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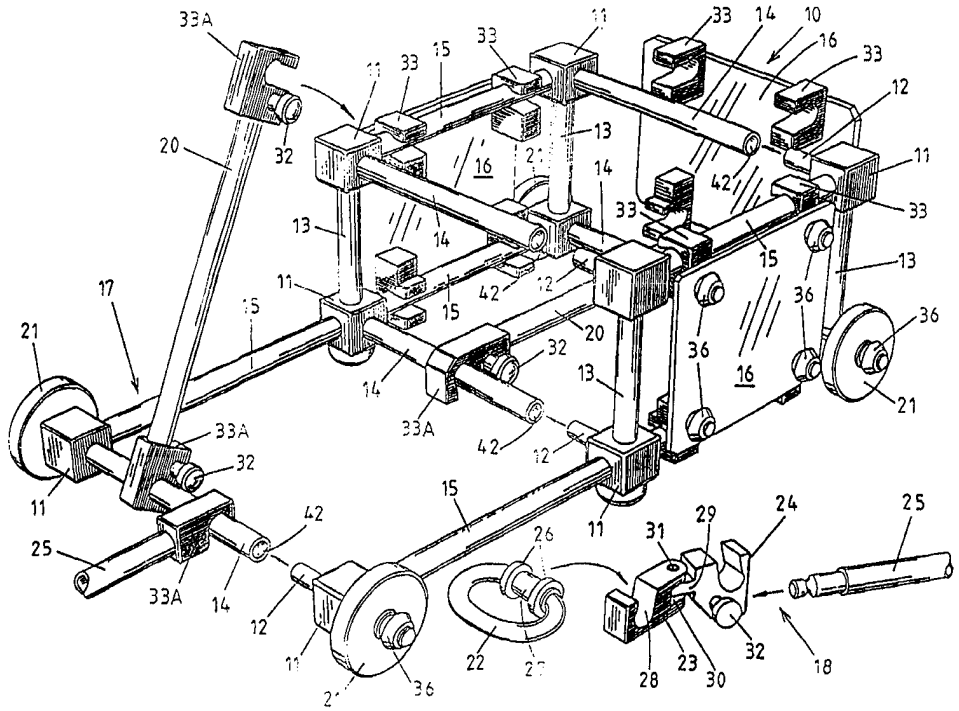
(54) Title: DEMOUNTABLE STRUCTURES



(57) Abstract

A fastening means comprising a shank having an intermediate groove located thereon, a body member with a space located therethrough for placement of the shank, a fastener held by the body member such that the fastener is located transverse to the shank, wherein the fastener is transversely movable between a locking and an unlocking position, the fastener locking the shank to the body member via the intermediate groove.

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TITLE

DEMOUNTABLE STRUCTURES

TECHNICAL FIELD

This invention relates to demountable structures which include movable structures such as toy vehicles, toy trailers and trolleys or fixed structures such as toy buildings, furniture or frameworks.

BACKGROUND ART

Demountable toy structures are known and, for example, reference may be made to FR 2239084 which refers to a toy construction set or game which comprises cuboidal blocks having a plurality of outwardly extending protrusions which also may be cuboidal in shape. There also may be provided elongate tubular components of square or rectangular cross-section having longitudinal grooves located in each outer planar face. Such tubular components are adapted to be engaged with associated cuboidal blocks wherein a respective outwardly extending protrusion may engage with a proximal outer end of an adjacent tubular component. Panels may be attached to the longitudinal grooves of the tubular components to thereby complete a desired structure. The longitudinal grooves may also be utilised for insertion of axles or pins which can support wheels, pulleys, handles or other components which can be utilised to build vehicles, lifting apparatus or other structures.

Reference may also be made to US 4352255 which refers to a toy constructional set comprising various lengths of resilient tubes formed from plastics material with slotted ends, large size tubular resilient plastics hoops, three basic types of tubular connectors and an optional wheel hub. Relatively large stationary and mobile structures can be formed form these components.

GB 1581603 refers to toy construction kits which include building elements having undercut grooves or slots, each element comprising a base, a connection means in the form of a peg provided on the base for joining another element of the kit to the base and an axle fitted to the base and comprising two

portions extending beyond the base, the axle being engageable in an undercut groove or slot of another building element of the kit to join that element to the base.

US 3883983 refers to a toy adaptor assembly capable of being affixed to a container to form a toy, the adaptor assembly comprising an integrally formed unit comprising a generally omega-shaped resilient support member with an open top for clasping the container and at least one axle bracket extending radially outwardly therefrom and axle hub means on the bracket and wheels which are removably mounted on the axle hub means.

US 4164090 refers to an assembly kit for assembling a toy vehicle which has an upper part provided with an undercut groove on a lower surface thereof and a lower part including structural elements each provided with a bar-shaped undercut element engaging the undercut groove so as to connect the lower and upper parts together. The upper part is hollow whereas the lower part is plate-like and is additionally provided with axle end portions for mounting wheels of the vehicle thereon. The bar-shaped undercut element has an elongate groove and is located between the axle end portions and in alignment therewith.

FR 2229203 refers to a construction toy for children using large size parts comprising a flat plate and curved pieces. Wheels and axles are also provided and assembly is carried out using serrated longitudinally split spring pegs.

GB 2058590 refers to a wheel hub or node fitting which uses a polygonal section axially bored hub block with radial spigots projecting from each flat. The bore may accept an axle pin to constitute a journal bearing and each spigot may accept a socket end of a frame spoke.

DE 3005182 refers to a model scaffolding kit having tubular sections linked by plastics moulded joints having clip on fittings. The joints are provided with vertical parts having ring flanges. The tubular sections are slid over reduced shanks of the joints whereby a three-dimensional structure may be

obtained around a complex shape.

Having regard to the prior art as discussed above, it will be noted in the case of DE 3005128, GB 1581603, US 3833983, FR 2229203, US 4164090 and GB 2058590 that such disclosures referred to specialised fittings or connectors which are relatively expensive to produce especially in the case where such fittings or connectors had to be produced from moulded plastics material. Another deficiency using specialised fittings or connectors was that the versatility of structures that could be produced was limited.

