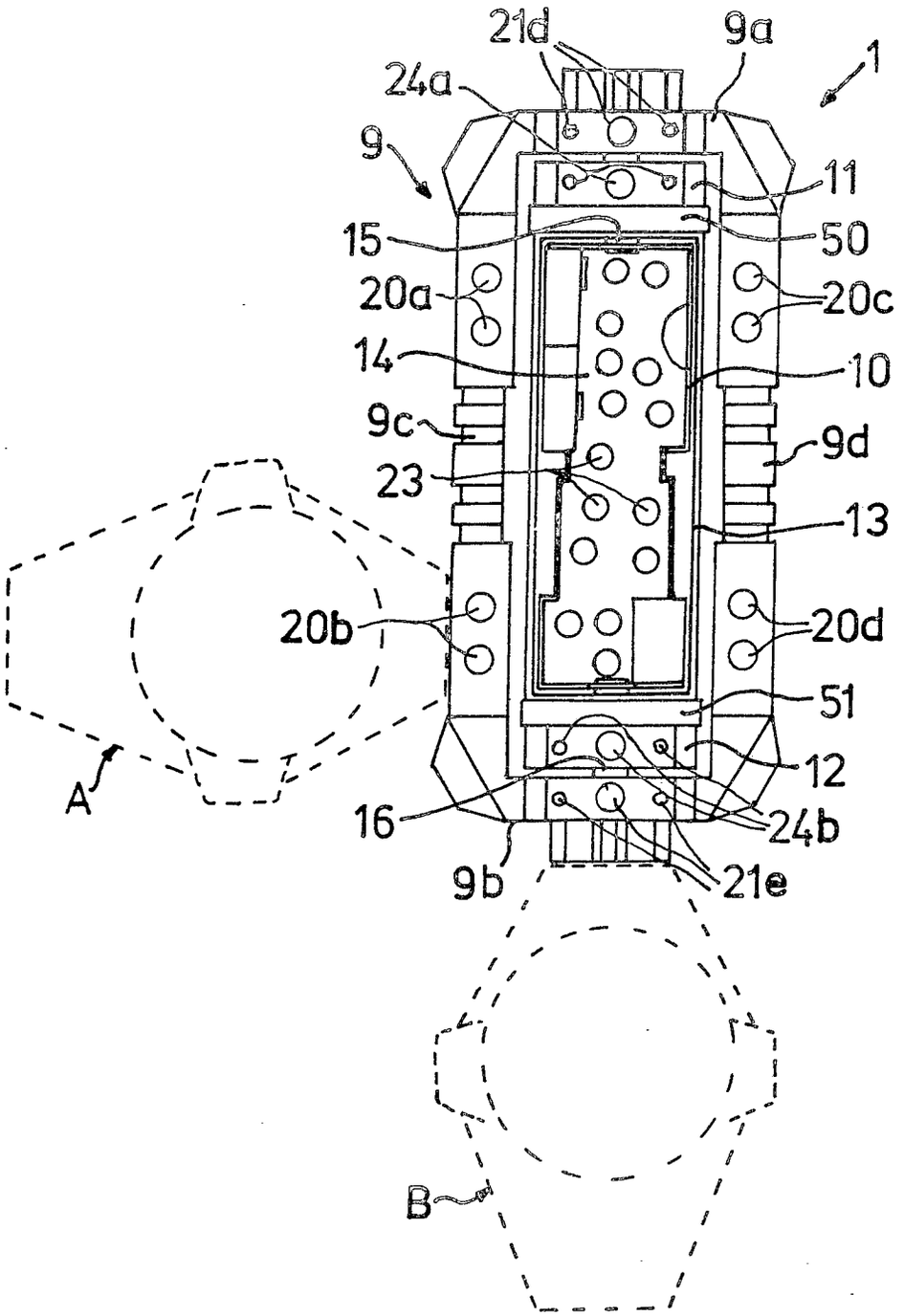

21d
9a
1
24a
9
11
15
50
20a
20c
14
10
9c
9d
23
13
20b
20d
51
12
A
16
24b
9b
21e
B

Fig. 2.

