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(21) International Application Number: PCT/US97/06686 (22) International Filing Date: 23 April 1997 (23.04.97) (30) Priority Data: 08/637,390 25 April 1996 (25.04.96) US (60) Parent Application or Grant (63) Related by Continuation US Not furnished (CIP) Filed on Not furnished (71)(72) Applicant and Inventor: JETTE, Roger [US/US]; 17 Prospect Street, Babylon, NY 11702 (US). (74) Agents: FARRELL, Raymond, E. et al.; Dilworth & Barrese, 333 Earle Ovington Boulevard, Uniondale, NY 11553 (US).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
(54) Title: FLEXIBLE CABLE MANAGEMENT SYSTEM (57) Abstract A cable support assembly which includes at least one elongate flexible spine member and a plurality of open ended support members mounted on the flexible spine member and spaced apart from one another such that the open ended support members define a support surface.		

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FLEXIBLE CABLE MANAGEMENT SYSTEM

BACKGROUND OF THE INVENTION:

1. Field of the Invention:

5 The present disclosure relates to cable management systems and more particularly to flexible cable management systems for cable management and installation applications.

2. Description of related art:

 Currently available cable management systems require the procurement
10 and installation of turning components and transitions. The presently disclosed flexible cable management system is designed to allow for either lateral or vertical curves thus eliminating the need for turning components and transitions.

BRIEF SUMMARY OF THE INVENTION:

 The presently disclosed cable management system is designed to allow
15 for the installation, organization, routing and protection of cable. It is designed in such a way as to bend into curves in either lateral or vertical directions without tools, heat, fixtures or chemical alterations and as such is different from any other product. It therefore eliminates the need to procure and to install turning components and transitions. The design of the presently disclosed cable management system with
20 multiple fastener points, allows for single person installation. This will create

significant savings in person hours for the design and installation of the invention in user installations.

Equally spaced spoke design and integrated proprietary enter/exit components allow the cable to leave the presently disclosed flexible cable management system at any point and in any direction to reach its destination. The enter/exit components are designed in such a way as to prevent copper or fiber optic cable from kinking or bending in too tight of a radius which would have a negative effect on the performance of the cables signals.

BRIEF DESCRIPTION OF THE DRAWINGS:

For a better understanding of the invention, reference is made to the following description of exemplary embodiments thereof, and to the accompanying drawing figures, wherein:

FIG. 1 is a perspective view of the flexible cable management system in accordance with the present invention;

FIG. 2A is an end view of an enter/exit component;

FIG. 2B is a side view of an enter/exit component;

FIG. 2C is a top view of an enter/exit component;

FIG. 3A is a top view of a flexible spine and a plurality of spoke members;

FIG. 3B is a side view of a spoke member;

FIG. 3C is a side view of a flexible spine member having spoke members and enter/exit component installed thereon;

FIG. 4A is a side view of a flexible cable management system fastened to concrete;

FIG. 4B is a side view of a flexible cable management system fastened to wallboard;

5 FIG. 4C is a side view of two support sections connected by means of a mechanical clamp;

FIG. 5 is an end view of an alternative embodiment of the presently disclosed cable management system;

FIG. 6 is a top view of the embodiment of FIG. 5, which shows the flexibility of the cable management system;

FIG. 7 is an end view of a further alternative embodiment of the presently disclosed cable management system; and

FIG. 8 is a perspective view of the cable management system embodiment of FIG. 7.

15 **DETAILED DESCRIPTION:**

Referring to the drawings in detail, and initially to FIG. 1, the presently disclosed flexible cable management system 100 is shown having both lateral and vertical bends formed therein. Such bends can be formed without the use of tools or other devices. Multiple fastener points 3 allow the flexible cable management system 100 to be secured in whatever position it has been bent, by means of a washered fastener 7 to a concrete surface 10 or a wall board anchor 9 to a wall board surface 11. A plurality of cables 13 are installed within the flexible cable management system and

are capable of being secured to any of a plurality of cable support members such as spokes 5 with a standard cable fastener 14. Sections of flexible cable management system 100 can be joined together at a connector tail 1.

Referring now to FIGS. 2A, 2B and 2C, an enter/exit component 2 is illustrated in the three views. The enter/exit component 2 is indexed to the flexible cable management system 100 by means of a spoke index and secured by wire ties passed through attachment holes 4. A cable may be secured to enter/exit component 2 by means of wire ties passed through wire tie attachment holes 12 and further held in place by means of cable containment tabs 15. A cable radius 17 is formed in enter/exit component 2 to preclude the installed cable from bending too tightly or kinking.

In FIGS. 3A, 3B and 3C, a flexible spine 6, spokes 5 and enter/exit component 2 are shown in their assembled positions.

Referring now to FIGS. 4A, 4B and 4C, various means for attaching the flexible cable management system 100 are illustrated. In FIG. 4A, flexible cable management system 100 is shown anchored to a concrete surface 10 at fastening point 3 by means of washered fastener 7. In FIG. 4B, flexible cable management system 100 is anchored to a wall board 11 at a fastener point 3 by means of a wall board fastener 9. Two support sections are shown joined together at connector tails 1 by means of a standard clamp 8, in FIG. 4C.