In the case of US 4352255 and FR 2239084, while it will also be appreciated that the structures disclosed in the references are versatile in nature, it is noted that the connectors which are utilised include friction fitting plugs which do not utilise additional bracing structure. This means that after repeated use, the friction fitting plugs, due to wear, have increased clearance and thus have a tendency to work loose or become disconnected. These disadvantages also apply to the other prior art references described above.

DISCLOSURE OF THE INVENTION

It is therefore an object of the invention to provide a demountable structure which may alleviate the disadvantages of the prior art referred to above.

In one form the invention resides in a fastening means comprising a shank having and intermediate groove located thereon, a body member with a space located therethrough for placement of the shank, a fastener held by the body member such that the fastener is located transverse to the shank, wherein the fastener is transversely movable between a locking and an unlocking position, the fastener locking the shank to the body member via the intermediate groove.

In another form the invention resides in a demountable structure comprising a frame including a plurality of frame members wherein each of the frame members are connected to each other characterised in that there is incorporated one or more primary frame members which interconnect a respective pair or pairs of secondary frame members wherein said primary frame

member(s) are attached at least at one end thereof to an associated secondary frame member by an attachment block having a longitudinal passage to facilitate insertion of a proximal end of the primary frame member and a transverse passage which accommodates a fastener wherein the fastener is movable from an inoperative position allowing insertion of the proximal end of the primary frame member to an operative position wherein the proximal end is locked into bearing engagement with the fastener.

Each of the primary and secondary frame members are preferably tubular and may be connected at each end to an associated end of an adjacent frame member utilising a mounting block having a plurality of protrusions extending therefrom wherein an individual protrusion may engage with an open end of a proximal frame member.

The mounting blocks may be cuboidal having at least three protrusions extending from an adjacent planar face or surface thereof. However, it will be appreciated that the mounting blocks may be spherical or form a polygonal prism if desired.

The frame may include a plurality of oblique frame members but more preferably the frame members include a plurality of longitudinal frame members, a plurality of transverse frame members and a plurality of uprights wherein a respective pair of adjacent frame members are attached to each other by the mounting block.

The primary frame members, in one embodiment, are preferably bracing members are suitably attached to opposed frame members intermediate their ends and, in this regard, the attachment block may have a notch or recess or engaging in snap fit or interference fit with an adjacent frame member. It is also preferred that a plurality of bracing members be utilised in relation to the frame to strengthen and reinforce the frame to provide an extremely strong and durable frame. In this particular embodiment, which constitutes a first embodiment of this invention, the longitudinal frame members, transverse frame members and uprights constitute secondary frame members.

The fastener may include a shank interconnecting enlarged ends and the shank may include an internal groove which facilitates insertion of the proximal end of the bracing member through the longitudinal passage. In the operative position, the proximal end of the bracing member may also have an internal groove which engages with the shank of the fastener adjacent the internal groove of the shank.

The attachment blocks may also be cuboidal in nature although this is not essential and any other suitable shape which may be spherical or alternatively, a polygonal prism may be utilised.

There also may be provided a plurality of wall sheets which may be attached to parallel longitudinal frame members or parallel transverse frame members and, in this regard, there may be utilised connection members preferably in the form of connection blocks which each incorporate a notch or recess for retention of an associated frame member. Each connection block may also include an outwardly extending protrusion which is aligned with an attachment aperture of a wall sheet wherein the protrusion may extend through the attachment aperture and be retained therein by use of a retainer which has an internal bore which receives the protrusion. The retainer may include a sealing member located in an internal groove of the internal passage which facilitates the protrusion engaging with the retainer in an interference fit.

If it is required that the frame be mobile, there may be provided at least one pair of ground engaging wheels. In this particular embodiment, each wheel may have a central aperture which may engage with an adjacent protrusion of a connection block and be retained therein by use of the retainer as described above.

In a second embodiment, the demountable structures of the invention may include furniture frames or other frame structures such as animal pens and enclosures. In the first embodiment, the demountable structures of the invention are suitably demountable toys or playthings and the primary frame members are preferably bracing members located intermediate secondary frame

members.

In the second embodiment, each primary frame member may be longitudinal frame members or transverse frame members and each secondary frame member may constitute uprights. However, this is not essential and a reverse arrangement may be adopted wherein secondary frame members may constitute longitudinal or transverse frame members and primary frame members comprise uprights.

BRIEF DESCRIPTION OF THE DRAWINGS

Reference may be now made to a preferred embodiment of the invention as shown in the attached drawings, wherein:-

FIG. 1 is a perspective view of a demountable toy vehicle constructed in accordance with the first embodiment of the invention;

FIG. 2 is a detailed perspective view of the attachment of the connection block to an associated wall sheet of the demountable toy shown in FIG. 1 by use of the retainer;

FIG. 3 is a detailed perspective view of the attachment of a wheel of the toy vehicle to an associated mounting block;

FIGS. 4-5 are detailed perspective views of the interconnection of the various components of a pulling handle assembly of the demountable toy vehicle shown in FIG. 1;

FIG. 6 is an exploded perspective view of the modified joint assembly between primary and secondary frame members which comprises a second embodiment of the invention;

FIG. 7 is an exploded perspective view of a table trolley constructed in accordance with the second embodiment of the invention; and

FIG. 8 is a perspective view of a bed constructed in accordance with the second embodiment of the invention.

BEST MODE

In FIG. 1 there is shown a demountable toy vehicle 10 comprising

a plurality of mounting blocks 11 each having an outwardly extending protrusion or lug 12, a plurality of uprights 13, a plurality of transverse frame members 14, a plurality of longitudinal frame members 15, a plurality of wall sheets 16, a pulling frame in the form of a forward extension 17 and a pulling handle assembly 18. The pulling frame 17 also includes a brace member 20. There is also provided ground engaging wheels 21.

The pulling handle assembly 18 includes holding ring 22, support block 23, pivot block 24 and handle rod 25. The holding ring 22 includes spaced lugs 26 defining an engagement portion 27 which engages in snap fit or interference fit with recess 28 of support block 23. Pivot block 24 is pivotally attached to support block 23 by lug 29 being pivotally received within notch 30 of support block 23 and retained therein by retaining pin 31. Handle rod 25 is releasably attached to pivot block 24 by the use of grooved fastener 32 and this is described hereinafter in more detail in FIGS. 4-5.

Each of wall sheet 16 is releasably attached to an associated connection block 33 as shown in FIG. 2. In this embodiment, each connection block 33 includes an attachment rod 34 which extends through an aligned attachment aperture 35 in wall sheet 16 and is retained therein by a suitable retainer in the form of a retaining button 36. Retaining button 36 includes an internal passage 37 having a groove 38 which retains an 0-ring seal 39. When attachment rod 34 is inserted into internal passage 37, it is retained therein in an interference fit relationship by seal 39. Each connection block 33 also includes a notch 40 which engages with an associated frame member 14 or 15 as shown in FIG. 1.

Each mounting block 11 includes a plurality of outwardly extending lugs 12 as best shown in FIG. 3 and such lugs 12 may engage with a mating tubular frame member 14 or 15 as best shown in FIG. 1 wherein a respective lug 12 which engage in plug-socket or male-female relationship with a mating hollow bore 42 of frame members 14 or 15 as well as uprights 13. Each lug 12 may also engage with wheels 21 as shown in FIG. 3 wherein lug 12 extends through

central aperture 43 of wheel 21 and is retained in this position by the use of retaining button 36 and associated seal 39 in a similar manner as described in FIG. 2. Wheel 21 also includes a hub 44.

In FIGS. 4-5, there is shown pivot block 24 having lug 29 which has retaining aperture 45 for retaining pin 31. The pivot block 24 also has a longitudinal internal passage 46 which has open ends 47 and 48.

There is also provided opposed transverse passages 49 for insertion of grooved fastener 32. Grooved fastener 32, as shown in FIG. 5, includes opposed enlarged end portions 50, shank 51 and engagement groove 52 which divides shank 51 into bearing portions 53 and 54. It will be appreciated that fastener 32 is insertable in opposed transverse passages 49 as shown in FIG. 4 and FIG. 5 and movable from a position shown in FIG. 4 to a locking position shown in FIG. 5.

There is also shown handle rod 25 having a proximal end 55 which includes end portion 56, groove 57 and enlarged part 58. The end 55 is inserted into internal bore 42 of handle rod 25 and bonded therein or retained therein by interference fit.

In FIGS. 4-5, it is shown that fastener 32 when inserted into opposed transverse passages 49 has an initial inoperative position shown in FIG. 4 wherein slot 52 is located in passage 46 which enables end 55 of handle rod 25 to be passed through end 47 of passage 46. Upon further movement of fastener 32, as shown by the arrow in full outline in FIG. 4, end 55 is locked in position by engagement of groove 57 with bearing portion 53.

It will be appreciated from FIG. 1 that the locking action shown in relation to grooved fastener 32 also has reference to attachment of attachment blocks 33A to associated transverse frame members 14. A different locking mechanism as described above in regard to FIG. 2 is utilised for locking of connection blocks 33 to associated wall sheets 16.

In FIG. 6, there is shown a modified joint assembly between adjacent frame members of a frame structure that may be utilised in furniture.

The joint assembly 60 comprises attachment block 61 having outwardly extending protrusions 62 each having an internal groove 63. Frame members 64, 65, 66 and 67 are each provided with an enlarged end portion or boss 68. Boss 68 is provided with a lug 69 having a transverse passage 70 through which may be inserted a fastener 32 as shown in FIG. 5. Transverse passage 70 also communicates with internal bore 71 of boss 68 and thus fastener 32 attaches each of the frame members 64, 65, 66 and 67 to attachment block 61 in a similar manner as described in FIGS. 4-5 where fastener 32 may be moved from an inoperative position where internal groove 52 allows each of bosses 62 to reach a position abutting an adjacent surface 72 of attachment block and subsequently fastener 32 may be moved to an operative or locking position by further transverse movement thereof wherein groove 63 engages with bearing portion 53.

In FIG. 7, there is shown a trolley table 75 in an exploded perspective view wherein table 75 includes tabletop 76 and support trolley legs 77, 78, 79 and 80. Legs 77 and 78 are attached to the underside 81 of tabletop 76 by use of screw fasteners 82 being inserted through co-aligned apertures 83 and 84. Aperture 83 is provided in boss 85 of leg 77 and aperture 84 is located in lug 86 attached to underside 81. Screw fasteners 82 engage with nuts 82A. Legs 79 and 80 are attached to underside 81 in similar manner with the modification that lugs 86A are provided with elongate apertures 87 which are provided with a plurality of notches 88 which provide a number of different positions for insertion of fastener 82 for the purpose of adjustment.

Leg 79 is provided with an internal component 89 having a plurality of adjustment grooves 90 which may be engaged in a selected groove 90 by fastener 32. Frame supports 91, 92 and 93 may each be attached to each other by the use of attachment blocks 61. There are also provided wheels 21 which are attached to a support lug 94 which is inserted through central aperture 44 and retained thereto by retaining button 36 having an internal seal 39.

In FIG. 8, there is shown bed 95 having bedhead 96 and

longitudinal frame members 97 and transverse frame members 98. There is also shown legs or uprights 99 and bed posts 100. Each of these frame members are connected by attachment blocks 61 as shown in FIG. 6. Wheels 21 may also be attached as shown in FIG. 7.

It will be appreciated from the foregoing that the demountable structures of the invention have many and varied applications and thus may include fixed structures which do not require wheels or movable structures which may have wheels. A feature of the invention is that a structure formed in accordance with the invention is extremely strong and durable by the use of the bracing members 20 which prolong the operational longevity of the structure in accordance with the first embodiment shown in FIGS. 1-5. The use of the groove fastener 32 enables rapid dismantling of the structure if required and this also applies to the use of mounting blocks 11, connection blocks 33 and attachment blocks 33A in relation to FIGS. 1-5 and attachment blocks 61 shown in FIGS. 6-7.

It will also be appreciated that in regard to the first embodiment shown in FIGS. 1-5 that such embodiment may also be directed to provision of demountable furniture frames or demountable enclosures which may comprise building frames, fences and the like.

It will also be appreciated that the use of an attachment member preferably in the form of attachment button 36 having an internal seal or 0-ring 39 may be used for attachment of adjacent frame members to each other or wall sheets or panels to a connection block having an outwardly extending protrusion such as the specific embodiment shown in FIG. 2. Thus the invention also includes within its scope demountable structures utilising this form of attachment *per se* independently of the use of fastener 32. In a preferred form, the demountable structures of the invention will utilise both forms of the attachment i.e. that shown in FIG. 2 as well as that shown in FIG. 5.

CLAIMS:

1. A fastening means comprising a shank having an intermediate groove located therein, a body member with an aperture located therethrough for placement of the shank, a fastener held by the body member such that the fastener is located transverse to the shank when the shank is located within the aperture; wherein the fastener is transversely movable between a locking and an unlocking position, the fastener locking the shank to the body member via the intermediate groove.

2. The fastening means of claim 1 wherein the aperture is a cylindrical hole.

3. The fastening means of claim 2 wherein the fastener includes a rod which has a grooved portion.

4. The fastening means of claim 3 wherein the intermediate groove extends around the shank.

5. The fastening means of claim 4 wherein the intermediate groove is located adjacent the end of the shank.

6. A demountable structure comprising a frame including a plurality of frame members wherein each of the frame members are connected to each other characterised in that there is incorporated one or more primary members which interconnect a respective pair or pairs of secondary frame members wherein said primary frame member(s) are attached at least at one end thereof to an associated secondary frame member by an attachment block having a longitudinal passage to facilitate insertion of a proximal end of the bracing member and a transverse passage which accommodates a fastener wherein the fastener is movable from an inoperative position allowing insertion of the proximal end of the primary frame member to an operative position wherein the proximal end is locked into bearing engagement with the fastener.

7. The demountable structure as claimed in Claim 6 wherein the fastener includes a shank having an intermediate groove and enlarged ends wherein the intermediate groove facilitates insertion of the proximal end of the

primary frame member through respective open ends of the longitudinal passage.

8. The demountable structure as claimed in claim 7 wherein the proximal end of the primary member includes an internal groove which, in the operative position, bears against the shank of the fastener adjacent the intermediate groove.

9. The demountable structure as claimed in claim 8 wherein each of the frame members are tubular and are connected to each other by mounting blocks having a plurality of protrusions extending therefrom wherein an individual protrusion engages with an open end of a proximal frame member.

10. The demountable structure as claimed in claim 9 wherein the secondary frame members include a plurality of longitudinal frame members, a plurality of transverse frame members and a plurality of uprights.

11. The demountable structure as claimed in claim 10 wherein the primary frame member(s) are attached to opposed secondary frame members intermediate their ends.

12. The demountable structure as claimed in claim 11 wherein the or each attachment shank includes a notch or recess for engaging in snap fit or interference fit with an adjacent secondary frame member.

13. The demountable structure as claimed in claim 12 including a plurality of primary frame members interconnecting two or more pairs of opposed secondary frame members.

14. The demountable structure as claimed in claim 13 including a plurality of wall sheets are attached to parallel frame members by connection members.

15. The demountable structure as claimed in claim 14 wherein the connection members are connection blocks having an outwardly extending protrusion which extends through an adjacent attachment aperture of the wall sheet and is retained therein by use of a retainer.

16. The demountable structure as claimed in claim 15 wherein each

connection block includes a notch or recess for engagement with an adjacent frame member in snap fit or interference fit.

17. The demountable structure as claimed in claim 16 wherein the retainer includes an internal passage having a seal wherein the protrusion engages with said internal passage in an interference fit.

18. The demountable structure as claimed in claim 17 also including ground engaging wheels.

19. The demountable structure as claimed in claim 10 having ground engaging wheels wherein an individual protrusion of an adjacent mounting block extends through a central aperture of each wheel and is retained thereon by a retainer.

20. The demountable structure as claimed in claim 19 wherein the retainer includes an internal passage having a seal wherein the protrusion engages with said internal passage in an interference fit.

21. The demountable structure of claim 20 wherein the demountable structure is a toy.

22. The demountable structure of claim 21 wherein the primary frame members are bracing members.

23. The demountable structure of claim 20 wherein the demountable structure is a furniture frame, animal pen or enclosure.

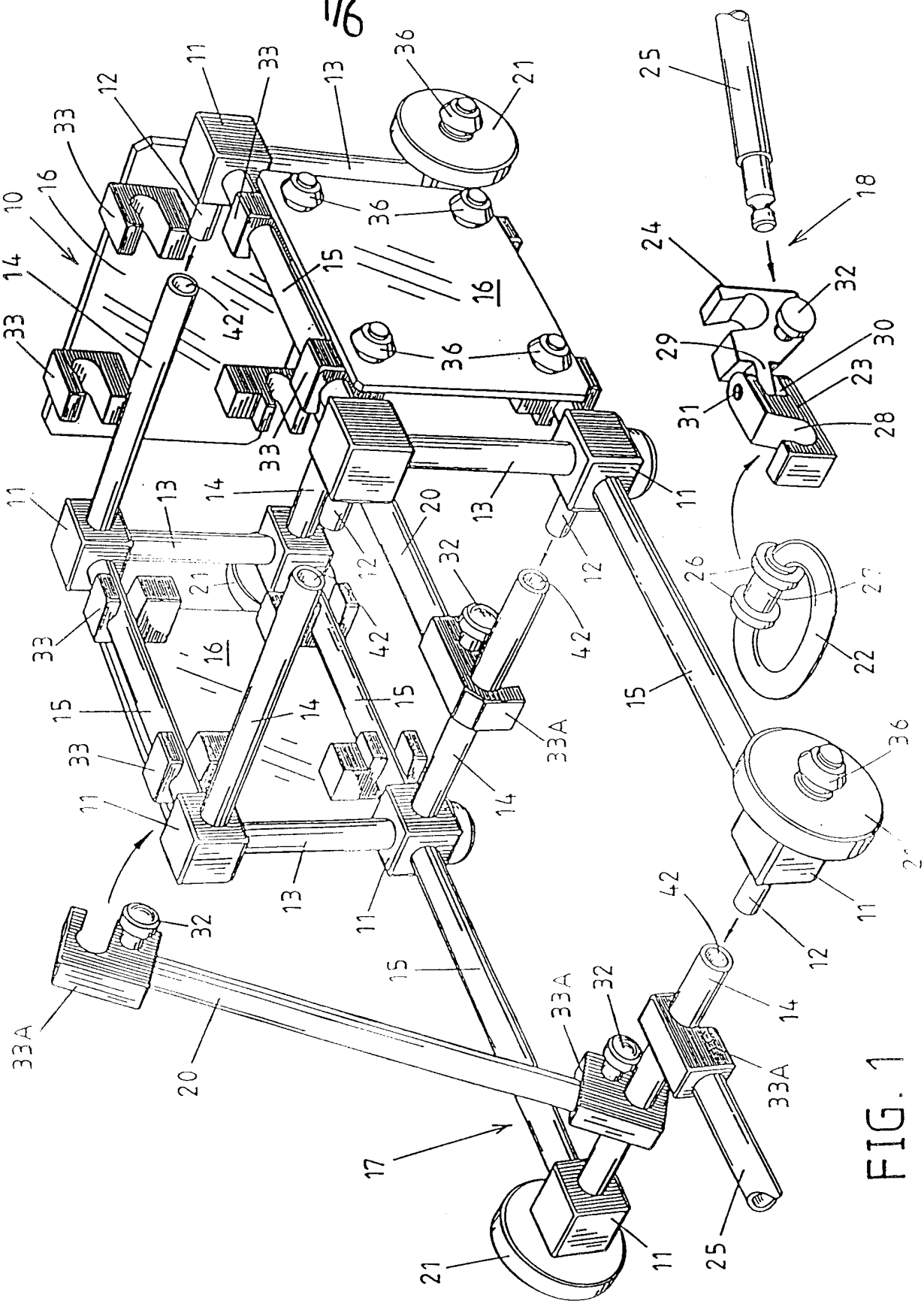
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FIG. 1

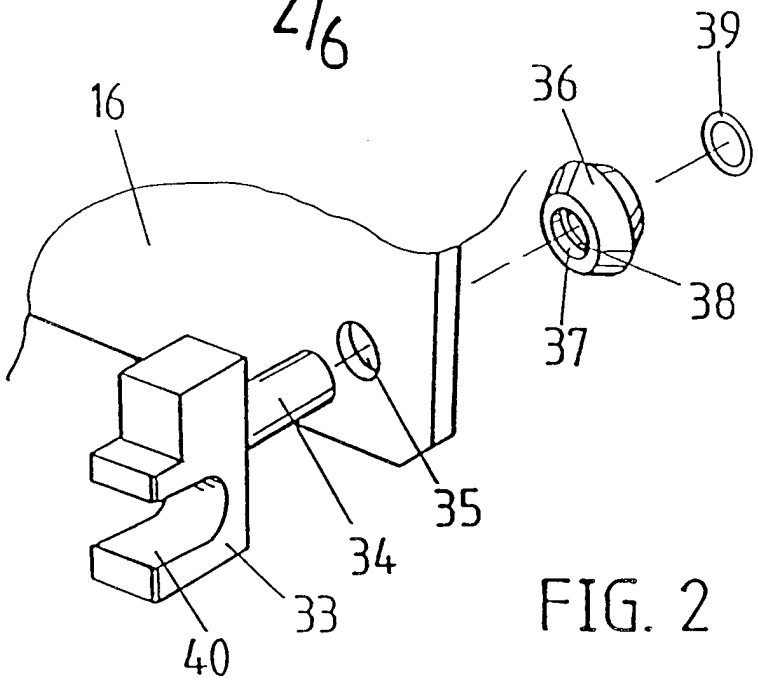

FIG. 2

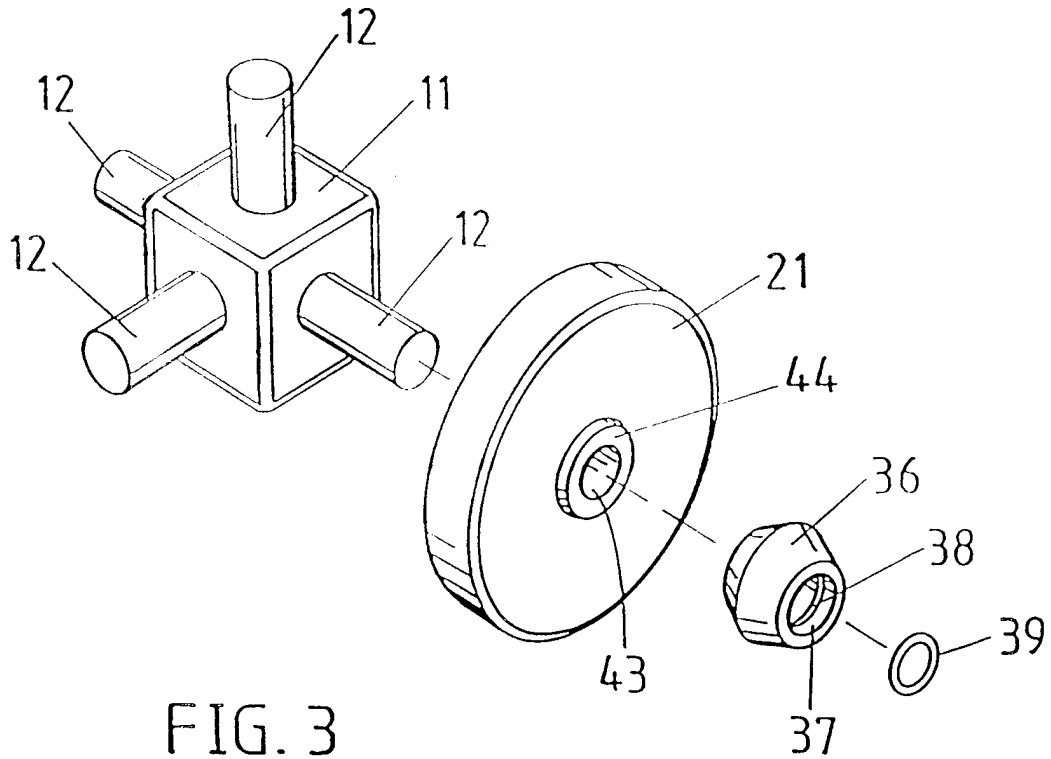

FIG. 3

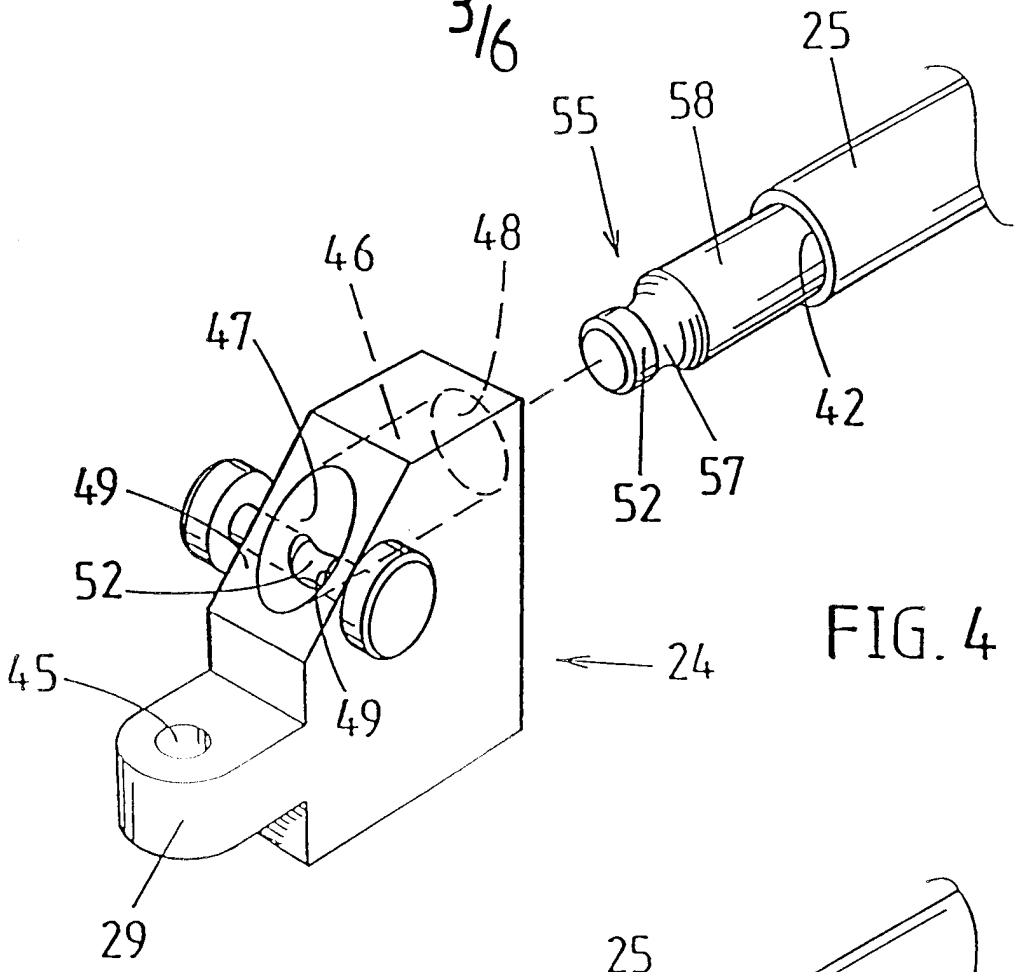
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FIG. 4

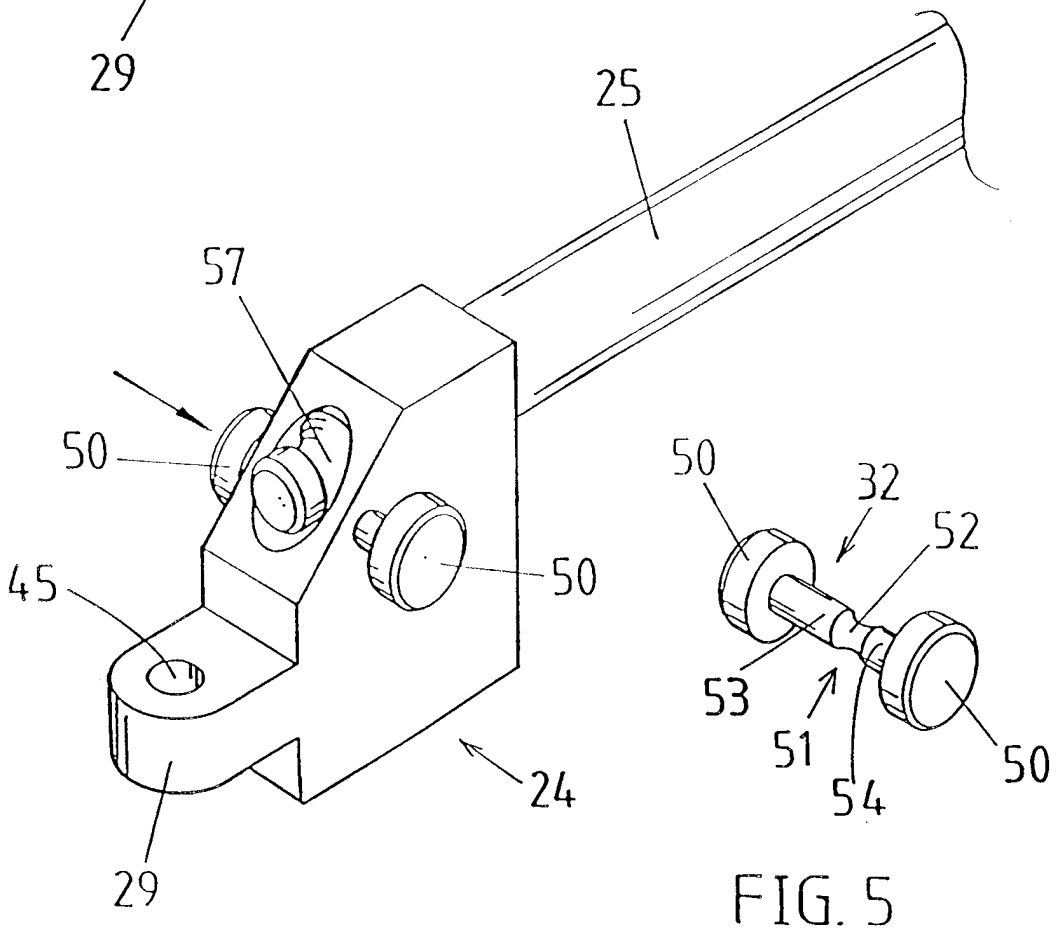
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FIG. 5

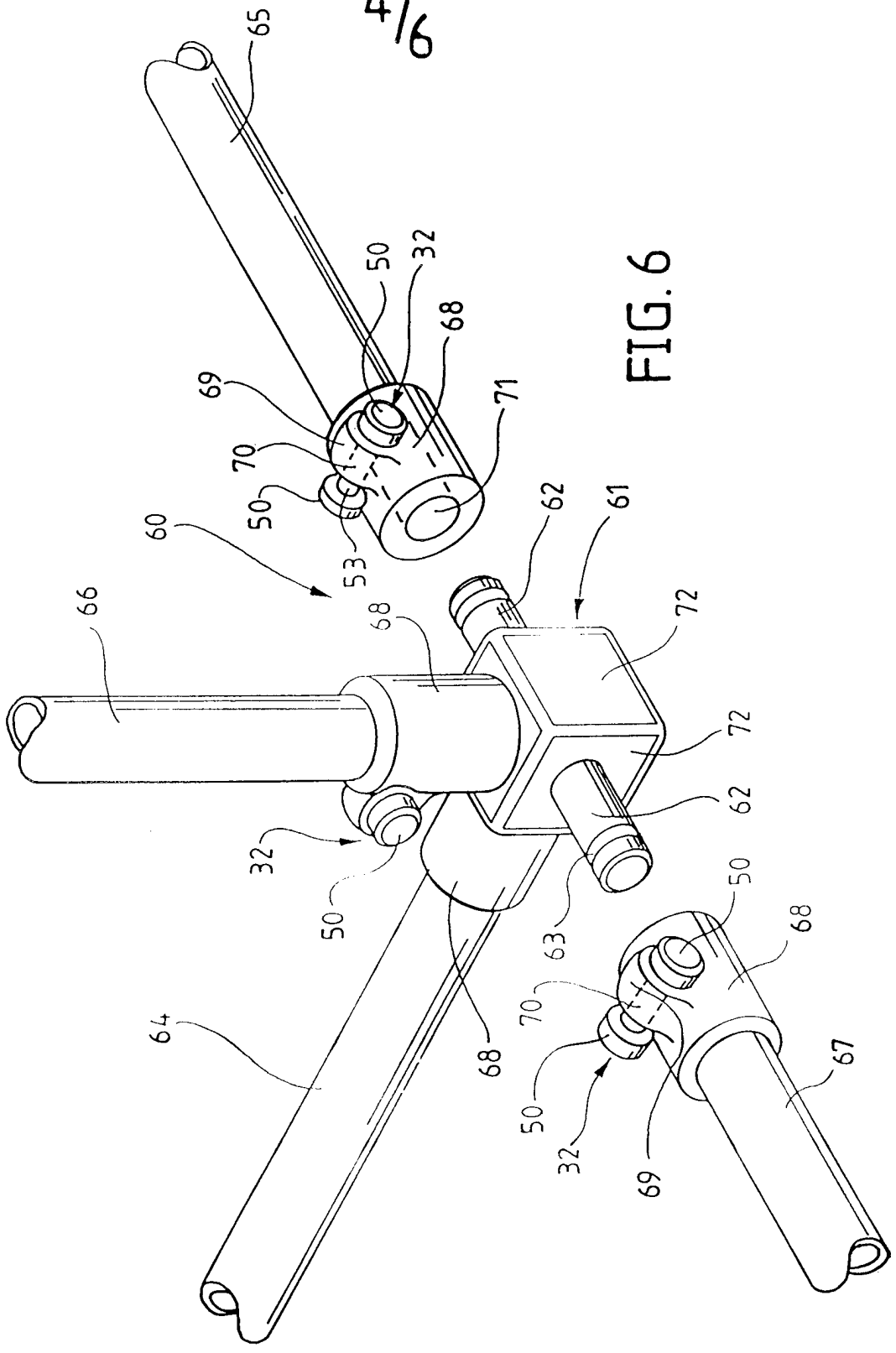
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FIG. 6

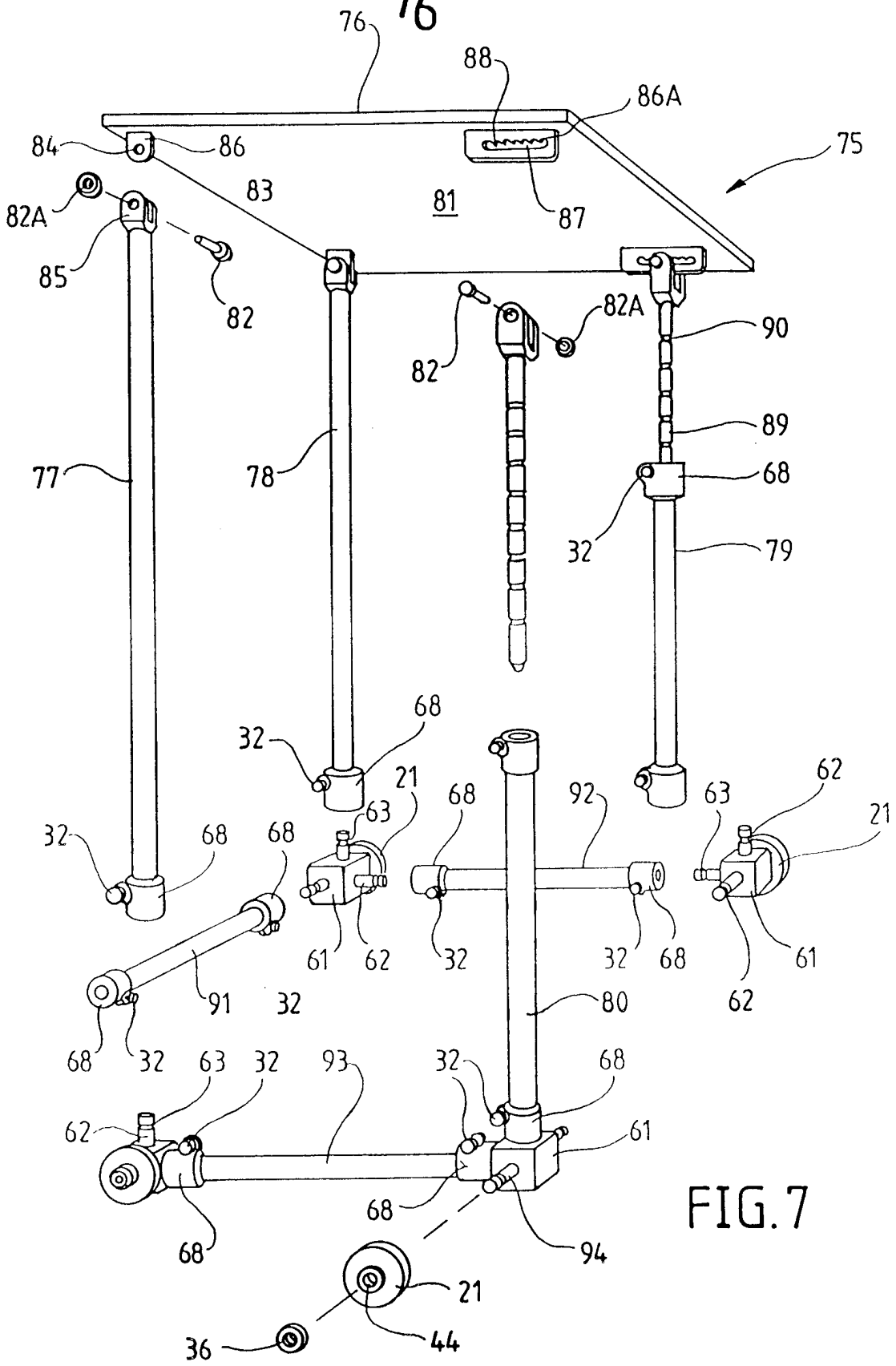
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FIG.7