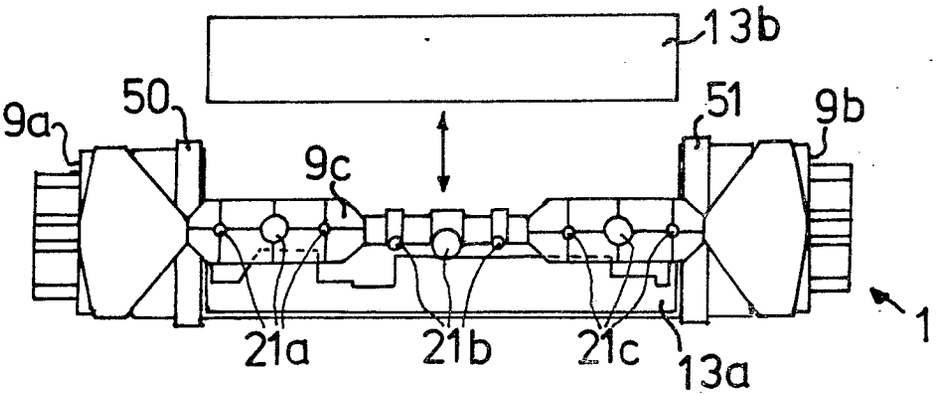


Fig. 3.

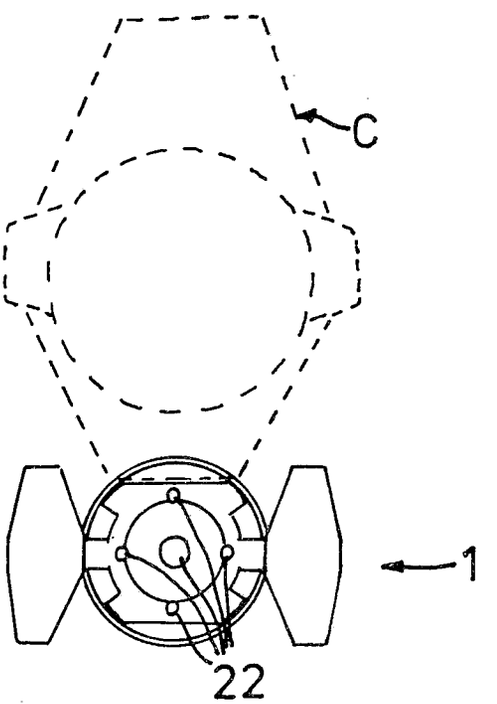
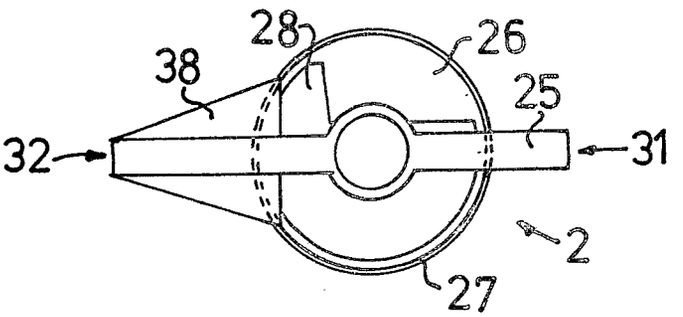


Fig.7.


28
26
38
25
32
31
2
27

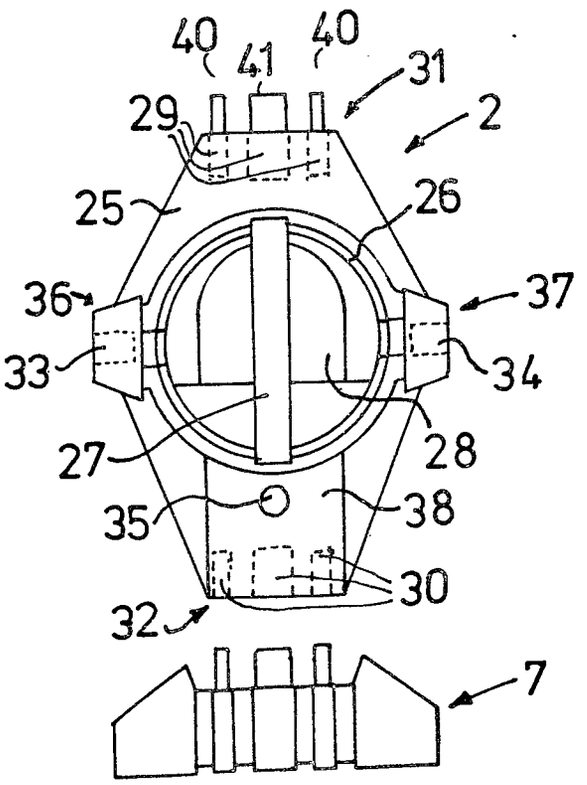

40
41
40
31
29
2
25
26
36
37
33
34
27
28
35
38
30
32
7

Fig.6.

Fig. 8.

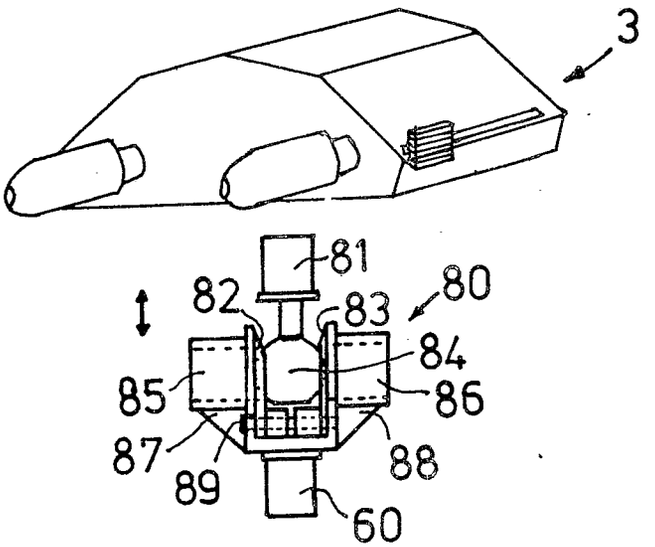


Fig. 9.

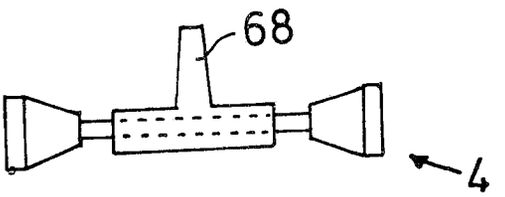


Fig. 4.

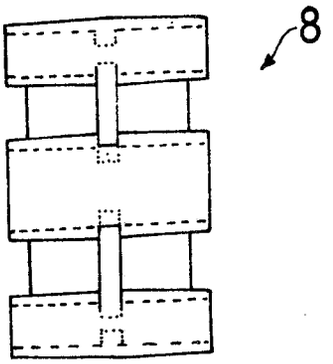


Fig. 5.

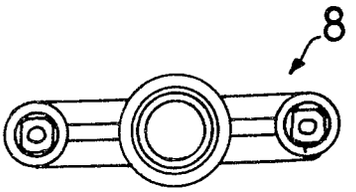


Fig.10.

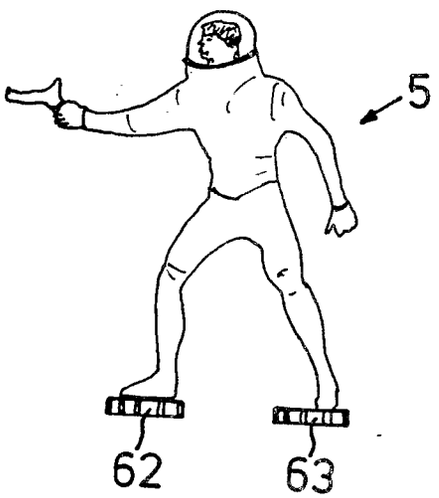
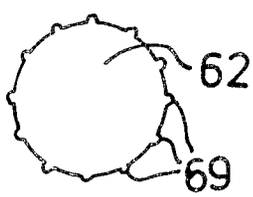


Fig.11.



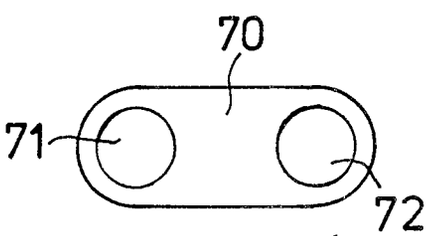


Fig.12.

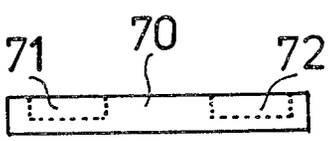


Fig.13.

Fig.14.