The flexible cable management system 100 includes a series of formed wire spokes 5 welded to a single spine 6. The wire spokes 5 are formed in a fashion to allow the maneuvering and protection of the cables 13 that are installed in the system.

Having a single spine allows the flexible cable management system 100 to be bent by hand in any direction necessary. Each spoke 5 has two fastener points 3 which allow the flexible cable management system 100 to be secured to the installation surface at multiple points along its length. Preformed proprietary enter/exit components 2 attach to spokes 5 of the flexible cable management system 100 at any point allowing the cable 13 to exit the flexible cable management system 100 without the risk of damage due to kinking. Flexible cable management system 100 is designed in such a way that it can be installed beneath raised floor, on existing floors, on walls and risers or suspended from a ceiling.

During installation, the technician will lay out the path of the cable runs on the primary floor of an installation area between the stantions of the raised floor. The technician would then place eight foot sections of the flexible cable management system 100 on the layout lines, bending by hand where necessary either laterally, up a wall or down a riser. Then, using a standard power charged stud gun and washered fasteners, randomly secure the flexible cable management system 100 to the installation area floor by means of the built in fastener rings. Anti-kink enter/exit components 2 would be installed on spokes 5 of the flexible cable management system 100 where it is necessary for cables 13 to exit the system to reach their destination. After the network of flexible cable management system 100 is completed, the technician would place copper and/or fiber optic cable into flexible cable management system 100 and randomly secure it using cable ties, to spokes 5 of flexible cable management system

100. Flexible cable management system 100 allows cable to be organized, routed and protected against crushing or kinking.

Referring to FIGS. 5 and 6, an alternative embodiment of the cable management system of the present disclosure is shown generally as flexible cable tray 200. Many of the overall characteristics of cable management system 100 are also featured in cable tray 200. Accordingly, the following description will focus mainly on the unique structural and functional aspects of cable tray 200. It is within the scope of the present disclosure, however, that the assembly, connection and fastening features described above in connection with cable management system 100 may apply to cable tray 200 as well.

Cable tray 200 is particularly suited for use in installations wherein it is desirable or even necessary to route cable bundles overhead. The prior practice in some installations of simply laying cable on the top of suspended ceiling gridwork now violates electrical code requirements for many locations. Further, cabling such as fiber optic or copper data transmission cable is subject to signal attenuation due to damage, no matter how slight, which may often be the result of the cable being haphazardly positioned along the top of ceiling grid structure and thus exposed to such damage.

Cable tray 200 provides a novel way of suspending cable bundles from the framework of the building structure itself, for example by bracketing the tray to studs or the like.

Similar to cable management system 100, cable tray 200 is preferably constructed of wire stock and includes a flexible spine 206 which runs centrally along the length of cable tray 200. This configuration provides the maximum flexibility for

cable tray 200 and, therefore maximum versatility during installation. A dual opening
cable support member 205 is formed by bending the wire stock to form cable receiving
portions 220 and 222 disposed one on either side of central spine 206. The two
receiving portions may be defined by a single piece of wire stock which is bent to form
5 a web section 224. Central spine 206 may be attached to web portion 224 either
transversely along the top thereof, as shown in FIG. 5, or the bottom thereof, by any
suitable known methods, for example, welding.

The central location of spine 206 facilitates the self balancing feature of
cable tray 200. In particular, once cable tray 200 is installed, cable is preferably
10 loaded evenly into each of receiving portions 220 and 222 to effectuate a balanced load
in cable tray 200. Looped ends 226 and 228 are provided on cable support 205 to
reduce the likelihood of inadvertent damage due to contact of cables with rough edges
during installation.

As shown in phantom lines in FIG. 6, cable tray 200 may be flexed
15 significantly to either side, to effectuate at least about a 90 degree or even greater turn
of cable tray 200 without individual cable support sections 205 making contact with
each other. Similarly, cable tray 200 may transition from a horizontal run to a vertical
run.

Referring to FIGS. 7 and 8, a further alternative embodiment
20 constructed in accordance with the present disclosure is shown generally as cable tray
300. Cable tray 300 features partially enclosed cable receiving portion 320. Spine 306
is attached to cable support members 305 transversely along a top segment thereof in

similar manner as set forth above for cable tray 200 and cable management system 100.

Spine 306 is attached to cable supports 305 substantially directly over the center of gravity of the unit as a whole. In this manner, when cable tray 300 is loaded with

cable evenly within receiving portion 320, there will not be any undesirable torque

5 applied to spine 306 which is preferably attached to the building structure by suitable

brackets or the like. End portions 326 and 328 are formed to bend away from the

opening into receiving portion 320 to minimize the chance of even the slightest amount

of damage to the cabling being placed in the receiving portion 320.

Although the illustrative embodiments of the present disclosure have

10 been described herein with reference to the accompanying drawings, it is to be understood that the disclosure is not limited to those precise embodiments, and that various other changes and modifications may be affected therein by one skilled in the art without departing from the scope or spirit of the disclosure. All such changes and modifications are intended to be included within the scope of the disclosure as defined

15 by the appended claims.

What is claimed is:

1. A cable support apparatus, which comprises:
an elongate flexible spine member selectively bendable into a number of
different configurations; and
5 a plurality of support members attached to the elongate flexible spine
member along the length thereof, the plurality of support members positioned relative
one another to permit substantial bending by hand of the elongate flexible spine
member, each of the plurality of support members defining at least one area adapted to
receive and support a cable therein.
- 10 2. A cable support apparatus as recited in claim 1, wherein each of
plurality of support members are arrayed along the elongate flexible spine member to
define a pathway to support and direct a series of cable.
3. A cable support apparatus as recited in claim 1, wherein the elongate
flexible spine member has a circular cross-section.
- 15 4. A cable support apparatus as recited in claim 1, wherein each of the
plurality of support members have a substantially U-shape in cross-section.
5. A cable support apparatus as recited in claim 1, wherein each of the
plurality of support members are attached at an intermediate portion thereof on the
elongate flexible spine member.
- 20 6. A cable support apparatus as recited in claim 1, wherein at least one
of the plurality of support members includes at least one leg portion configured and

dimensioned to maintain cables positioned on the apparatus at a predetermined distance away from a base.

7. A cable support apparatus as recited in claim 1, wherein at least one of the plurality of support members includes a fastener point adapted to facilitate mounting of the cable support apparatus to a base.

8. A cable support apparatus as recited in claim 1, which further comprises at least one wall component which defines a smooth transition surface to direct cabling supported by the apparatus along a non-linear path to prevent damage to the cabling.

9. A cable support apparatus as recited in claim 1, wherein the elongate flexible spine is solid in cross-section.

10. A cable support apparatus as recited in claim 1, wherein at least one of the support members defines two areas adapted to receive and support cable therein.

11. A cable support apparatus as recited in claim 10, wherein the elongate flexible spine is disposed along the support members such that the two areas are disposed one on either side of the elongate flexible spine.

12. A cable support apparatus as recited in claim 1, wherein the elongate flexible spine is disposed centrally above the at least one area adapted to receive and support cable therein.

13. A modular cable support system, which comprises:
a series of support sections, each support section including an elongate flexible spine member, and a plurality of support members attached to the elongate

flexible spine member along the length thereof, the plurality of support members positioned relative one another to permit substantial bending by hand of the elongate flexible spine member, each of the plurality of support members defining at least one partially enclosed area adapted to receive and support a cable therein; and

5 means for connecting the plurality of support sections.

15. A modular cable support system as recited in claim 14, wherein each of the plurality of support members are formed as a continuous member from bendable material.

16. A modular cable support system as recited in claim 14 wherein the
10 plurality of support members are formed from wire stock.

14. A modular cable support system as recited in claim 11, wherein the means for connecting the plurality of support sections includes a mechanical clamp.

15. A modular cable support system as recited in claim 11, wherein each of plurality of support members are arrayed along the elongate flexible spine
15 member to define a pathway to support and direct a series of cable.

16. A modular cable support system as recited in claim 11, wherein the elongate flexible spine member has a circular cross-section.

17. A modular cable support system as recited in claim 11, wherein each of the plurality of supports members have a substantially U-shape in cross-section.

20 18. A modular cable support system as recited in claim 11, wherein the plurality of supports members are attached at an intermediate portion thereof to the elongate flexible spine member.

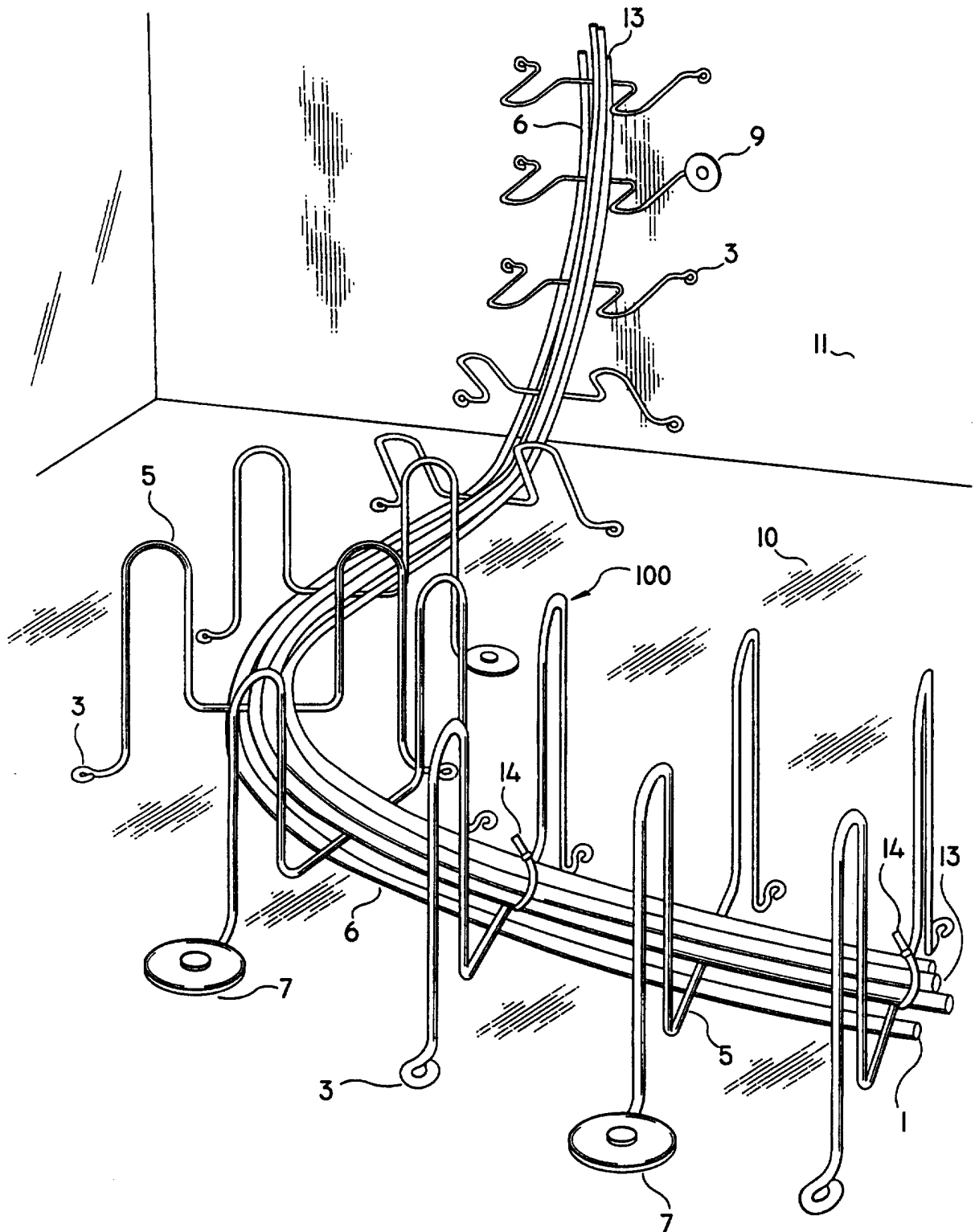
19. A modular cable support system as recited in claim 11, wherein the plurality of support members include at least one leg portion configured and dimensioned to maintain cables positioned on the support system at a predetermined distance away from a base.

5 20. A modular cable support system as recited in claim 11, wherein at least one of the plurality of support members includes a fastener point adapted to facilitate mounting of the cable support system to a base.

21. A modular cable support system as recited in claim 11, which further comprises at least one wall component attached to at least one of the plurality of support members, the at least one wall component defining a smooth transition surface
10 to direct cabling supported by the support system along a non-linear path to prevent damage to the cabling.

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FIG. 1



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FIG. 2C

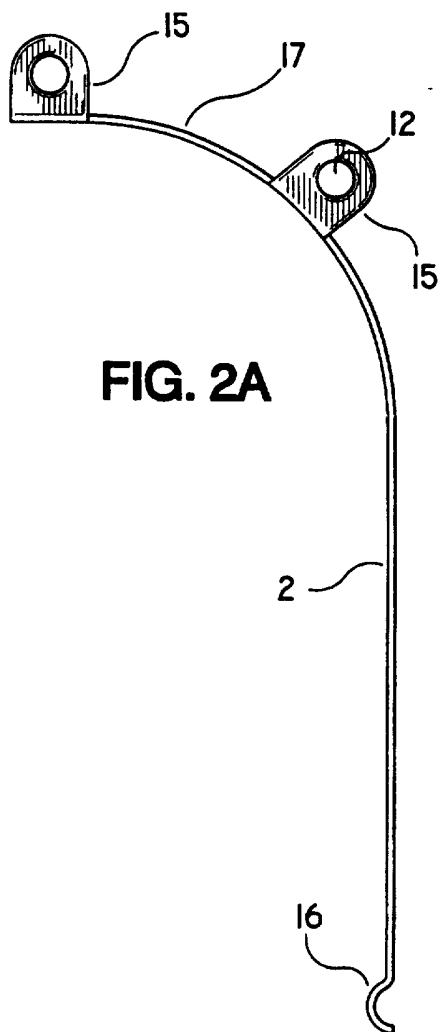
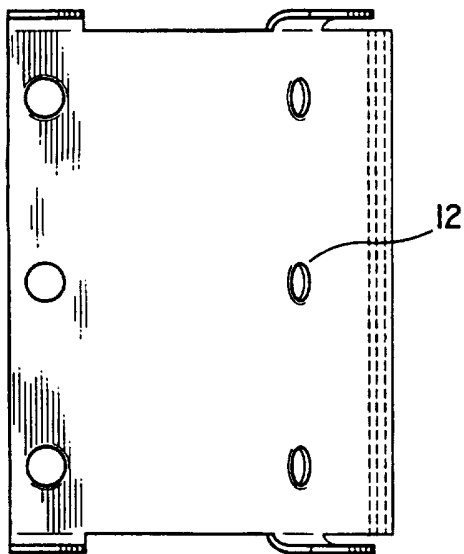
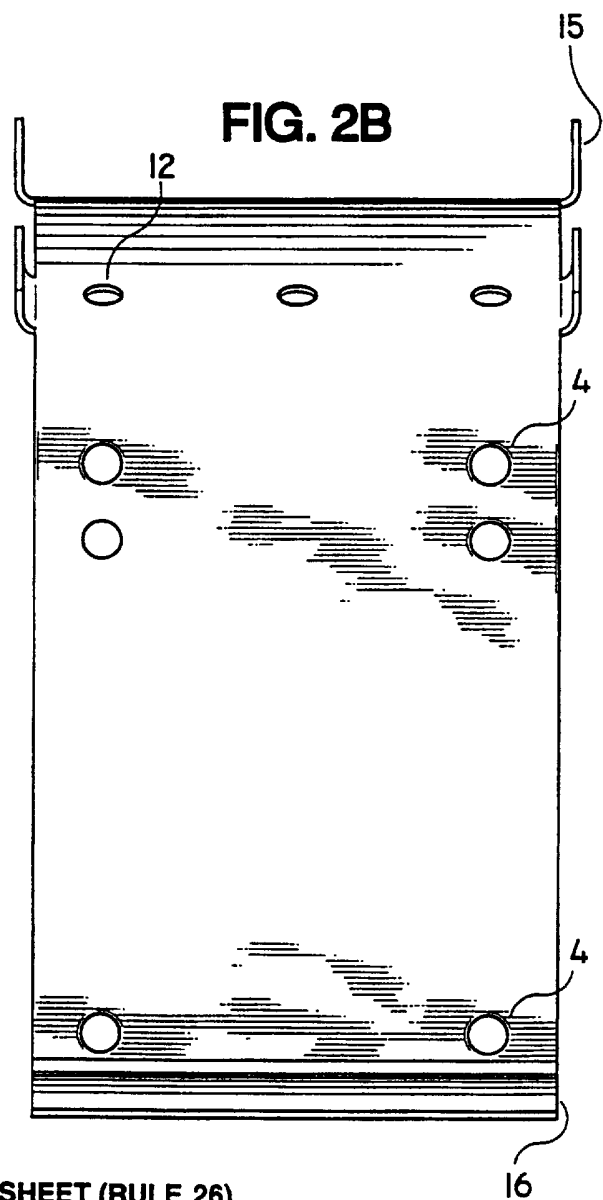


FIG. 2A

FIG. 2B



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FIG. 3A

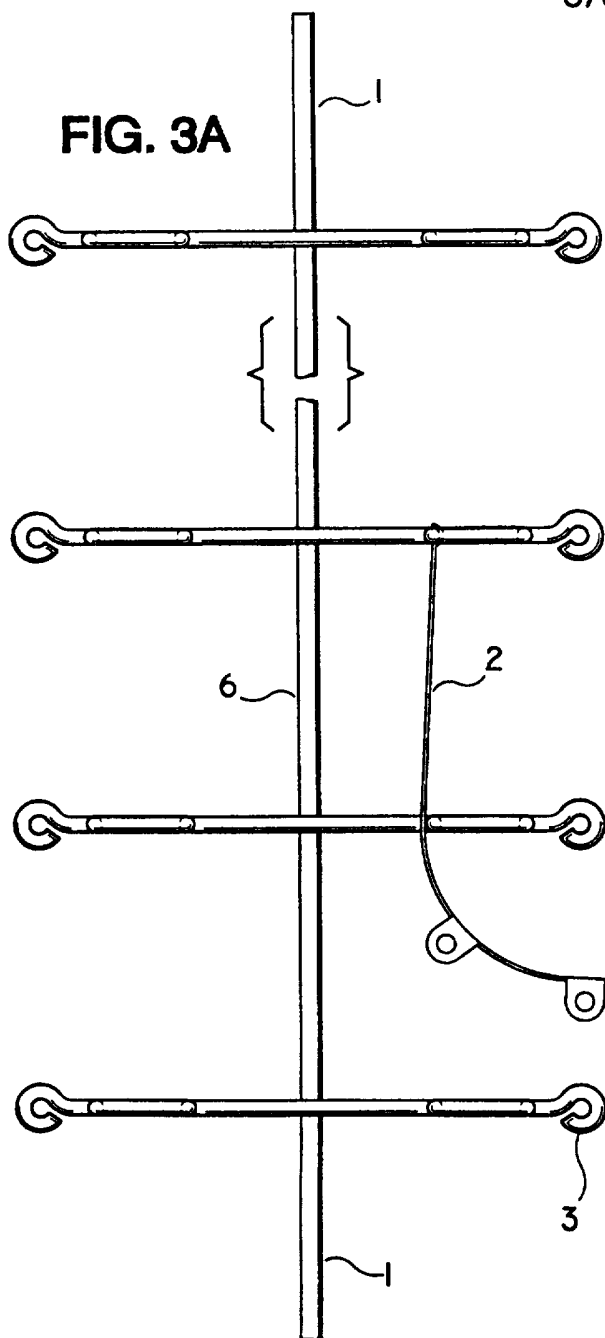


FIG. 3B

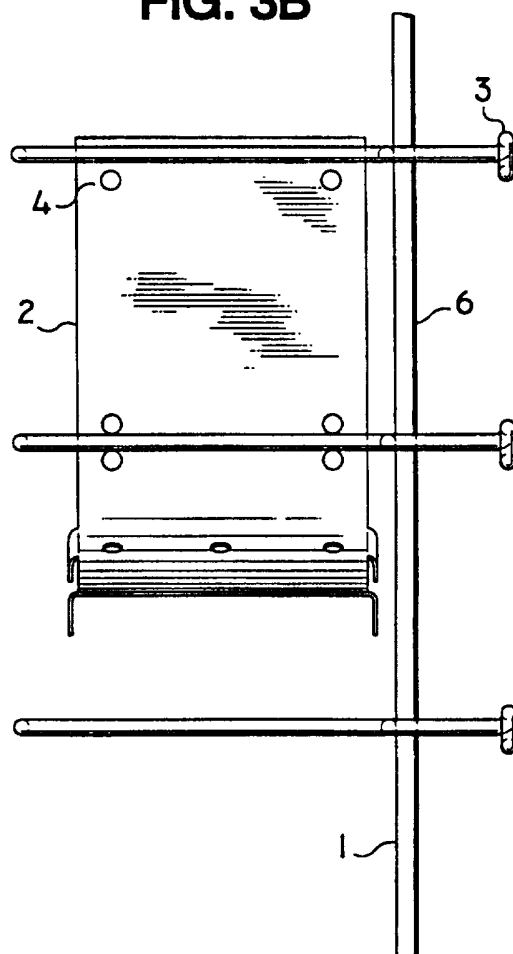


FIG. 3C

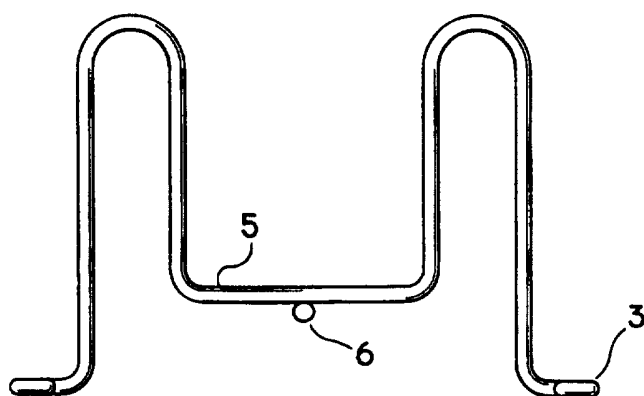


FIG. 4A

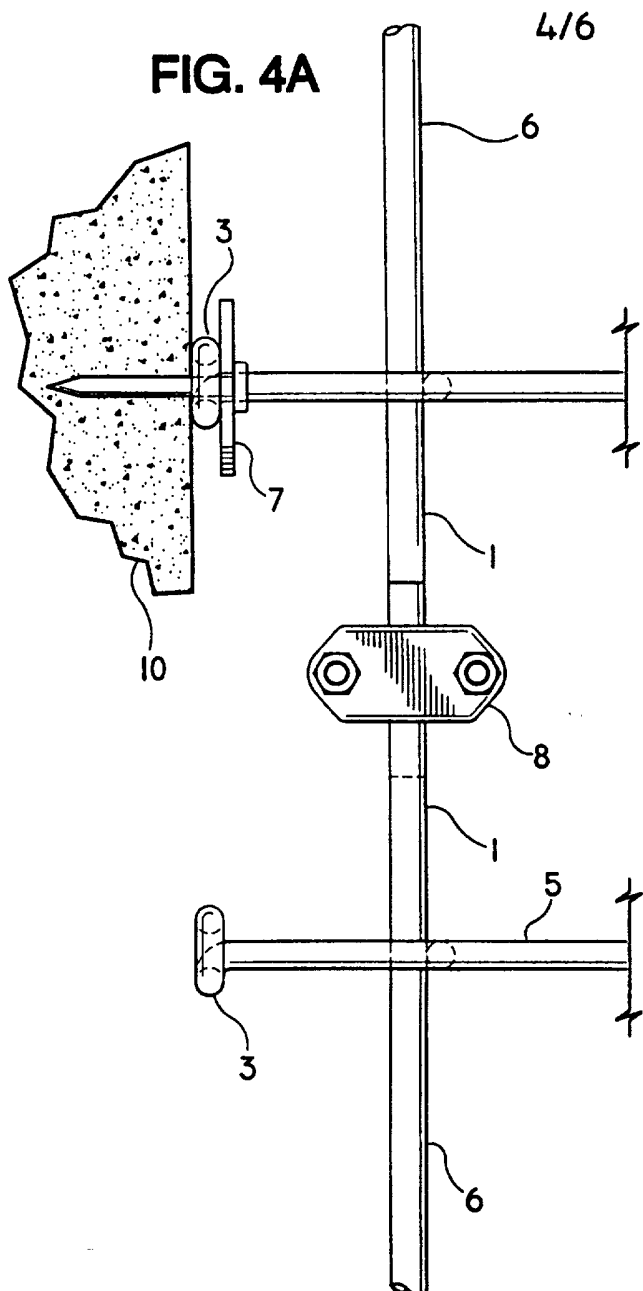


FIG. 4B

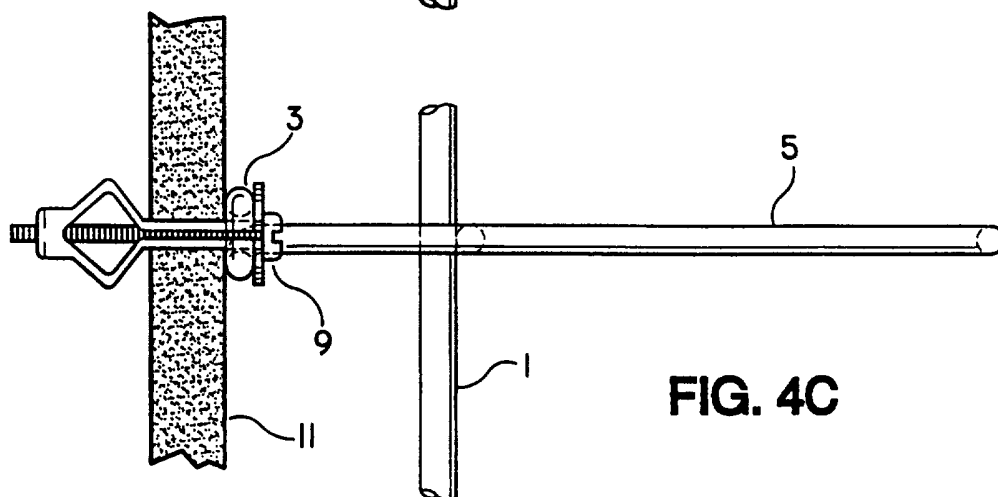
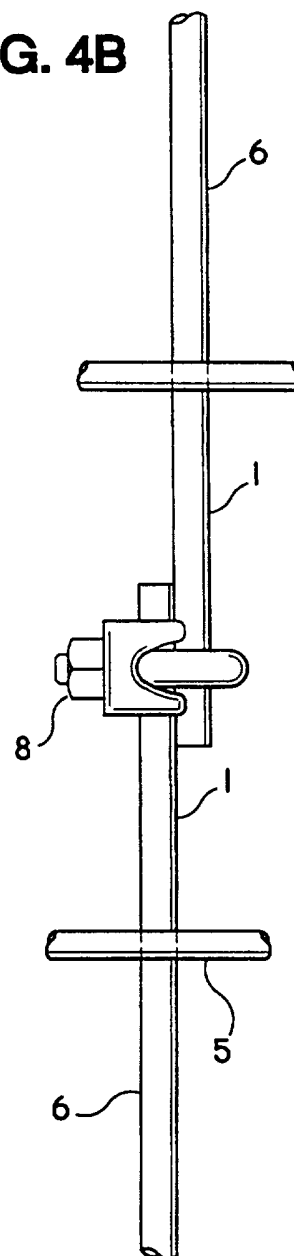


FIG. 4C

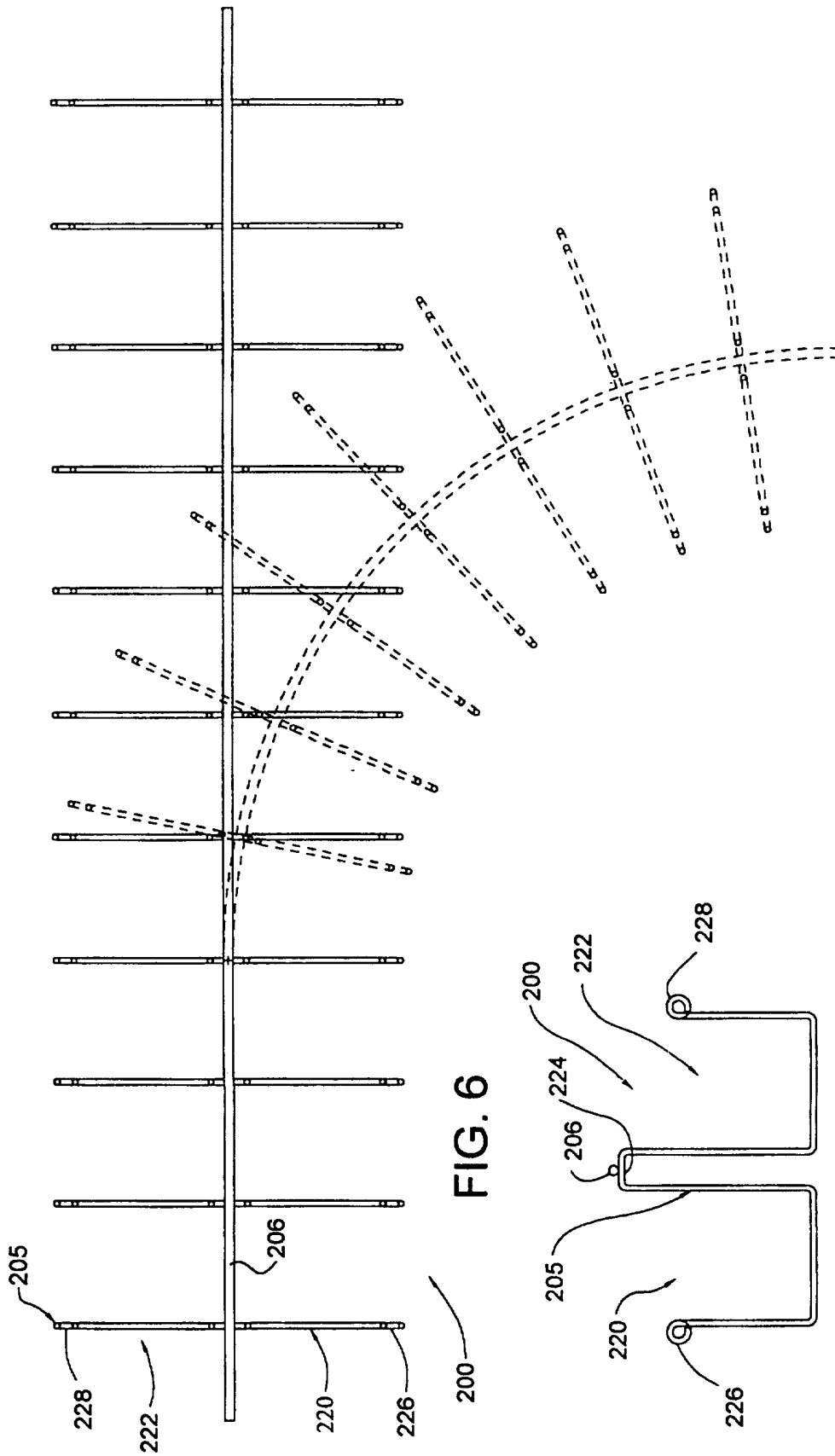
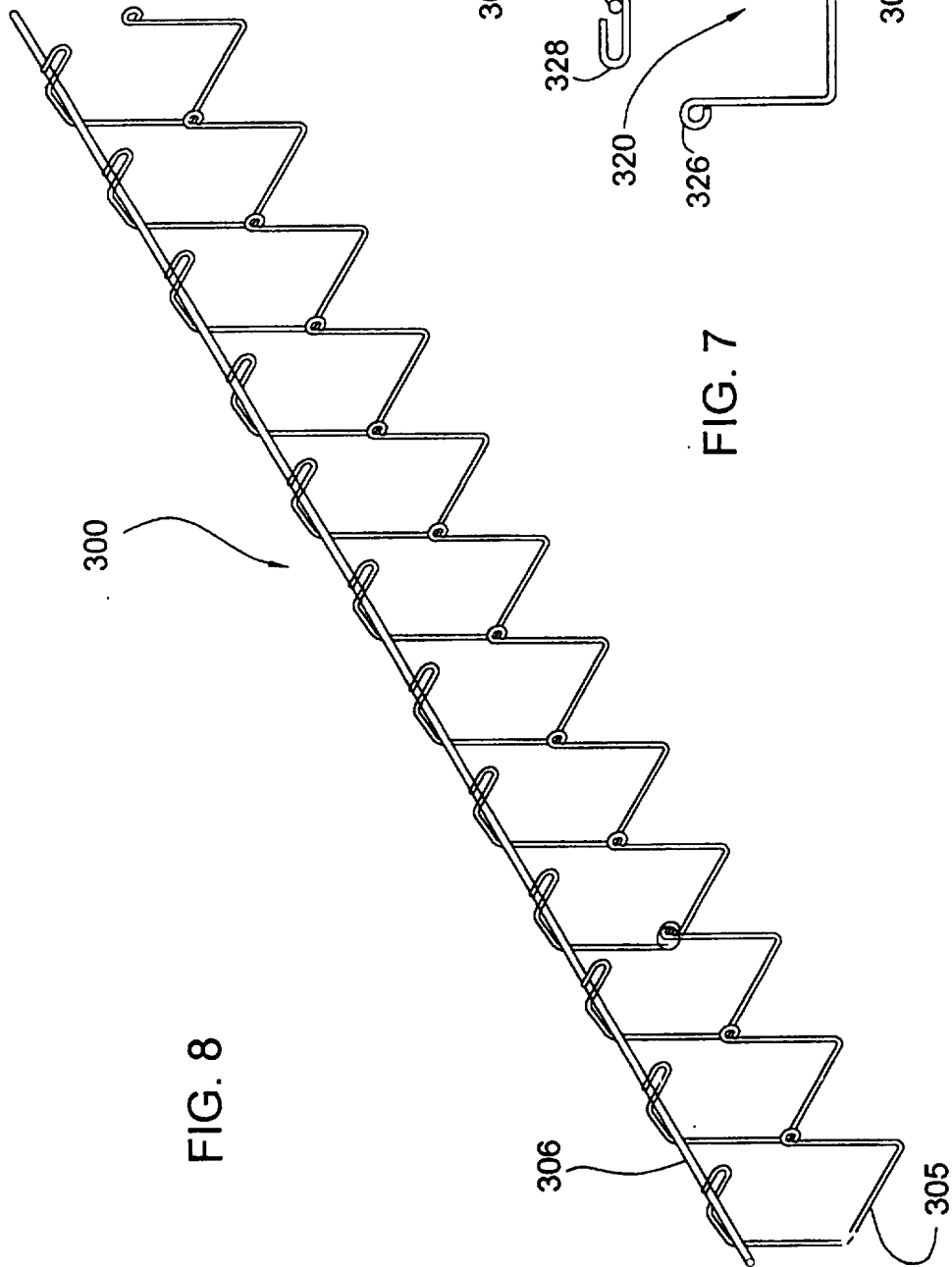


FIG. 5

FIG. 6

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INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/US 97/06686

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H02G3/04

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)
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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 practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 74 35 122 U (RENATE RULF) 13 March 1975 see the whole document ---	1-6,9-21
X	DE 16 15 074 A (ZIEGLER) 9 April 1970 see the whole document ---	1-5,9, 14-16 10,11, 17-20
A	DE 37 42 448 A (PHILIPS PATENTVERWALTUNG) 29 June 1989 see figure 1 -----	1,8,23

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

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Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 7435122 U	13-03-75	NONE	
DE 1615074 A	09-04-70	NONE	
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