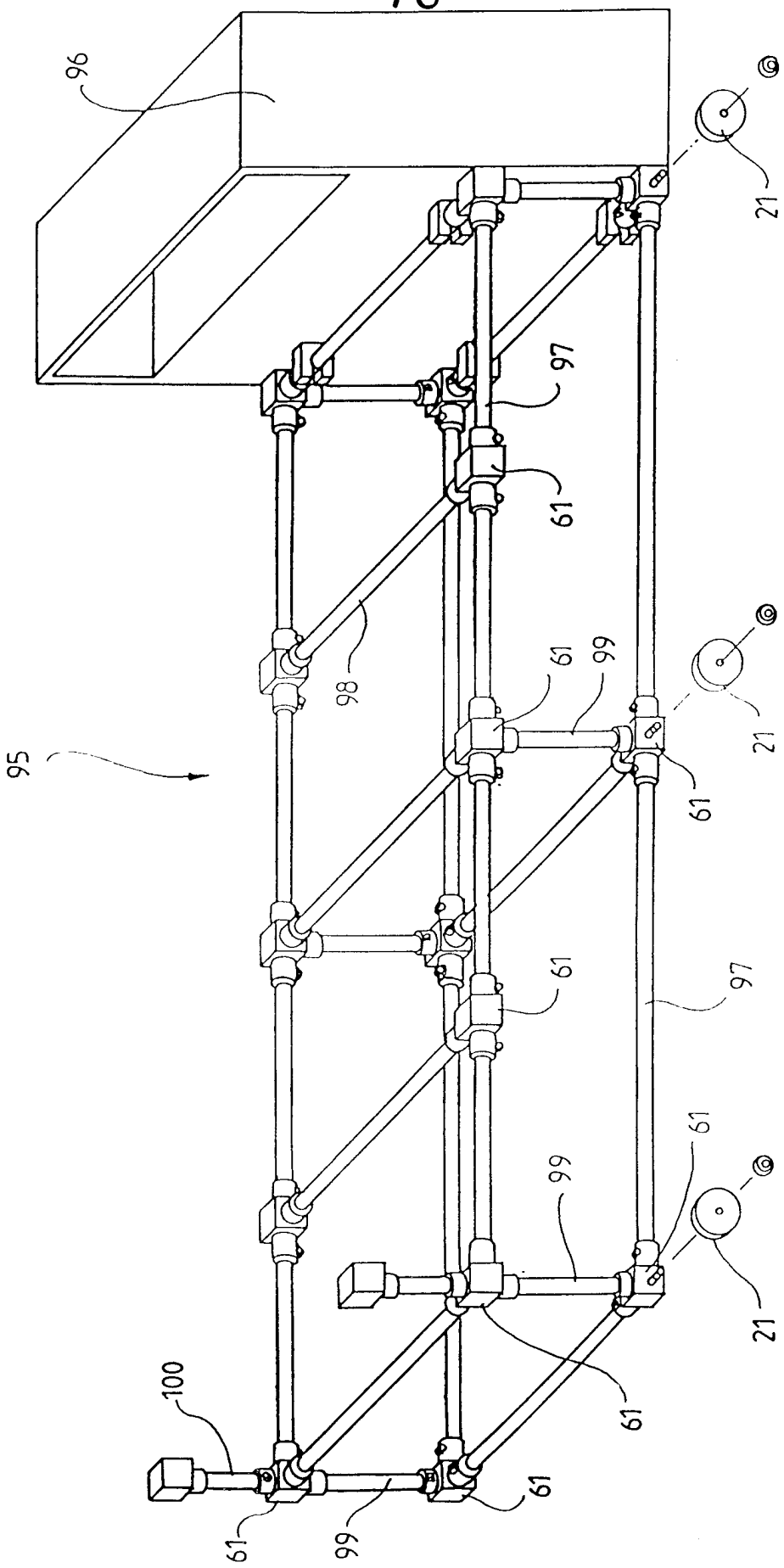

FIG 8

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 97/00698

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl[6]: A63H 33/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC : As Above

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PAIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SE 8000612 (KOMMUNSAMKOP) 24 August 1981	1 to 13
X	BE 886985 (FISCHER, A) 4 May 1981	1, 2, 6
X	DE 1128227 (SYLWAN, M.C.) 8 November 1962	1,7
X	DE 849062 (KOBLER and CO.) 11 September 1952	1 to 13
X	CH 262580 (KOBLER and CO.) 1 October 1949	1, 7

☐ Further documents are listed in the continuation of Box C

☐ See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 December 1997	11 DEC 1997
Name and mailing address of the ISA/AU AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No.: (02) 6285 3929	Authorized officer **J.W. THOMSON** Telephone No.: (02) 6283 2214