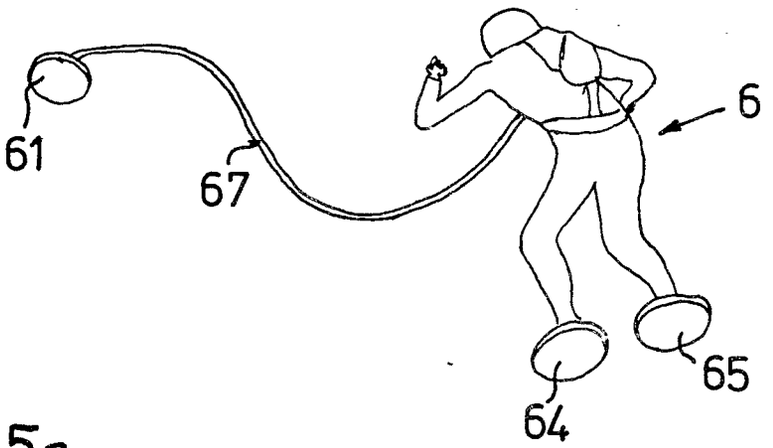


Fig.15a

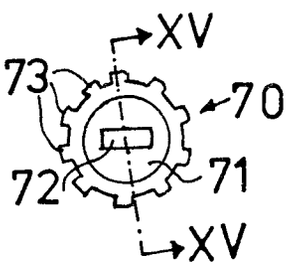


Fig.15c

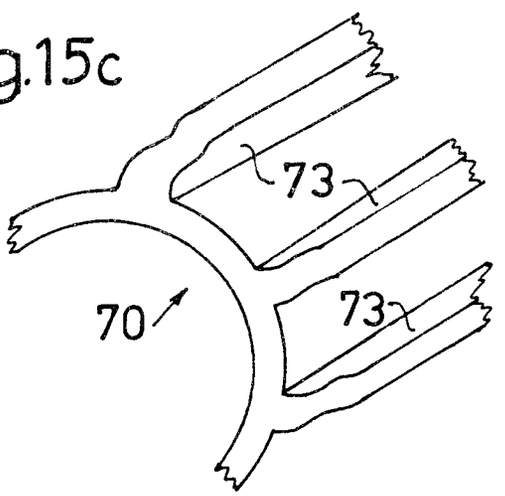


Fig.15b

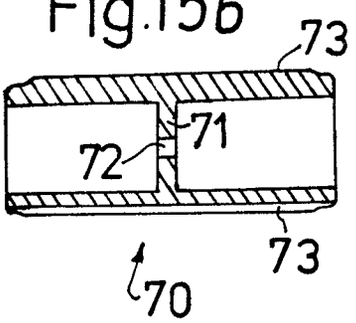
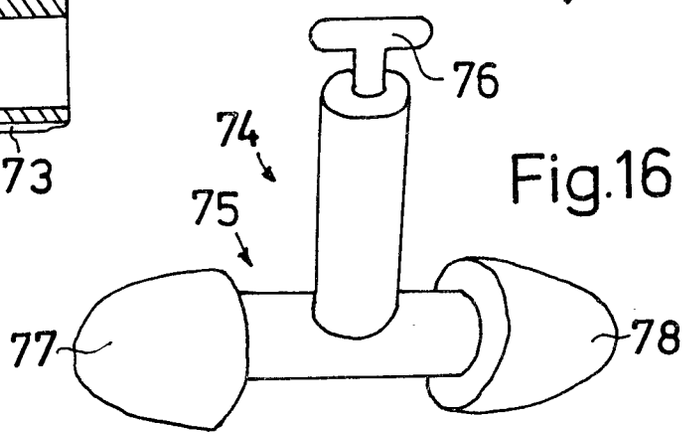


Fig.16



SPECIFICATION

A space toy system

This invention relates to a space toy system.

Space toys are known in which individual space vehicles are constructed from a plurality of releasably interlocking components or bricks. These interlocking bricks are comparatively small compared with the size of the finished space vehicle and, by themselves, are not readily identifiable as space vehicles or even components of a space vehicle. Indeed the individual interlocking bricks have little use or play value by themselves. Furthermore it will be appreciated that, since a comparatively large number of interlocking bricks have to be employed to construct even a space vehicle of simple design, the time and effort involved in constructing a complex system of interlocking space vehicles and accessory components is comparatively great.

The present invention seeks to provide a comparatively simple space toy system comprising a number of components which can be releasably interlocked together, at least one of the components being usable by itself as a separate toy space vehicle.

According to the present invention a space toy system comprises a first component constituting by itself a separate space vehicle and having a rotatable member usable as a ground-engaging wheel and a unitary frame supporting the rotatable member, and at least one further component, the unitary frame and the or each further component being provided with interlocking means for enabling the or any one of the further component(s) to be releasably interlocked to the unitary frame in a plurality of different positions, the interlocking means on the unitary frame being arranged to enable the or any one of the further component(s) to interlock with the unitary frame respectively in each of any one of three mutually perpendicular directions.

Conveniently the or each further component is releasably interlocked with the unitary frame by means of at least one plug and socket connection. Typically the unitary frame is provided with a plurality of sockets, constituting the, or at least some of the, interlocking means of the unitary frame, into which sockets plug members can be inserted to provide a push-fit connection. In this case the plug members may be provided on the, or at least one of the, further component(s) to constitute the, or at least some of the, interlocking means of the particular further component. Alternatively or additionally the plug members are separate components, the, or at least one of the, further component(s) being provided with one or more sockets constituting the, or at least one of the, interlocking means of the further component, at least one of the separate plug members being insertable part way into each of at least one pair of confronting sockets in the unitary frame and a further component to interlock the latter to the unitary frame.

In the case where plug members are provided as separate components they may be in two different forms, one form for providing a push-fit connection with sockets having a comparatively large cross-sectional area and the other form for providing a push fit connection with sockets having a comparatively small cross-sectional area. Conveniently the, or at least one of the, further components can be interlocked with the unitary frame using at least two, e.g. three, plug members.

The, or at least one of the, further component(s) may comprise a component identical with or similar to, the said first component; an accessory element (for example a figure, such as a space man, a gun or canon, or landing pad) which can be used by itself as a play toy; a modifying element (for example wings) which can be interlocked with the first component or an accessory element; or a linking element for linking different components together.

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

Figure 1 is a plan of a first component of a space toy system according to the invention,

Figure 2 is a side view of the first component shown in Fig. 1,

Figure 3 is an end view of the first component shown in Figs. 1 and 2,

Figures 4 and 5 are plan and end views, respectively, on enlarged scales, of a linking element constituting a further component of a space toy system according to the invention,

Figures 6 and 7 are plan and side views, respectively, of a first accessory element constituting a further component of a space toy system according to the invention,

Figure 8 is a perspective view of a second accessory element constituting a further component of a space toy system according to the invention,

Figure 9 is a side view of a modifying element constituting a further component of a space toy system according to the invention,

Figure 10 is a side view of a third accessory element constituting a further component of a space toy system according to the invention,

Figure 11 is a plan of a detail, on an enlarged scale, of the third accessory shown in Fig. 10,

Figures 12 and 13 are plan and side views, respectively, of a base for supporting the third accessory shown in Fig. 10,

Figure 14 is a perspective view of a fourth accessory element constituting a further component of a space toy system according to the invention,

Figures 15a, 15b and 15c are an end view, a sectional view on line XV–XV of Fig. 15*b*

and a perspective view, on a an enlarged scale, of a detail, of a connecting peg, and

Figure 16 is a perspective view, on enlarged scale, of a tool for withdrawing the peg of Figs. 15*a*–15*c* from a socket.

One embodiment of a space toy system according to the invention comprises a first component in the form of a command module 1 (see Figs. 1 to 3) and at least one further component which can be releasably interlocked with the command module 1 in a plurality of different locations. The further component(s) may include at least one further command module 1, at least one interceptor 2 (see Figs. 6 and 7), at least one canon 3 (see Fig. 8), at least two pairs of wheels 4 (one pair of wheels being shown in Fig. 9), a space man 5 (see Fig. 10), a space walker 6 (see Fig. 14), at least one modifying element, such as a wing 7 (see Fig. 6) and at least one linking element 8 (see Figs. 4 and 5).

The command module 1 is suitably made of plastics material and comprises a frame 9 of generally rectangular form having spaced apart end portions 9*a* and 9*b* and spaced apart side portions 9*c* and 9*d*, the frame surrounding and supporting a rotatable member generally designated 10. The rotatable member 10 comprises a pair of axially spaced apart end elements 11 and 12, a transparent, hollow cylinder, generally designated 13, extending from one to the other of the end elements 11 and 12, and a command deck element 14 supported within the cylinder 13. The end elements 11 and 12 have stub shafts 15 and 16, respectively, rotatably received in openings (not shown) formed in the frame 9. The command deck element 14 is rotatably supported at its ends by the stub shafts 15 and 16 and has its centre of gravity below the axes of the shafts 15, 16 so that it always adopts an upright position when the shaft axes are horizontal. The cylinder 13 is formed in two parts; namely a first cylinder part 13*a* permanently secured to the end elements 11 and 12, and a second cylinder part 13*b*, in the form of a cover, which is removably secured between the end elements 11 and 12. Ground-engaging tyres 50 and 51 are secured to the end elements 11 and 12, respectively.

The command module 1 has formed therein a plurality of first sockets, each having similar circular cross-sections, and a plurality of second sockets, each having similar circular cross-sections smaller than the cross-section of each of the first sockets. In particular the rectangular frame 9 has pairs of first sockets 20*a*, 20*b* and 20*c*, 20*d* formed in the upper and lower surfaces of the side portions 9*c* and 9*d*, respectively (only the sockets formed in the upper surfaces of the side portions 9*c* and 9*d* are shown in Fig. 1). Groups of sockets 21*a* to 21*e* each consisting of a single first socket and a pair of second sockets are also formed in the frame 9; three groups of sockets 21*a* to 21*c* being formed in the side surface of each side portion 9*c*, 9*d* (only the groups of sockets 21*a* to 21*c* formed in side portions 9*c* are shown in Fig. 2), and a single group of sockets 21*d* (21*e*) being formed in the upper and lower surfaces of end portion 9*a* (9*b*) (only the groups of sockets formed in the upper surfaces of end portions 9*a* and 9*b* are shown in Fig. 1). The end portions 9*a* and 9*b* also each have formed in their end faces a further group of sockets 22 consisting of an axially positioned first socket and four second sockets positioned equally therearound.

In addition to sockets being formed in the frame 9, a plurality of first sockets 23 (only some of which are numbered in Fig. 1) are formed in the floor of the command deck element 14 and a group of sockets 24*a*, 24*b*, each consisting of a first socket and a pair of second sockets arranged in a similar manner to the groups of sockets 21*a* to 21*e*, is formed in the upper and lower surfaces of the end elements 11, 12, respectively.

The interceptor 2 shown in Figs. 6 and 7 comprises a frame 25 rotatably supporting a transparent rotatable element 26 in the form of a hollow, transparent sphere having a ground-engaging tyre 27 secured around its periphery. A cockpit element 28 is freely rotatably supported inside the element 26 and has a centre of gravity below the turning axis of the rotatable element so that the element 28 always adopts an upright position when the turning axis of the rotatable element is horizontal. The interceptor 2 has a group of sockets 29, 30, each consisting of a first socket and two second sockets arranged in a similar manner to the group of sockets 21*a* to 21*e*, formed in its spaced apart front and rear ends 31, 32, respectively. Further first sockets 33, 34 and 35 are formed on the sides 36, 37 and top 38, respectively, of the interceptor 2.

Pins are employed to interlock the interceptor 2 to the command module 1. In Fig. 6 a pair of pins 40 and a single pin 41 are shown inserted into, so as to project from, the group of sockets 29 at the front end of the interceptor 2. The projecting pins 40, 41 are then inserted into any one of the groups of sockets 21*a* to 21*e*, or 22 formed in the frame 9 or in the group of sockets 24*a* or 24*b* formed in the end elements 11 or 12. The pins 40, 41 are shown as being cylindrical throughout their length, although conveniently they taper towards their ends. If the pins are tapered they should have a cross-section midway between their ends which is slightly greater than the cross-section of the socket into which they are to be inserted. In this manner the tapered pins can only be inserted part way into a socket.

It will be appreciated that the sockets formed in the frame 9 are so arranged that

the interceptor 2 can be interlocked with the frame 9 in each of three mutually perpendicular directions. Two mutually perpendicular interlocking positions of the interceptor 2 are shown in dashed lines at A and B in Fig. 1, and a third mutually perpendicular interlocking position of the interceptor 2 is shown in dashed lines at C in Fig. 3. When the interceptor 2 is interlocked in position A the turning axes of the command module 1 and interceptor 2 are parallel to each other and the interlocked assembly can be rolled along a surface with the ground-engaging tyres 50, 51 and 27 engaging the surface.

Of course only a single pin 41 need be employed to interlock the interceptor 2 to the command module 1. In this case the interceptor may in addition be interlocked with either first socket of each pair of first sockets 20*a* to 20*d*. Alternatively the interceptor may be interlocked to the command module 1 via either of the sockets 33 or 34.

The space toy system may be enlarged in many different ways. For instance the interceptor 2 may have the wing 7 (see Fig. 6) releasably interlocked to the group of sockets 30 at its rear end 32. The wing 7 may be connected directly to the group of sockets 30 or via the linking element 8 (see Figs. 4 and 5). Furthermore other components may be releasably interlocked to the command module 1 and/or interceptor 2. In particular the canon 3 shown in Fig. 8 and the space walker 6 shown in Fig. 14 are provided with plug elements 60 and 61, respectively, for engagement in any of the first sockets provided on the command module 1 and/or interceptor 2. The plug element 60 associated with the canon 3 forms part of a universal joint, generally designated 80, which is removably connected to a socket (not shown) provided at the bottom of the canon 3 via a further plug element 81 of the universal joint 80. The universal joint 80 further comprises a pair of spaced apart, recessed jaws 82, 83 which define a socket therebetween for receiving, for universal movement relative thereto, a ball 84 fixed to the plug element 81. Sockets 85 and 86, for receiving plug elements (e.g. pins 41) to enable other components to be connected to the universal joint, are formed on the jaws 82 and 83, respectively. Pairs of spaced-apart bracing webs 87, 88 are secured between each socket 85, 86 and its associated jaw 82, 83. The tightness by which the ball 84 is gripped between the jaws 82 and 83 can be adjusted by means of an adjusting screw 89 secured in aligned bores provided in the jaws 82 and 83. It will be appreciated that the universal joint can be employed for connecting other components together.

The plug element 61 of the space walker 6 is connected to the body via a pliable life-line 67. Pairs of ground-engaging wheels 4 (one of which is shown in Fig. 9) may be inserted via a plug element 68 into the first socket of each group of sockets 21*a* and 21*c* formed in the side portion 9*c* to enable the command module 1 to be wheeled along the ground on its side. Finally the space man 5 shown in Fig. 10 and space walker 6 shown in Fig. 14 are provided with plug elements 62, 63 (see Fig. 11) and 64, 65, respectively, on their feet. These plug elements 62, 63 (64, 65) suitably have ribs 69 (see Fig. 11) formed on their peripheral surfaces and can be detachably plugged either into sockets 71, 72 formed in a metallic base member 70 (see Figs. 12 and 13) to support the component in an upright position on the ground or into the pairs of first sockets 20*a* to 20*d* formed in the frame 9 or into pairs of first sockets 23 formed in the floor of the command deck element 14.

In one embodiment of a space toy system according to the invention, the pin 41 is replaced by a plug member in the form of a connecting peg, generally designated 70, and shown in Figs. 15*a*, 15*b* and 15*c*. The peg 70 is hollow and has an integral web 71 formed midway between its ends having a rectangular opening 72 therethrough. The external surface of the peg 70 is provided with longitudinally extending ribs 73 (only some of which have been designated a reference numeral in Fig. 15*a*) which are slightly tapered at each end (see Fig. 15*c*) to facilitate location of the peg prior to its insertion into a socket. In order to limit the penetration of a peg 70 into a socket, it is preferred to provide each socket with a radially inwardly projecting restriction on its inner cylindrical walls.

A tool 74 (see Fig. 16) is conveniently provided to facilitate withdrawal of the peg 70 from a socket into which it is inserted. The tool 74 has a handle 75 and a T-shaped end portion 76 which is able to pass through the opening 72 when orientated so that the top of the "T" extends in the lengthwise direction of the rectangular opening 72 but which is unable to pass through the opening 72 when the top of the "T" is orientated to extend in the transverse direction of the rectangular opening 72. The ends 77 and 78 of the handle 75 are designed so as to plug into sockets in the command module or interceptor when the tool is not in use as an extractor.

In another embodiment of a space toy system according to the invention, the pin 41 is replaced by an elongate tubular plug (not shown) moulded from low density polyethylene resin which, when not inserted in its associated socket 29, has an undeformed non-circular cylindrical outer surface with a bore of circular form. The plug, in transverse cross-section perpendicular to the elongate direction, has a substantially elliptical shape having a maximum dimension d_2 along its major axis and a minimum dimension d_1 perpendicular to the major axis (i.e. along the

minor axis). Preferably the dimensions of the plug are such that

$d_1 < D \leqslant d_2$, where D is the diameter of the socket 29.

When the above relationship is satisfied the plug cannot be fully inserted into its associated socket 29 without being deformed. However, because the plug is of tubular form and is made of a material which is not hard, the plug is resiliently deformable on the application of pressure on opposed side surfaces of the plug. If the socket 29 is formed in comparatively hard material, e.g. ABS resin or die cast zinc alloy, such pressure can be applied, to resiliently deform the plug, by locating the plug in the mouth portion of the socket 29 and manually pushing the plug into the socket. Since the walls of the socket are made of a comparatively hard material compared with the material of the plug, the side walls of the socket 29 apply a resiliently-deforming pressure to the side walls of the plug as the latter is manually pushed into the socket thereby causing the dimension d_2 to decrease and the dimension d_1 to increase. When the plug is fully inserted into the socket 29, the side walls of the socket maintain the resiliently-deforming pressure applied to the side walls of the plug and counteract the tendency of the plug to assume its original "elliptical", undeformed condition so that the plug is releasably retained captive in the socket. The plug is easily manually removable from the socket 29 and, once removed, substantially re-assumes its undeformed condition. If after much use the plug does not return to its "elliptical" form it can easily be manually manipulated back into its original "elliptical" form. Typically the plug has a through bore diameter of 0.312 inches, a dimension d_1 of 0.410 inches and a dimension d_2 of 0.445 inches. Conveniently the socket 29 has a diameter D of 0.436 inches.

It will be appreciated that complex space toy systems can be built by interlocking different components together. Although the space toy system described herein has employed the command module 1 as the basic first component of a toy system according to the invention, it should be realised that the interceptor 2 could constitute the first component of a toy system according to the invention since it is in the form of a toy space vehicle which includes a rotatable member (in the form of rotatable element 26) and a unitary frame 25 which enables other components to be releasably interlocked with it in each of any of three mutually perpendicular directions.

CLAIMS

1. A space toy system comprising a first component constituting by itself a separate space vehicle and having a rotatable member usable as a ground-engaging wheel and a unitary frame supporting the rotatable member, and at least one further component, the unitary frame and the or each further component being provided with interlocking means for enabling the or any one of the further component(s) to be releasably interlocked to the unitary frame in a plurality of different positions, the interlocking means on the unitary frame being arranged to enable the or any one of the further component(s) to interlock with the unitary frame respectively in each of any one of three mutually perpendicular directions.

2. A space toy system according to claim 1, in which the said rotatable member is at least substantially spherical.

3. A space toy system according to claim 1 or 2, in which the said unitary frame surrounds the said rotatable member.

4. A space toy system according to any of the preceding claims, in which the said rotatable member comprises an outer, hollow, ground-engaging shell rotatably carried by the said unitary frame for rotation about an axis of rotation, and an inner cockpit member positioned inside the said outer shell and supported for rotation about the said axis of rotation independently of the said outer shell.

5. A space toy system according to claim 4, in which the said cockpit member is self-righting, the cockpit member having a centre of gravity off-set from the said axis of rotation and, at least when the said axis of rotation is disposed substantially horizontally, positioning itself with its centre of gravity beneath the said axis of rotation.

6. A space toy system according to any of the preceding claims, in which the or each further component is releasably interlocked with the unitary frame by means of at least one plug and socket connection.

7. A space toy system according to claim 6, in which the said unitary frame is provided with a plurality of sockets, constituting the, or at least some of the, interlocking means of the unitary frame, into which sockets plug members are insertable to provide push-fit connections.

8. A space toy system according to claim 7, in which at least some of the plug members are provided on the, or at least one of the, further component(s) to constitute the, or at least some of the, interlocking means of the particular further component.

9. A space toy system according to claim 7, in which at least some of the plug members are separate components, the, or at least one of the, further component(s) being provided with one or more sockets constituting the, or at least some of the, interlocking means of the further component(s), at least one of the separate plug members being insertable into each of at least one pair of confronting sockets in the unitary frame and a

further component to interlock the latter to the unitary frame.

10. A space toy system according to claim 9, in which the said at least some plug members are provided in two different forms, one form for providing a push-fit connection with a first socket having a comparatively large cross-sectional area and the other form for providing a push-fit connection with a second socket having a comparatively small cross-sectional area.

11. A space toy system according to claim 10, in which the, or at least one of the, further component(s) is interlocked with the unitary frame using at least two plug members.

12. A space toy system according to claim 10 or 11, in which at least some of the said sockets on at least one of the said components are arranged in at least one group of sockets, the or each socket group comprising a centrally arranged first socket and a pair of second sockets, the said second sockets being arranged on opposite side of, and equally-spaced from, the centrally arranged first socket and having their axes lying in a common plane with the axis of the centrally arranged first socket.

13. A space toy system comprising a first component constructed and arranged substantially as hereinbefore described with reference to, and as illustrated in, Figs. 1 to 3 of the accompanying drawings and at least one further component interlockable with the first component respectively in each of any one of three mutually perpendicular directions.

14. A space toy system comprising a first component constructed and arranged substantially as hereinbefore described with reference to, and as illustrated in, Figs. 6 and 7 of the accompanying drawings and at least one further component interlockable to the first component respectively in each of any one of three mutually perpendicular directions.

15. A space toy system according to claim 14 or 15, in which the, or at least one of the, further component(s) is constructed and arranged substantially as hereinbefore described with reference to, and as illustrated in, Figs. 4 and 5, Fig. 8, Fig. 9, Figs. 10 and 11 or Fig. 14 of the accompanying drawings.

16. A space toy system according to any of claims 13 to 15, incorporating an interlocking plug member constructed and arranged substantially as hereinbefore described with reference to, and as illustrated in, Figs. 15*a* 15*b* and 15*c* of the accompanying drawings.

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1. A space toy system comprising a first component constituting by itself a separate space vehicle and having a rotatable member usable as a ground-engaging wheel and a unitary frame which encircles and rotatably supports the rotatable member, and at least one further component, the unitary frame and the or each further component being provided with interlocking means for enabling the or any one of the further component(s) to be releasably interlocked to the unitary frame in a plurality of different positions, the interlocking means on the unitary frame being arranged to enable the or any one of the further component(s) to interlock with the unitary frame respectively in each of any one of three mutually perpendicular directions.

Printed for Her Majesty's Stationery Office
by Burgess & Son (Abingdon) Ltd.—1981.
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.