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<p>(21) International Application Number: PCT/US79/00688</p> <p>(22) International Filing Date: 5 September 1979 (05.09.79)</p> <p>(31) Priority Application Number: 939,789</p> <p>(32) Priority Date: 5 September 1978 (05.09.78)</p> <p>(33) Priority Country: US</p> <p>(60) Parent Application or Grant: (63) Related by continuation US 939,789 (CIP)</p> <p>(71) Applicant; and (72) Inventor: ANDERSON, Howard [US/US]; Accord, NY 12404 (US).</p>		<p>(74) Agents: MULTER, Richard D. et al.; LeBlanc, Nolan, Shur & Nies, 1911 Jefferson Davis Highway, Suite 700, Arlington, VA 22202 (US).</p> <p>(81) Designated States: GB, JP, US.</p> <p>Published <i>With international search report</i></p>
<p>(54) Title: SECTIONAL SUPPORTS</p> <p>(57) Abstract</p> <p>Previously known vertical sectional support structures have been weak, expensive to construct and require more space for storage than the disclosed invention. An improved, sectional, vertical support structure (10) which may be molded of inexpensive plastic materials and sizes of interchangeable vertical components which can be stronger and stored in a smaller volume of space than the vertical support of my previous U.S. Patent No. 4,048,752 is disclosed. Plant trellis etc. (10) is comprised of spiders (12), vertical standard (14) and vertical spacers (16) between hubs (18). Each hub (18) has a central, concentric annular stop (28) within bore (26) and spokes (30) connected to its outside. Spiders (12) have support rings (20) connected to hubs (18) by spokes (30). Rings (20) and spokes (30) are an inverted U-shape in cross section and may contain stiffeners (38) and (34) respectively, to strengthen the spiders (12) under load.</p> <div> </div>		

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SECTIONAL SUPPORTS

This invention relates to supports and, more specifically, to novel, improved, vertical supports of the multi-sectional type.

My novel supports are particularly useful as trellises for vine-type plants -- for example, tomatoes, cucumbers, pole beans, peonies, sweet peas, etc. The principles of the present invention will accordingly be developed primarily by reference to such applications.

It is to be understood, however, that this is only for the sake of convenience as my novel supports can equally well be used for other purposes.

Multi-sectional supports which are, similarly, useful for a variety of purposes are disclosed in my prior patent no. 4,048,752 issued September 20, 1977.

One primary object of the present invention resides in the provision of novel, multi-sectional supports which are improvements over these disclosed in my previously issued patent.

With the exception of an optional ground stake, the latter are composed entirely of telescopically engaged support sections or members each having a vertically extending, tubular hub; a circular supporting component surrounding the hub; and axially aligned spokes for supporting the latter component from the hub.

The external dimensions of the lower parts of the hubs are made the same as the internal dimensions of the upper parts thereof so that each support member can be telescopically connected to the adjacent member or members.

The novel, improved sectional supports disclosed herein are, in contrast, composed of a lower standard or base member, support components or spiders, and spacers, all of which are separate components.

One advantage of this improved construction is that multi-



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sectional supports employing it are less expensive to manufacture. The standard and spacers can be fabricated simply by cutting stock tubing of an appropriate diameter to proper lengths. And, in the typical case in which the supporting components are made from a synthetic resin, the cost of molding them is substantially reduced because the vertical dimension of the components is materially decreased, producing a concomitant, severalfold reduction in the cost of an appropriate mold.

Yet another advantage of the multi-sectional supports disclosed herein over those described in my issued patent is that the former are substantially less bulky than the latter. This makes them easier to handle, and they can be packaged in a container having only about one-half the volume of that required for those patented multi-sectional supports of comparable height and lateral dimensions.

Another novel, and distinguishing, feature of the multi-sectional supports disclosed herein is the use of x-patterned, integral stiffeners in the spokes of the supporting components. This keeps the support components from bending when they are subjects to a load in use (by a plant, for example).

Still another advantage of the novel multi-sectional supports disclosed herein is versatility. Their components can be fabricated from a variety of materials -- there are many suitable metals and plastics. The height of the support can be readily varied by changing the number of supporting components employed; and the user can readily change the spacing between supporting components by employing spacers of different lengths and/or shortening the spacers he may have on hand.

One important and primary object of the present invention has been identified above.

Other important, but more specific objects of my invention reside in the provision of novel, improved multi-sectional supports:



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which are, comparatively, inexpensive to make;

which, in conjunction with the preceding object, employ components that can be made in inexpensive molds or from stock materials;

which can be readily made from a variety of materials and in a variety of shapes and sizes;

which are so configured that their components are not bulky and can, accordingly, be easily handled and compactly packaged;

which are versatile in that the height of the support and the spacing between support components can readily be dimensioned as desired by the user;

which have support components that are highly resistant to bending under load;

which have various combinations of the foregoing attributes.

Still other important objects and features of my invention and additional advantages thereof will become apparent from the appended claims and as the ensuing detailed description and discussion proceeds in conjunction with the accompanying drawing in which:

Figure 1 is an elevation of a multi-sectional support constructed in accord with and embodying the principles of the present invention;

Figure 2 is a vertical section through a part of the support;

Figure 3 is a top view of a spider type support component incorporated in the support of Figure 1; and

Figure 4 is a bottom view of the support component.

Referring now to the drawing, Figure 1 depicts a vertical, multi-sectional support 10 embodying and constructed in accord with the principles of the present invention. Support 10 is composed of support components or spiders 12, a vertical standard 14 on which the lowermost spider 12 is mounted, and spacers 16 for supporting the remaining spiders 12 in verti-



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cally spaced relationship above the lowermost spider.

As best shown in Figures 2-4, spiders 12 each include a vertically extending, tubular hub 18; a circular support ring 20 surrounding the hub; and two, dimetrically opposed spokes 22 for supporting ring 20 from hub 18.

A bore 26 is formed through the hub 18 of each component 12. Intermediate the upper and lower ends of the hub, an integral, annular stop 28 projects into bore 26. As will become apparent below, the stops 28 of support components 12 co-operate with vertical standard 14 and spacers 16 to support the components 12 in the vertically spaced apart relationship shown in Figure 1.

As best shown in Figure 2, both the spokes 22 and support ring 20 of components 12 have an inverted U-shaped configuration. The spokes have a parallel, spaced apart side walls 30; and the support ring 20 of component 12 has similarly disposed side walls 32..

Integral with, and extending between, the side walls 30 of each spoke are stiffeners identified generally by reference character 34. In the illustrated embodiment of the invention, there are three x-patterned arrays 36 of stiffeners, these being arranged in end-to-end, abutting relationship in each spoke. The major cross-sectional dimension of each stiffener is parallel to the corresponding dimension of the associated spokes side walls; and each stiffener is integral, at opposite ends thereof, with an opposite one of the side walls 30.

Preferably, additional, integral, internal stiffeners 38 are provided in the support rings 20 of components 12 to further strengthen the supports. As shown in Figure 4, stiffeners 38 are preferably concentric with and spaced mid way between the inner and outer walls 32 of the support ring with projections extending therefrom to those walls at intervals around the ring.

In the illustrated embodiment of my invention, the cross-sectional dimensions of stiffeners 34 and 38 are approximately 60% as great as the corresponding dimensions of the spoke



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walls and ring side walls 30 and 32. This relationship is important in that it keeps the side walls 30 and 32 of the spokes and rings from rippling or warping when components 12 are formed. Such distortion of the ring side walls 32 is also inhibited by the pattern and configuration of stiffeners 38.

It is also important that the stiffeners 34 in spokes 22 be disposed in end-to-end abutting relationship as described above. It is the function of these stiffeners to keep support components 12 from bending as suggested by arrows 40 in Figure 2 when the support components are subjected to a load. This capability is substantially decreased when the preferred, abutting relationship of stiffeners is not employed.

Supports of the character just described can be molded at comparatively low cost because of their relatively short vertical dimension. Any of a number of resins, including polypropylene and acrylonitrile-butadiene-styrene, can be employed.

Both standard 24 and spacers 16 are uniformly sectioned, cylindrical tubes of appropriate length in the illustrated embodiment of my invention. These components can also be made of various materials. Polyvinyl chloride has proved satisfactory.

Both the standard and spacers are dimensioned for sliding fits in the bores 26 through the hubs 18 or support components 12. Typically, this goal can be realized employing tubing of standard dimensions cut to appropriate lengths although standards and spacers with special diameters can be employed, if desired, as special order tubing is not significantly more expensive than the stock material, if ordered in quantity.

The uncomplicated configurations of standard 14 and spacers 16 also produce a decided advantage for the multi-sectional supports disclosed herein from the viewpoint of manufacturing costs.



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Furthermore, the configuration of the support components, and the fact that they, the spacers, and the standard are separate and distinct components, permit the supports disclosed herein to be packaged in a manner which is economical from the viewpoint of space consumption and, concomitantly, from the viewpoint of handling and shipping costs.

The dimensions of the novel, multi-sectional supports just described may of course vary, depending upon the application of the invention. One typical support of that character, intended for use as a tomato trellis, has polypropylene support components 12 with an overall diameter of 13.5 inches. The support component hub is approx. 3 inches long and has a one inch diameter bore therethrough. The integral stop 28 in the hub 18 of the support components is slightly less than one eighth inch wide and one eighth inch deep. The spokes 22 and support ring 20 of the component are respectively about eleven-sixteenths and thirteen-sixteenths inch wide; and both are about seven eighths inch deep. Standard 14 and spacers 16 are respectively 14 and 7.5 inches long, and they are fabricated from one inch outer diameter, series 40, polyvinyl chloride tubing.

As shown in Figure 1, supports of the character described herein and used as plant supports or trellises are installed by first pushing or driving the standard 14 into the ground as shown in Figure 1 (the surface of the ground is identified by reference character 42). The lowermost support component 12 is then slid down over standard 14 until the stop 28 in its hub 18 seats on the upper end of the standard, positioning the lowermost support component 12 above and relative to surface 42. A spacer 16 is then inserted in the hub 20 of the installed support component 12 and slid down until it seats on the stop 28 of that component. The next support component 12 is then installed on this first, lowermost spacer in the same manner that the bottom support component 12 was installed on standard 14. The installation of spacers and support components is continued in the manner just described



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until support 10 has reached the desired height.

Assembled, the support components 12 of the multi-sectional support with the exemplary dimensions identified above are spaced approximately 6.5 inches apart.

Increased spacing can be obtained by employing longer spacers, and the distance between the support component 12 can be decreased by cutting spacers 16 to a shorter length.

Many other variations may of course be made in the multi-sectional support described above and illustrated in the drawing without exceeding the scope of the present invention. Exemplary modifications which are applicable to the supports disclosed herein are identified in my issued patent no. 4,048,752.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description; and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by Letters Patent is:



CLAIMS

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1. A multi-sectional support adapted to be deployed in a generally vertical orientation, comprising: an assembly having a plurality of support components each having a centrally located hub, a support portion surrounding the hub, and spokes extending between and supporting said support portion from said hub; an elongated standard for supporting one of said components above a reference surface; and a spacer supporting a second of said support components above and in spaced relation to the first of said support components; said support components, said spacer, and said standard all being distinct, independent, and separable components and said components being maintained in the aforesaid assembled relationship solely by sliding socketed engagements of said standard and said spacer in the hubs of said first and second support components.

2. A multi-sectional support as defined in claim 1 wherein there are stop means in said hubs for limiting the movement of said support components with respect to said standard and said spacer and thereby positioning said support components relative to said spacer and said standard.

3. A multi-sectional support as defined in claim 2 in which said stop means comprise ledges which are integral with said hubs and extend into the bores therethrough.

4. A multi-sectional support as defined in claim 1 wherein there are internal stiffener means in said spokes to keep the support portions of said support components from bending relative to the hubs thereof when said support portions are subjected to loads.

5. A multi-sectional support as defined in claim 1 wherein the hubs of said support components have uniformly sectioned bores of like dimensions therethrough, said spacer and standard likewise being of uniform section and, also, being dimensioned to slidably fit within the bores through said hubs.



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6. A multi-sectional support as defined in claim 5 in which said spacer and said support are hollow tubes.

7. A support component for a multi-sectional support or the like which comprises: a hub, a support portion surrounding the hub, spokes extending between and supporting said support portion from said hub, and means for keeping said support portions from bending relative to said hub when said support portions are subjected to a load, said last-mentioned means comprising internal stiffeners in said spokes.

8. A support component as defined in claim 7 which has exactly two spokes, said spokes being diametrically opposed and having spaced apart, vertically oriented walls, said stiffeners extending in a plurality of serially disposed, abutting x-patterns between said walls and being joined at opposite ends thereof to the opposite ones of said walls, and the major cross-sectional dimensions of said stiffeners being parallel to the major cross-sectional dimensions of said walls.

9. A support component as defined in claim 7 in which the cross-sectional dimensions of said stiffeners are approximately 60 percent as great as the corresponding cross-sectional dimensions of the walls of the spokes in which they are located.

10. A support component as defined in claim 7 in which said stiffeners are integral portions of the spokes in which they are located.

11. A support component as defined in claim 7 in which there is a bore through the hub thereof and in which there is a ledge integral with the hub and extending into the bore therethrough which is adapted to engage the end of and thereby position said supporting component relative to a support means thereof.

12. A support component as defined in claim 7 which has integral, internal stiffeners in the support portion thereof.



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13. A multi-sectional support as defined in claim 1 wherein each of said support components has exactly two spokes, said spokes being diametrically opposed and having spaced apart, vertically oriented walls, and there being internal stiffener means in said spokes to keep said support portions from bending relative to said hub when the support portions of the component are subjected to a load, said stiffeners extending in a plurality of serially disposed, abutting x-patterns between said walls and being joined at opposite ends thereof to the opposite ones of said walls, and the major cross-sectional dimensions of said stiffeners being parallel to the major cross-sectional dimensions of said walls.

14. A multi-sectional support as defined in claim 1 wherein there are integral, internal stiffeners in the support portion of each support component, each said support portion having spaced apart, vertically oriented side walls and there being one stiffener oriented as aforesaid between said side walls and additional stiffeners extending between said one stiffener and said side walls.



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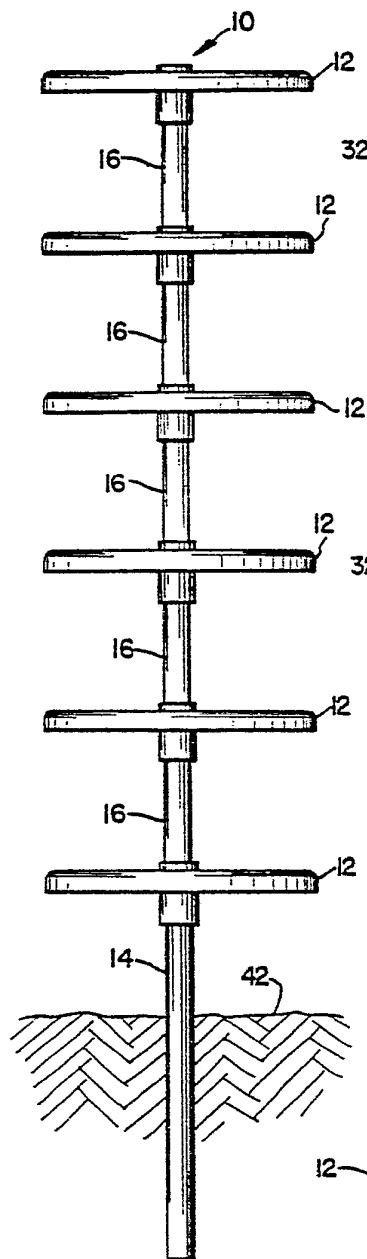


FIG. 1

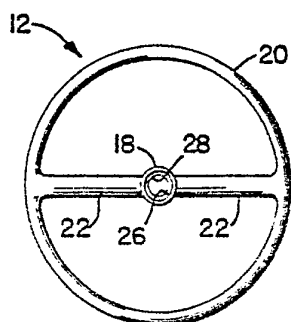


FIG. 3

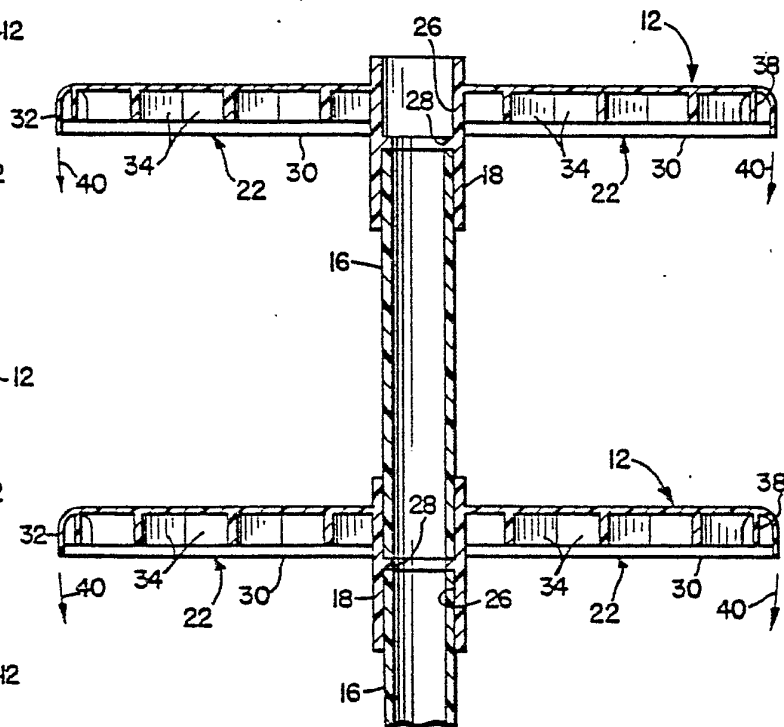


FIG. 2

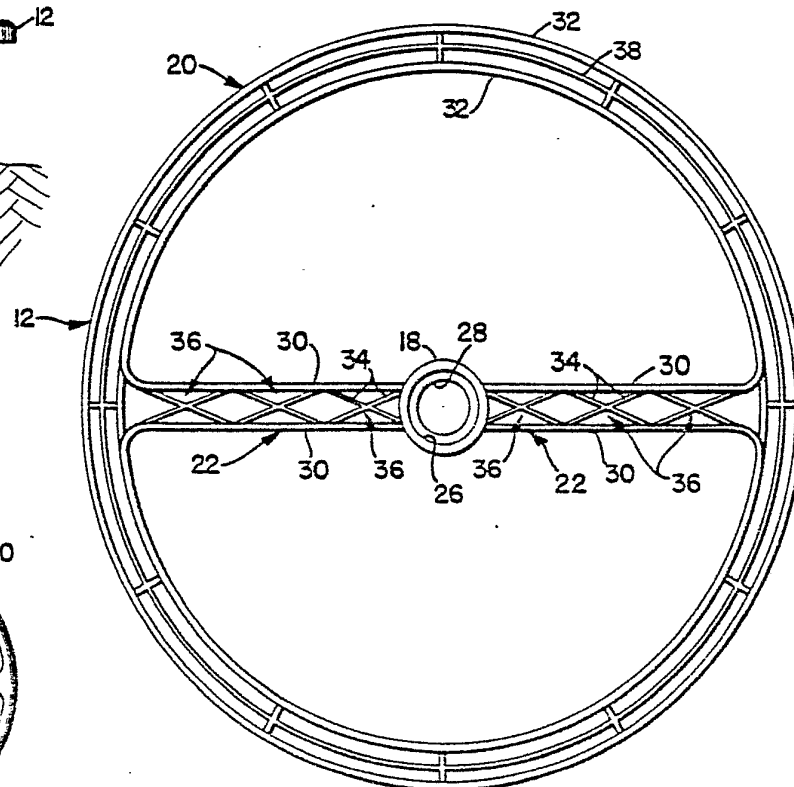
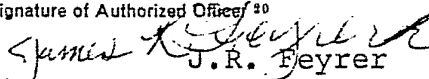


FIG. 4

INTERNATIONAL SEARCH REPORT

International Application No PCT/US79/00688

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ³		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int. Cl.	A01G	17/04
U.S. Cl.	47/47;	211/163
<i>W/O 00/00523</i>		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁴		
Classification System	Classification Symbols	
U.S.	47/39, 45, 46, 71; 403/1, 2, 3, 4, 167, 168; 108/28, 59, 91; 211/144, 163; 301/54	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴		
Category *	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
X	US, A, 115,456, Published 30 May 871, Fisher	1, 6, 11
X	US, A, 373,823, Published 29 November 1887, Gallup	2, 3
X	US, A, 598,913, Published 15 February 1898, Drayer	4, 7
X	US, A, 666,769, Published 29 January 1901, Medearis	1
X	US, A, 743,276, Published 03 November 1903, Hammack	1
X	US, A, 1,035,100, Published 06 August 1912, Peterson	1, 13
X	US, A, 2,157,400, Published 09 May 1939 Cooper	1, 6, 11
X	US, A, 3,785,088, