



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.06.2001 Bulletin 2001/26

(51) Int Cl.7: **A47B 17/00**, A47B 83/00,
A47B 21/00

(21) Application number: **00309798.7**

(22) Date of filing: **06.11.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**
Designated Extension States:
AL LT LV MK RO SI

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(30) Priority: **10.11.1999 GB 9926628**

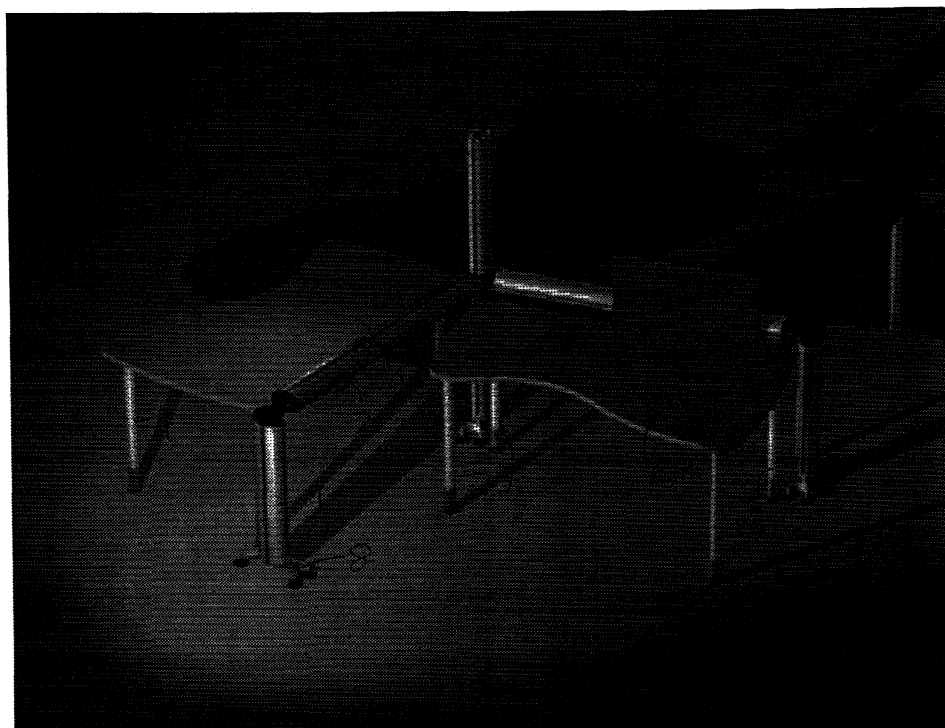
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(54) **Support system**

(57) The present invention relates to a support system for furniture. The support system includes a number of upright support members and, a number of elongate lateral connection beams for coupling to the support members. Each support member is capable of supporting a number of connection beams extending substan-

tially radially outwardly from an axis. The support members and/or the connection beams also have at least one wall defining a part of a connector for allowing components to be connected a number of different positions along the length of the respective support member and/or connection beam.

Fig. 1.



Description

[0001] The present invention relates to a support system for furniture, for example for use in an office environment.

[0002] Typically furniture, and in particular office furniture, is formed from a number of different components, such as desks, tables, chairs and upright partitioning. These components are usually produced as pre-designed modular units so that they can be connected together to provide a desired furniture arrangement. Thus for example, a number of desks may be linked together with upright partitioning so as to define separate work areas.

[0003] However, because the components are pre-designed so that they can be interconnected, they can generally only be connected in a very limited number of arrangements. This therefore limits the number of possible furniture layouts available when an office is being designed.

[0004] An alternative is to use separate individual furniture components. However, this typically results in inconsistencies in the appearance of different areas of the office.

[0005] Further problems are caused by the need to provide services to the desks, such as telephone connections, electrical supply and network connections for computers. If separate furniture items are used, the desks have to be located near to specifically provided sockets in the floor or walls. Even so, there are typically trailing wires loose on the floor which can cause trip hazards.

[0006] One solution to this has been to incorporate wiring within the desks. However, again this still requires that the desks are located near sockets in the floor or walls.

[0007] A further solution has been to incorporate wiring within upright partitioning. However, this firstly requires that upright partitioning is used and secondly requires that the desks are provided near sockets in the upright partitioning so that connection to the network and/or electrical supplies can be made. Even in this case, the partitioning is typically difficult to erect and accordingly, this system once installed is difficult to rearrange and move.

[0008] In accordance with the present invention, we provide a support system for furniture, the support system comprising:

a number of upright support members, each upright support member defining an axis; and,
a number of elongate lateral connection beams for coupling to the support members, each support member being capable of supporting a number of connection beams extending substantially radially outwardly from the axis, the support members and/or the connection beams having at least one wall defining a part of a connector for allowing compo-

nents to be connected thereto at a number of different positions along the length of the respective support member and/or connection beam.

[0009] Accordingly the present invention provides a support system based around a number of upright support members and lateral connection beams. The connection beams can be connected to the support members to extend radially outwardly from the axis, allowing a variety of support configurations to be produced. Components, such as furniture or media components, can be connected to the support members and the connection beams at any point along their length. As a result, the system allows an extensive number of support arrangements to be produced. In addition to this, all the configurations can be based on the same components which follow the same general style, thereby providing a more flexible support system.

[0010] Typically each end of the connection beams are capable of being supported by an upright support member. Alternatively however a cantilever arrangement could be used in which only one end of the connection beams are supported by an upright support member. A further alternative is for one end of the connection beams to be fixed to a wall, or the like.

[0011] Preferably the connection beams and the support members include a cooperating tongue and groove arrangement to allow the connection beams to be supported by the support members. This advantageously allows the lateral connection beams to be connected to the upright support members at any circumferential position. However, other connections such as plug and socket arrangements could be used. It will also be realized that the cooperating tongue and groove may be formed as integral parts of the respective connection beams and support members. Alternatively, these parts may be formed separately and mounted on the connection beams and support members in an appropriate manner.

[0012] Preferably a cavity extends along the length of the support members and/or the connection beams. This allows strong but lightweight support members and/or connection beams to be produced. However, solid beams and members could be used.

[0013] If a cavity is present, the cavity is advantageously adapted to contain a service carrying medium. This allows services such as electrical supplies, network connections and telephone connections to be supplied directly to the user. Furthermore, by appropriate positioning of the support members near appropriate floor or wall sockets, the service medium within the cavity can be connected to the service medium already present within the building without having the problems of trailing wires or the like. In this manner, the system can be used to provide service support to furniture.

[0014] In this case, one of the components comprises a socket which can be connected to the at least one wall and which, in use, allows service utilizing devices to be

coupled to the service carrying medium. However, any suitable method of connection may be used. Thus for example devices such as computers or telephones or the like may simply be directly wired via the cavity to sockets provided at remote locations on the wall or in the floor.

[0015] Typically the support members and/or the connection beams each comprise a central beam and a number of enclosure members removably mounted thereon. However, beams formed from a single component may be used.

[0016] When a central beam is used, the support members and the connection beams preferably have substantially identical central beams. This allows the support members and the connection beams to have the same design, thereby making the system easier to manufacture and install, as well as reducing production cost significantly. However, different designs of central beam and different designs of support member and connection beam can be used. Alternatively however, the enclosure members may be pivotally mounted to the central beam, to allow the enclosure member to be rotated away from the central beam thereby providing easy access to the central beam.

[0017] In the case in which a central beam and enclosure members are used, the at least one wall is usually provided on the central beam such that, in use, components are coupled to the central beam. This allows the central beam to support some or all of the weight of the components whilst the enclosure members may be used to provide a desired outward appearance. This has the advantage that the external members may be removed and replaced allowing support members and connection beams having different appearances to be easily produced. However, in some circumstances it may be desirable for the one wall to be defined by the enclosure members, particularly if the component is lightweight and does not require much support.

[0018] Typically the at least one wall defines a slot extending along the length of the central beam, the slot being adapted to receive the components in use. The use of the slot has the advantage that components may be mounted at any point along the slot length. However, alternative connections such as plug and socket arrangements or tongue and groove connections may be used.

[0019] Preferably the central beam includes a number of circumferentially spaced walls. This allows components to be coupled to the central beam at a number of circumferentially spaced locations, as well as anywhere along the length of the central beam, thereby further increasing the versatility of the system.

[0020] Typically the central beam is formed from an aluminium extrusion. In this case, the enclosure members are also typically formed from aluminium extrusions. This is a strong lightweight material which ensures that the structural support system is not of an excessive weight whilst still being of a strength suitable for

use as furniture. However, any materials such as wood, plastics or the like may be used. In the case in which extrusions are used, because the support members and connection beams can use the same cross sectional design, the central beams and enclosure members can be extruded in long sections, and then divided into portions of appropriate lengths to form the support members and connection beams.

[0021] Typically the cavity is defined between the central beam and the enclosure members. This allows easy access to the cavity to replace any wiring, or cabling contained therein particularly if the enclosure member is pivotally or removably mounted to the central beam. However, the cavity may be contained within the central beam.

[0022] The upright support members usually include a number of feet extending radially outwardly from the support axis, at one end of the support member, the feet being adapted to contact the ground and maintaining an upright support member in a substantially upright orientation. This allows the upright support members to be provided freestanding allowing them to be easily moved thereby improving the flexibility of the device. Alternatively, some or all of the upright support members may be provided on castors allowing at least some of the support structure to be easily moved. A further alternative is for the support members to be fixed to the floor, for example using bolts. This may be preferred if a strong rigid structure is required.

[0023] Typically the components include furniture components such as desks, tables, chairs, partitioning, shelving and other storage modules as well as media components such as computer equipment including monitors, keyboards and the like and media service supply devices such as telephones. This allows the support system to be utilised in a number of different environments including the office, in the outfitting and design of shops and in general architectural use.

[0024] Examples of the present invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of furniture system incorporating a support system in accordance with the present invention;

Figure 2A shows a cross-sectional view of a central beam of one of the connection beams or support members shown in Figure 1;

Figure 2B shows a cross-sectional view of an enclosure member of one of the connection beams or support members shown in Figure 1;

Figure 2C is a cross-sectional view of the enclosure members of Figure 2B coupled to the central beam of Figure 2A;

Figure 3A is a cross-sectional view of a connection beam or support member including a socket box;

Figure 3B is a cross-sectional view of a connection beam or support member including an alternative

socket box;

Figure 3C is a cross-sectional view of a connection beam and a table shown in Figure 1;

Figure 3D is a cross-sectional view of a support piece;

Figure 3E is a cross-sectional view of a connection beam or a support member including the support piece of Figure 3D;

Figure 4A is a perspective view of one of the support members of Figure 1;

Figure 4B is a plan view of the support member shown in Figure 4A;

Figure 5A is a perspective view of the connectors for connecting the connection beams to the support members for the apparatus of Figure 1;

Figure 5B is a cross-sectional view along the line B-B' of Figure 5A;

Figure 5C is a plan view of a modified version of the apparatus of Figure 5A further including a cable tidy;

Figure 5D is a cross-sectional view along the line A-A' of Figure 5C;

Figure 5E is a plan view of the cable tidy of Figures 5C and 5D; and,

Figure 5F is a modified version of Figure 5B showing an additional support member 1.

[0025] The modular furniture system shown in Figure 1 includes a number of upright support members 1 connected together via lateral connection beams 2, as shown.

[0026] The support members 1 and the connection beams 2 can be used to support furniture components such as a table 3. In this case, a rearward edge 3A of the table 3 is supported by the connection beam 2, whereas the front edge 3B is supported by legs 4.

[0027] Similarly, a partition component 5 is also shown which is connected to a different connection beam 2. In this case, an adjacent table 6 is also provided but this is merely positioned against the connection beam 2 and is supported by its own legs 7.

[0028] In this example, the support members are maintained in an upright position by feet indicated generally at 8 and which will be described in more detail below.

[0029] The support members and the connection beams are, in this example, adapted to incorporate wiring, such as fibre optic cable, mains supply wiring and computer network connections so that computers may be provided on the tables 3,6. Construction of the support members 1 and the connection beams 2 will now be described in more detail with respect to Figures 2A, 2B and 2C.

[0030] As shown in Figure 2C, the support members and the connection beams are formed from a central support beam 10 surrounded by enclosure members 14. The cross section of the support members 1 and the connection beams 2 is constant along their entire length.

This allows the support beams and the enclosure members to be produced by extruding aluminium. The extruded support beam 10 and enclosure members 14 can then be divided into desired lengths to form the support members and the connection beams. This has the advantage that a single construction technique can be used to form support members and connection beams of any desired length. In addition to this, the use of aluminium extrusions ensures the structure has a lightweight but strong construction.

[0031] The support beam, which is shown in cross-section in Figure 2A, includes four slots 11, as well as a number of screw holes 12,13 which extend along the length of the support beam. The slots 11 are used for connecting components, including furniture components such as desks and partitioning as well as media components such as sockets, or other additional parts to the support beam 10. The screw holes 12,13 are used for attaching end plates to the support members 1 and the lateral connection beams 2. The connection of components and end plates will be explained in more detail below.

[0032] The enclosure members 14 are shown in Figure 2B. In this example, the enclosure members include two clips 14A,14B which are used to connect the member to the support beam 10, as shown in Figure 2C. The enclosure members 14 therefore provide the support members 1 and the connection beams 2 with a desired outward appearance, and as will be appreciated by the skilled man this allows the appearance of the support members and the connection beams to be easily changed.

[0033] As an alternative, the enclosure members 14 may be pivotally mounted to the support beam 10, to allow the enclosure members to be hinged away from the support beam. This allows easy access to the support beam 10 and surrounding cavities (which will be explained below).

[0034] The positioning of the enclosure members 14 on the support beam 10 defines two major cavities 15A and two minor cavities 15B which can be used for carrying wiring, fibre optical cable, telephone connections, mains electrical supply, or the like. In general, such wiring or the like will be contained in the major cavities 15A as these have a larger area and can therefore accommodate more wiring. However, the minor cavities can also be used. The cavities allow wires to pass along the length of the support members 1 and the lateral connection members 2 so that services can be provided to the users at any desired location.

[0035] This is achieved by means of a socket box 17 which couples to the slot 11 using a dovetail tongue connector 18, as shown in Figure 3A. In this case, wires W are able to pass from the major cavity 15A into the socket box 17. Devices such as computers or the like can then be plugged into an appropriate socket 19 on the socket box, as required. It will be realized that the socket box 17 can also be coupled to any of the other slots 11

allowing devices to be connected to wires contained in any of the major or minor cavities 15A,15B.

[0036] An alternative method of coupling the socket box to the connection beams 2 and/or the support members 1 is shown in Figure 3B. In this case, the dovetail tongue connector 18 is replaced by a clip 16. The clip 16 cooperates with the enclosure members 14, as shown to hold the socket box in place. Again, this could be used to couple to wires in any of the cavities 15A, 15B.

[0037] Furniture or media components are coupled to the connection beams 2 or the support members 1 using brackets shown in Figure 3C. The bracket 40 includes a dovetail tongue connector 41 which is inserted into the slot 11, as shown. The connector is then fixed in the desired location using a fixing means such as a screw, glue, or the like (not shown). The bracket can then be connected to a furniture or media component, such as the table 3 to support the edge of the table as shown in Figure 1.

[0038] An alternative method of coupling furniture or media components to the connection beams to the support members 1 is shown in Figures 3D and 3E. Figure 3D is a cross-sectional view of a support piece 20 which connects to the support members 1 or the connection beams 2 as shown in Figure 3E.

[0039] The support piece 20 includes a dovetail tongue connector 21 which cooperates with the slot 11 as shown. Once located at the desired position, the dovetail tongue connector would then be fixed in position within the slot using a fixing means, such as fixing screws, glue, or the like. The support piece 20 includes two support points 22 each of which includes a hole 22A.

[0040] In use, the support piece 20 can be utilised in a number of ways. Thus, for example the support piece could be attached to the slot 11 on the underside of a connection beam allowing components to be hung from the support points 22. Alternatively, the support piece 20 could be positioned on the upper side of a connection beam, allowing shelving to be rested on the support points 22. If connected to the side of a connection beam, as shown for example in Figure 3E, then articles can be attached to the support points 22 using fixing screws which are inserted in the holes 22A.

[0041] The support piece 20 may also be coupled to a support member to allow components, such as shelving to be attached thereto. In this case, the shelves could be fixed to the support points 22 using fixing screws which screw into the holes 22A.

[0042] An alternative use for the support pieces 20 is as the feet 8 which are used to maintain the support members 1 in an upright position. An example of this is shown in Figures 4A and 4B. Figure 4A is a detailed perspective view of a support member 1 in which the upper portion of the support member is cutaway allowing the support beam 10 and the enclosure members 14 to be seen. The feet 8 are shown in more detail in Figure 4B are formed from a support piece 20, with foot pads 23 fixed to the support points 22.

[0043] In use, the dovetailed tongue connector 21 is inserted in a respective slot 11 of the support beam 10, as shown in Figure 4B. The support piece 20 is then secured at the desired position along the length of the support member 1 by fixing the dovetail tongue connector 21 in the slot 11 using a fixing means, such as a screw, glue, or the like (not shown). The foot pads 23 then rest on the floor as shown in Figure 4A to thereby support the support member 1.

[0044] The means for connecting the support members to the connection beams is shown in more detail in Figures 5A and 5B. A plate 30 is fixed to the upper end of the support member 1 using four fixing screws (not shown) which screw into the screw holes 12 of the support beam 10. The plate 30 is generally formed from moulded plastic and includes a soft portion 30A which can be deformed to allow access to the cavities 15A, 15B of the support member 1 via the plate 30.

[0045] Mounted above the plate 30 is a slot connector element 31 including an annular slot 32 for receiving brackets 33. The slot connector element 31 is typically fixed to the support member 1 by fixing screws (not shown) which screw into the screw holes 13. Each of the brackets 33 includes a plate 34 which is fixed to the support beam 10 of a respective connection beam 2. Again, this is achieved using four fixing screws (not shown) which are screwed into the screw holes 12 of support beam 10. The plate 34 is generally identical to the plate 30 and therefore also includes a softer portion 34A to allow access to the respective cavities 15A, 15B.

[0046] In use, the brackets 33 are positioned in the slot 32 at the desired circumferential location. A fixing plate 35 is then attached to the slot connector element 31 to prevent the brackets 33 from being removed from the slot, as shown in Figure 5B.

[0047] It will also be realized that as the bracket 33 and the plate 34 can be fixed to the connection beams at any orientation, allowing the position of the slots 11 relative to the ground to be altered. Thus, in the examples so far described, the connection beam is aligned with the underside slot 11 parallel to the ground so that slots are located in the 12, 3, 6, and 9 o'clock positions. However, by rotating the connection beam relative to the bracket 33 and the plate 34, the slots 11 could be located at any positions, for example the 1, 4, 7, and 10 o'clock positions.

[0048] A modification of the system shown in Figures 5A and 5B is shown in Figures 5C, 5D and 5E. In this case a cable tidy 37 is provided mounted on the fixing plate 35. The cable tidy, which is shown in side view in Figure 5D and plan view in Figure 5E includes a lower portion 39 and an upper dome portion 38. The lower portion 39 has a number of flexible fingers 39A which are typically formed from a plastic material. The upper dome portion 38 couples with the lower portion 39, as shown in Figure 5D.

[0049] In use, a wire W can then be interlocked around the flexible fingers 39A as shown in Figure 5E.

Accordingly, wires from the cavities 15A,15B can pass through the softer portion 30A of the fixing plate 30 and then be wrapped around the finger portions 39A of the cable tidy lower portion 39. The wire W can then be directed to an appropriate cavity 15A,15B of the connection beam 2 via the soft portion 34A of the fixing plate 34.

[0050] A further modification of the connection is shown in Figure 5F. In this case, a further plate 36 is attached to the fixing plate 35. The further plate 36 can then be connected to a further support member 1, as shown by the dotted line. This allows the support members 1 to be stacked vertically as shown for example in Figure 1.

[0051] As will be appreciated by a person skilled in the art, this allows multiple layers of the support system to be constructed. Thus, several support members may be stacked vertically and corresponding horizontal connection beams provided such that there are connection beams at several different heights within the overall support system. This further increases the versatility of the system and in particular allows multiple height modular storage to be implemented when modular storage units are fixed to the connection beams and the support members.

[0052] The plates 30,34,35,36 as well as the slot connector element 31 are typically formed from molded plastics, which provide a tough and durable construction.

Claims

1. A support system for furniture, the support system comprising:
 - a number of upright support members, each upright support member defining an axis; and,
 - a number of elongate lateral connection beams for coupling to the support members, each support member being capable of supporting a number of connection beams extending substantially radially outwardly from the axis, the support members and/or the connection beams having at least one wall defining a part of a connector for allowing components to be connected thereto at a number of different positions along the length of the respective support member and/or connection beam.
2. A system according to claim 1, wherein each end of the connection beams are capable of being supported by an upright support member.
3. A system according to claim 1 or claim 2, the connection beams and the support members including a cooperating tongue and groove arrangement to allow the connection beams to be supported by the support members.
4. A system according to any of the preceding claims, wherein a cavity extends along the length of the support members and/or the connection beams.
5. A system according to claim 4, wherein the cavity is adapted to contain a service carrying medium.
6. A system according to claim 5, wherein one of the components comprises a socket which can be connected to the at least one wall and which, in use, allows service utilizing devices to be coupled to the service carrying medium.
7. A system according to any of the preceding claims, wherein the support members and/or the connection beams comprise a central beam and a number of enclosure members removably mounted thereon.
8. A system according to claim 7, wherein the support members and the connection beams have substantially identical central beams.
9. A system according to claim 7 or claim 8, the at least one wall being provided on the central beam such that, in use, components are coupled to the central beam.
10. A system according to any of claims 7 to 9, the at least one wall defining a slot extending along the length of the central beam, the slot being adapted to receive the furniture components in use.
11. A system according to any of claims 7 to 10, wherein the central beam includes a number of circumferentially spaced walls.
12. A system according to any of claims 7 to 11, wherein the central beam is formed from an aluminium extrusion.
13. A system according to any of claims 7 to 12, wherein the enclosure members are formed from aluminium extrusions.
14. A system according to any of claims 7 to 13, when dependent on claim 4, wherein the cavity is defined between the central beam and the enclosure members.
15. A system according to any of the preceding claims, wherein the upright support members include a number of feet extending radially outwardly from the support axis, at one end of the support member, the feet being adapted to contact the ground and maintain the upright support member in a substantially upright orientation.

16. A system according to any of the preceding claims, wherein the furniture components include at least work surfaces and partitions.

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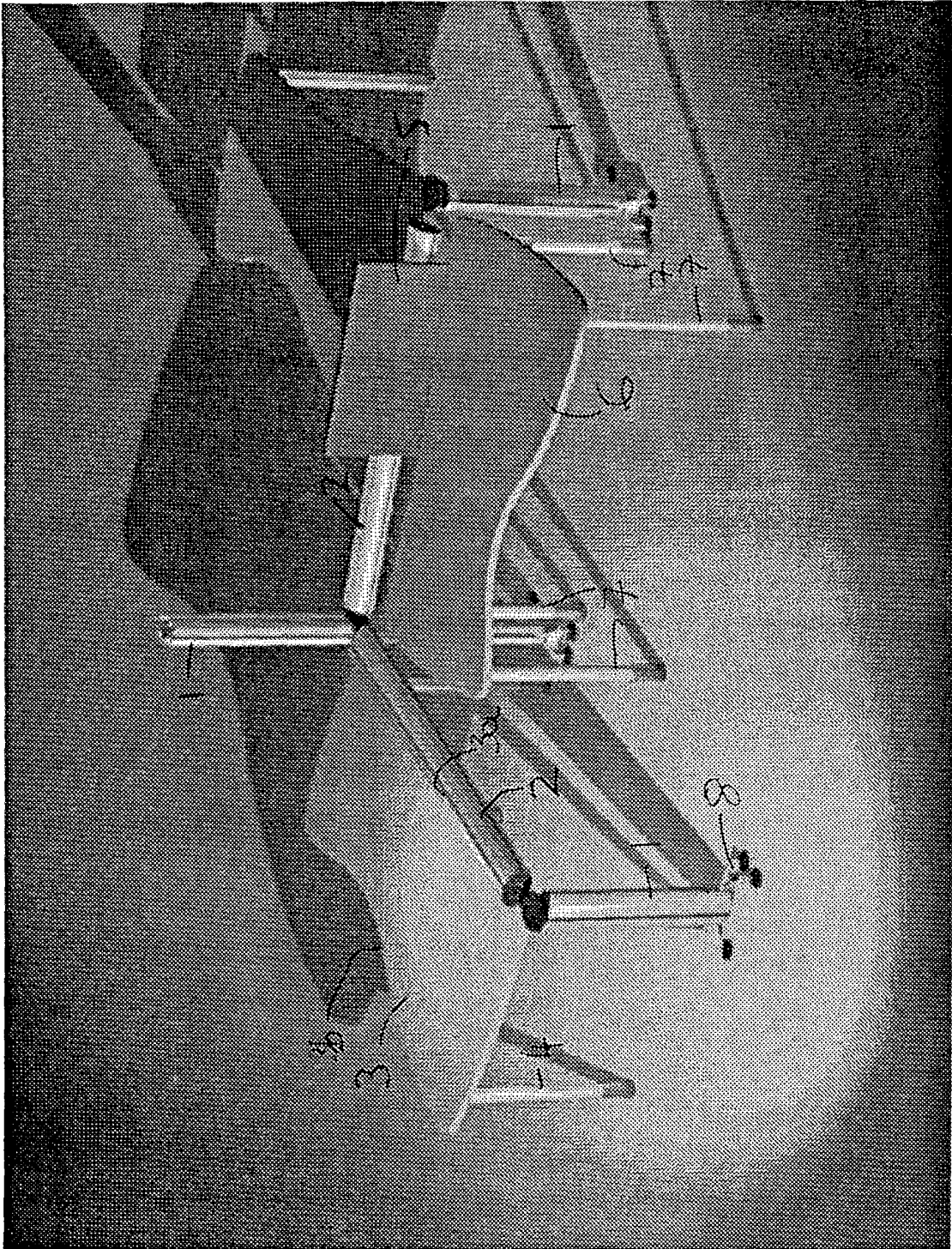


Fig. 1.

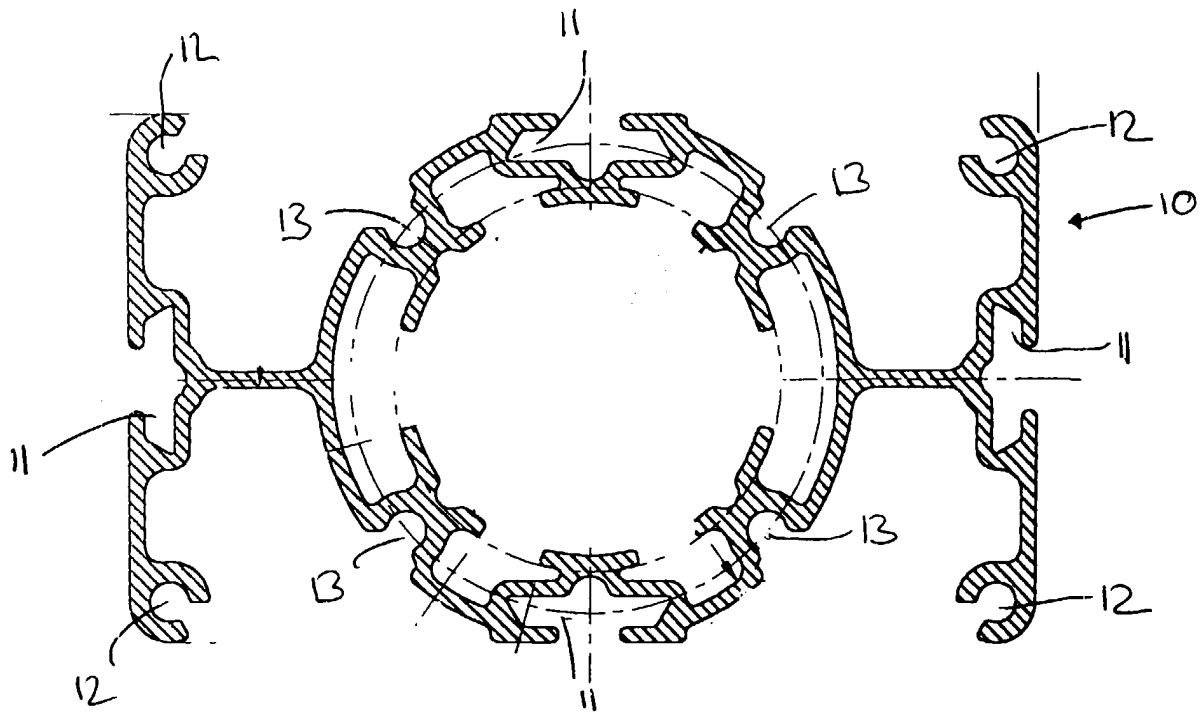


Fig 2A

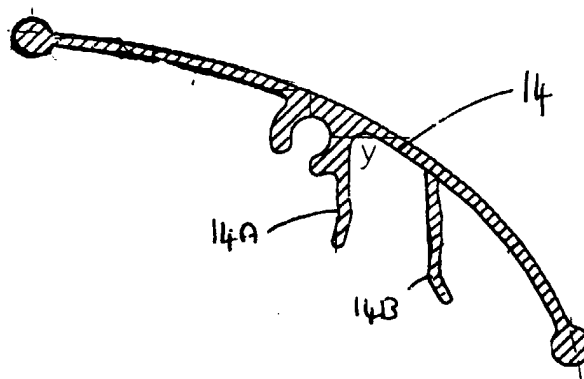


Fig 2B

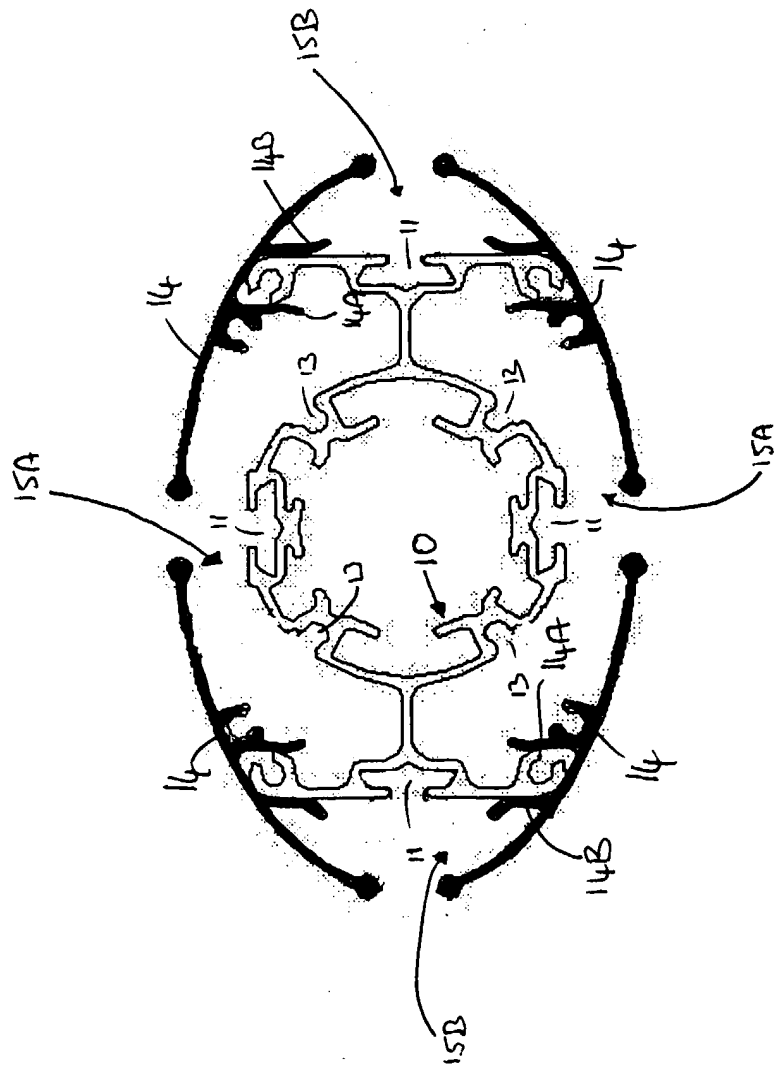


Fig 2C

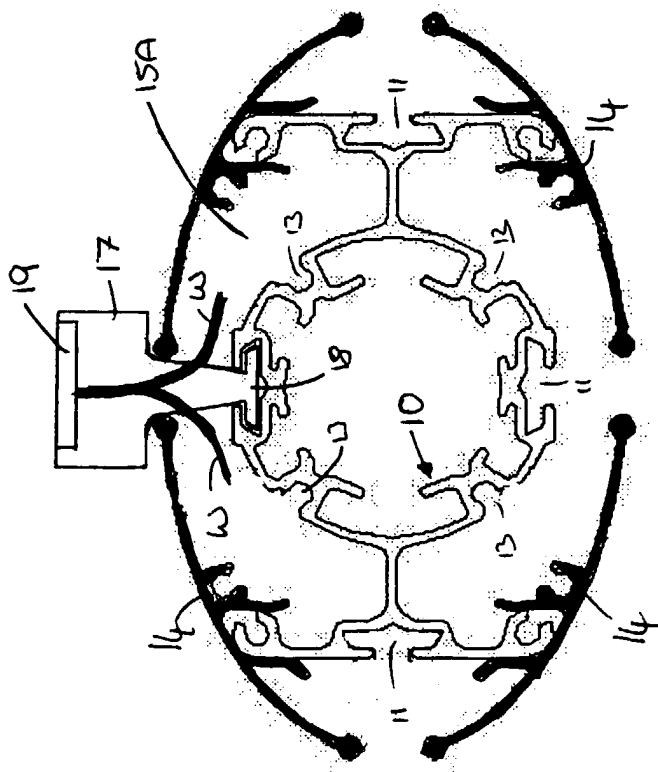


Fig 3A

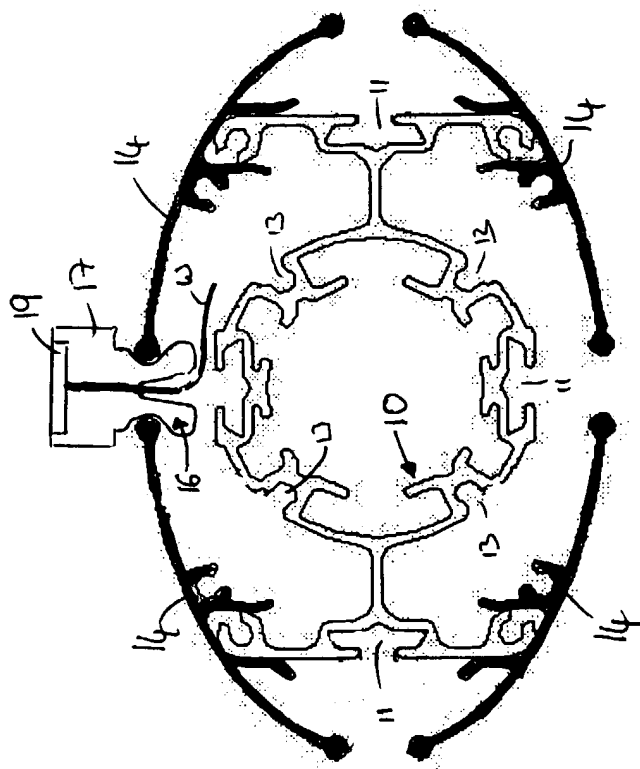


Fig 3B

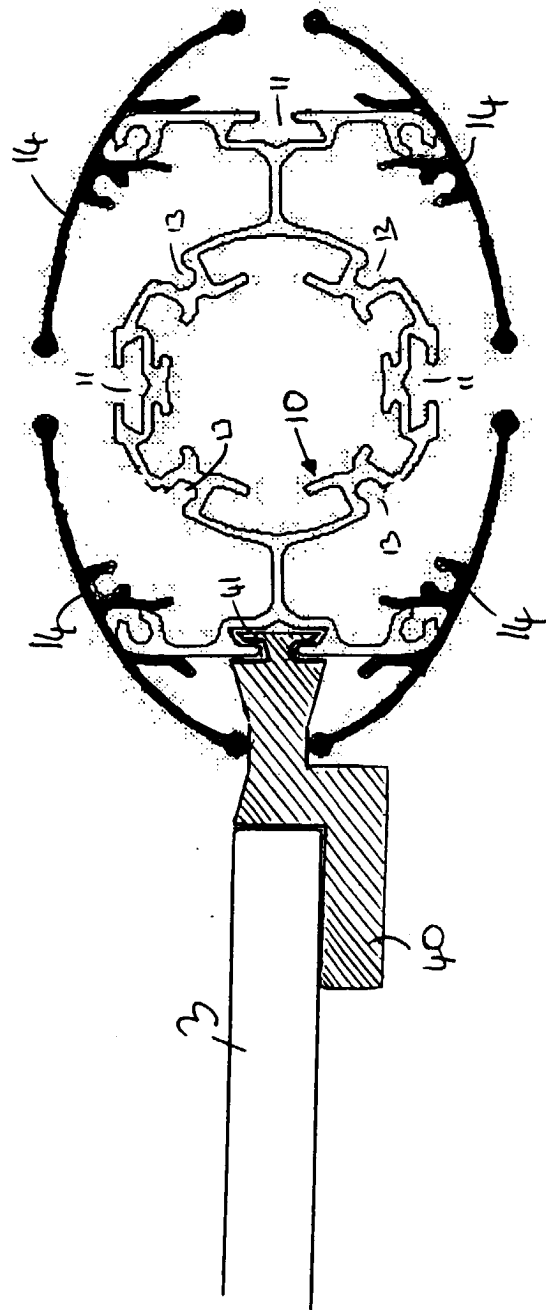


Fig 3C

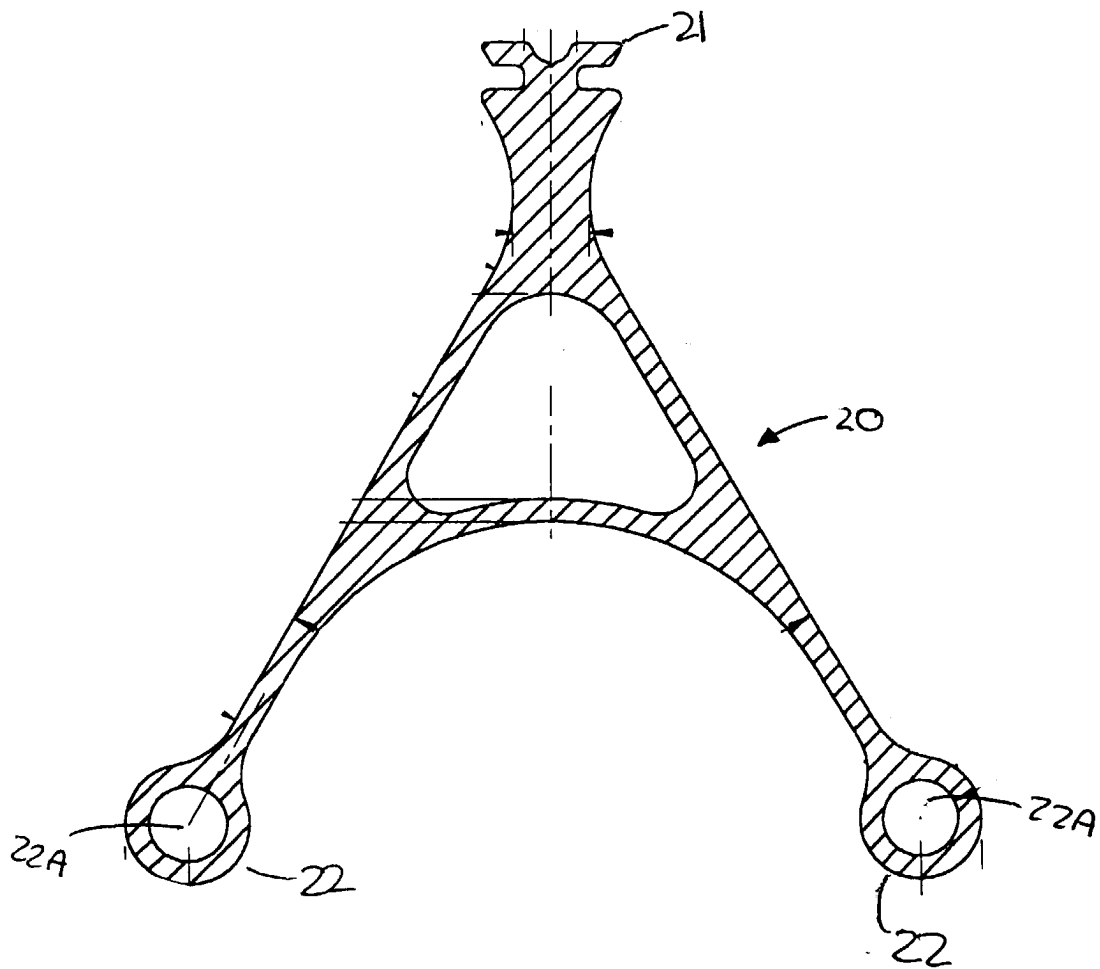


Fig. 3D

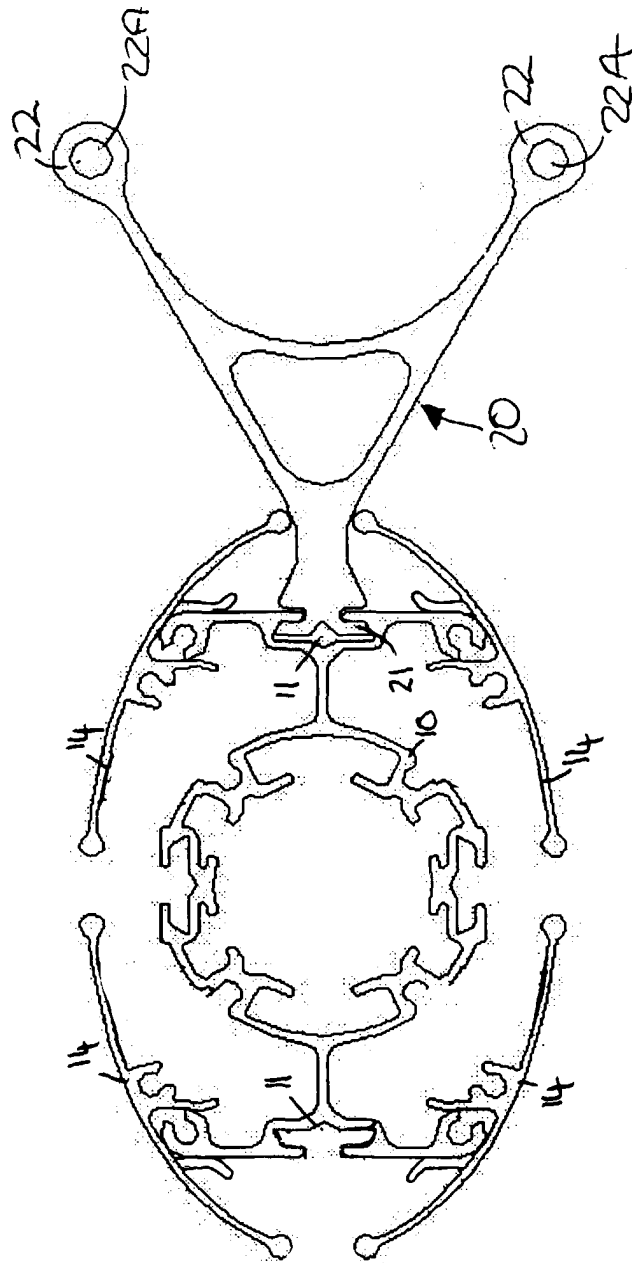
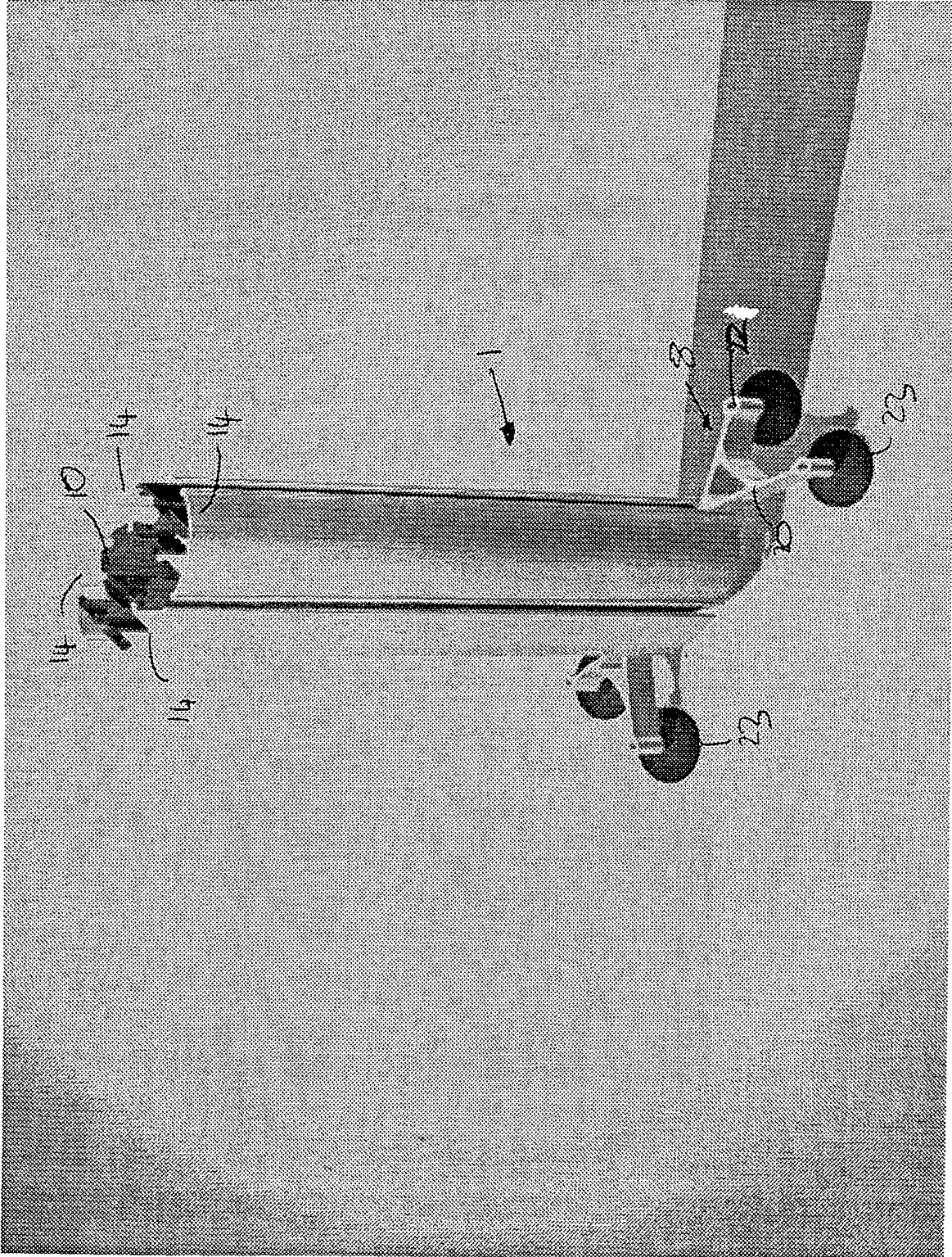


Fig. 3E

Fig 4A



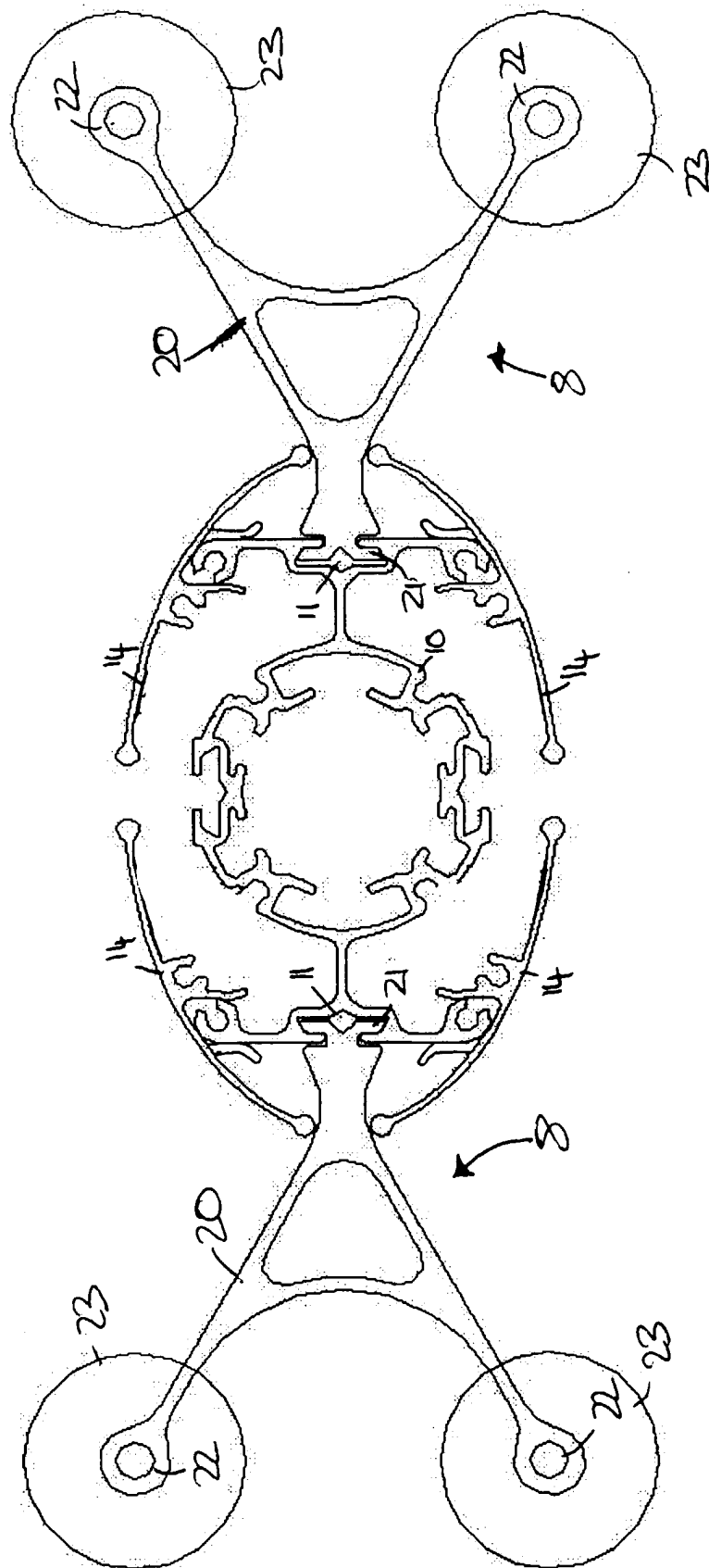


Fig. 4B.

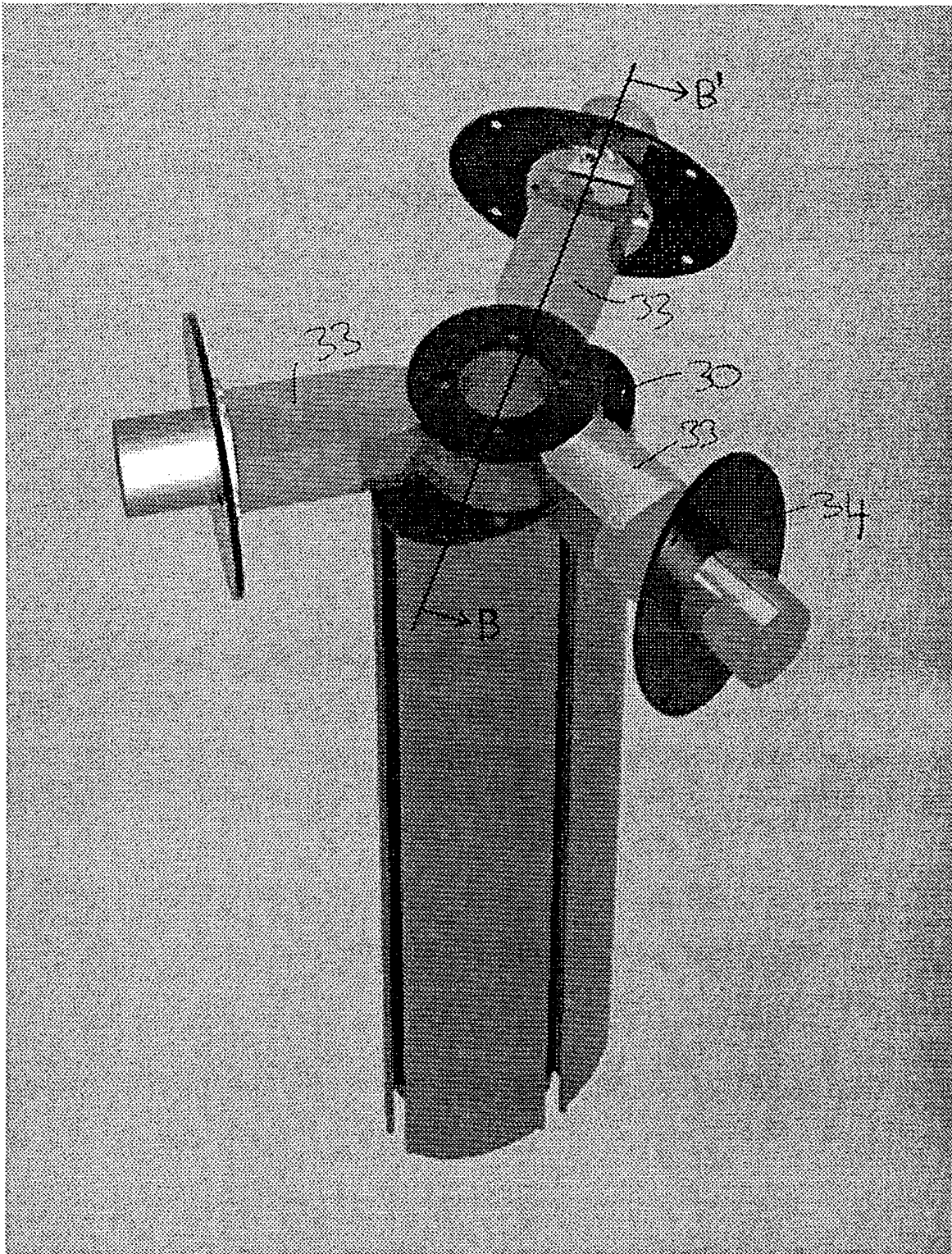
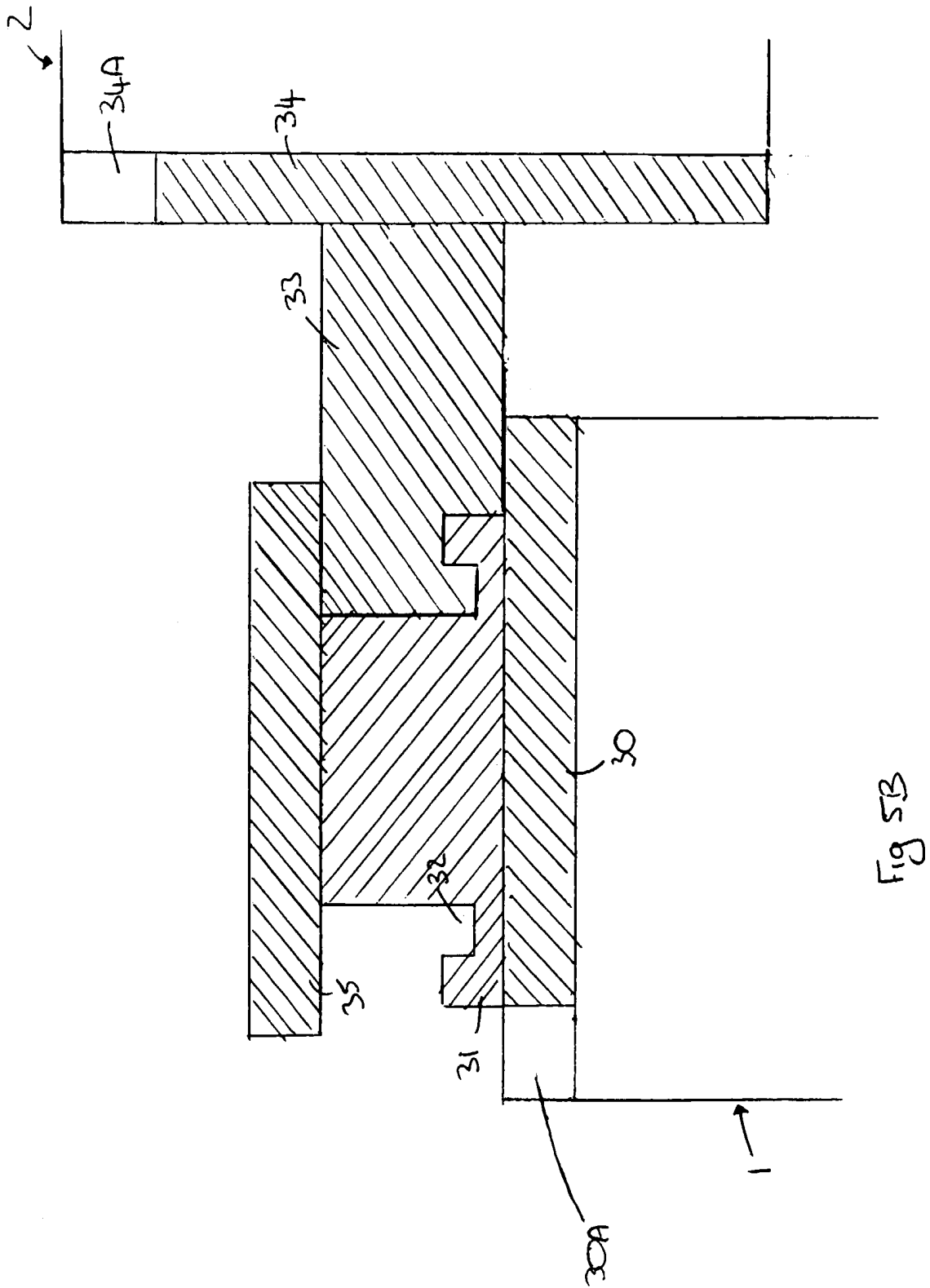


Fig. 5A



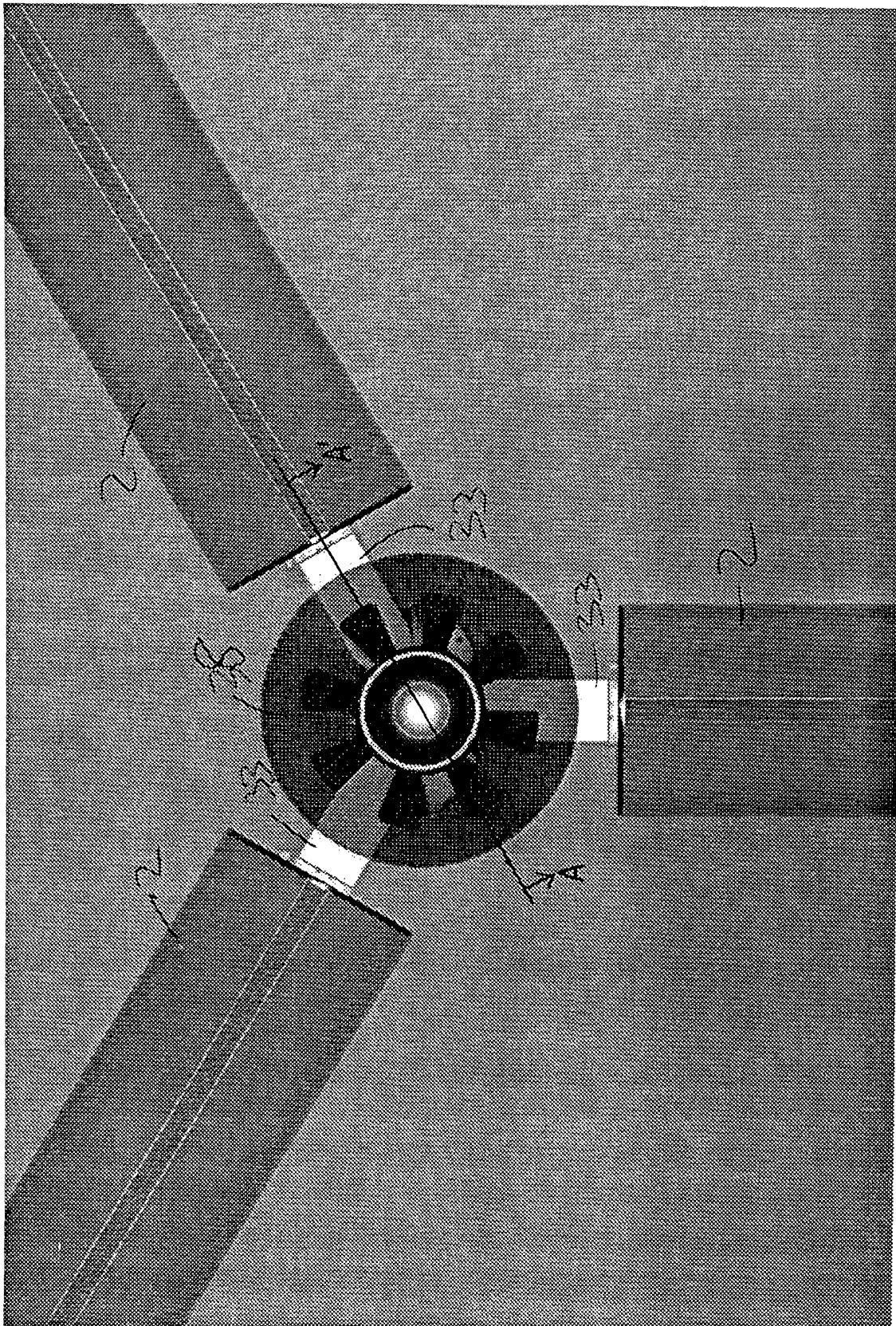
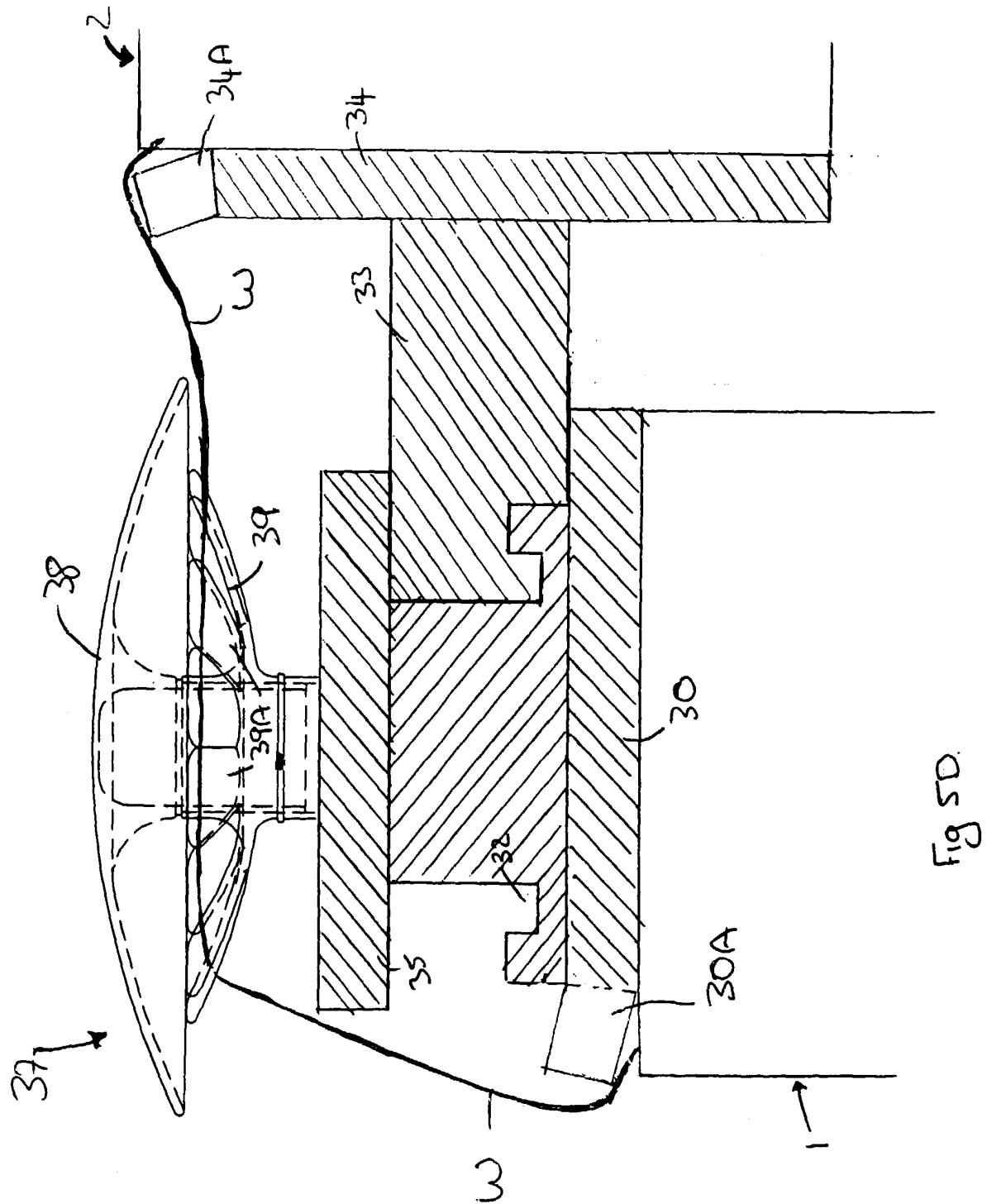


Fig. 5C



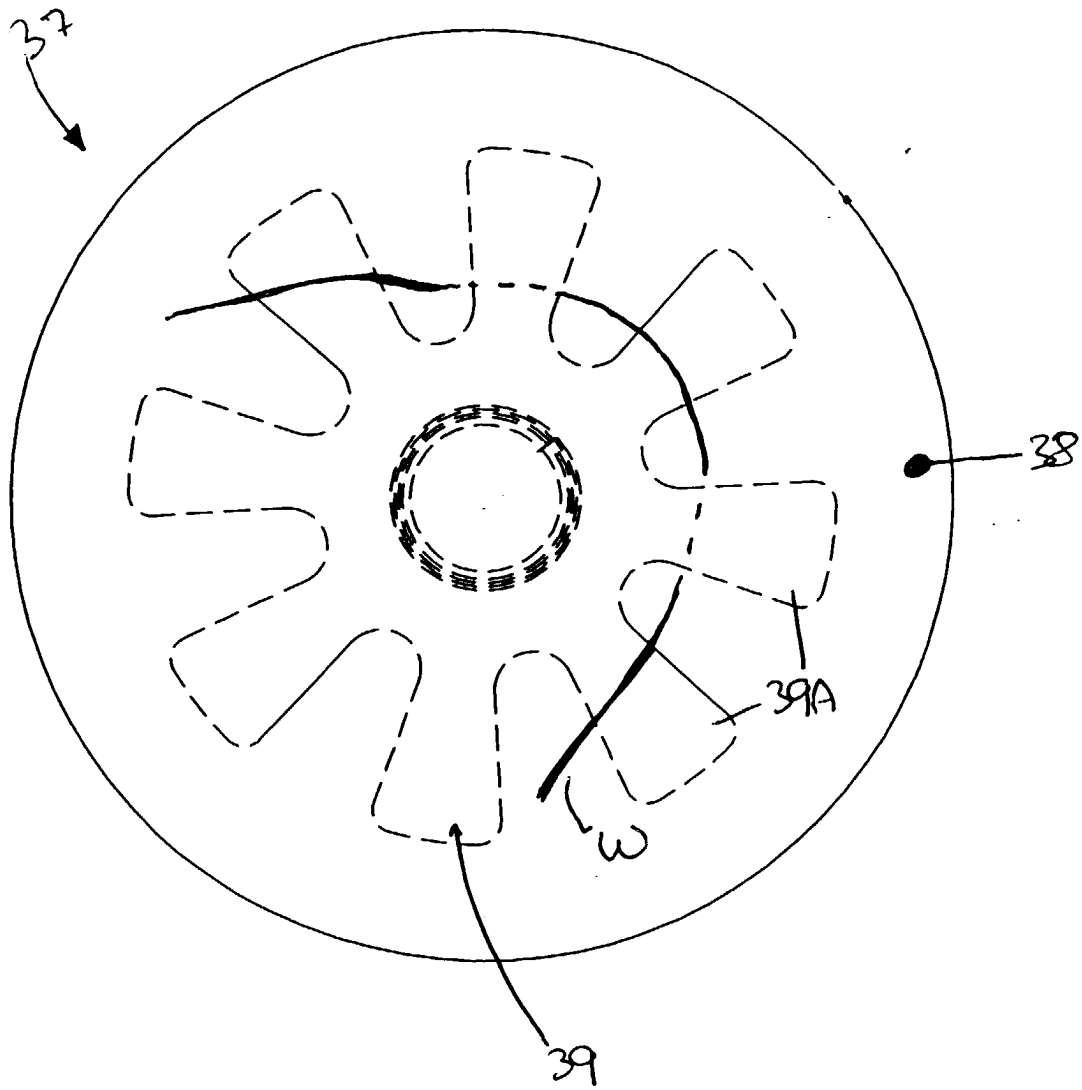
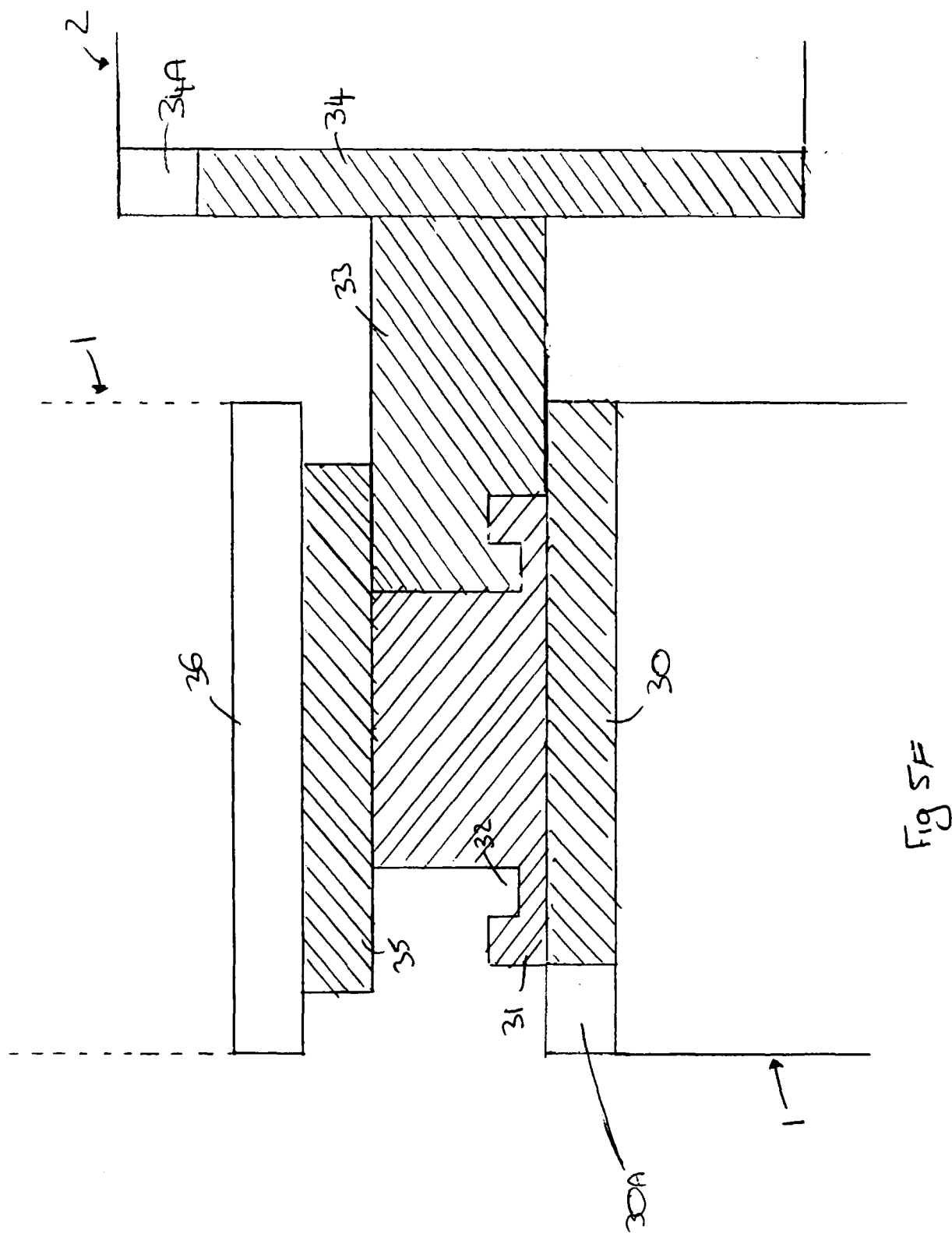


Fig. 5E.





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 30 9798

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 5 975 657 A (LACOUR PAUL M) 2 November 1999 (1999-11-02) * abstract * * column 20, line 42 - column 22, line 48 * * figures 6,10,12 *	1-4	A47B17/00 A47B83/00 A47B21/00
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			A47B F16B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 April 2001	Examiner Ottesen, R
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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EPO FORM 1503 03/92 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 30 9798

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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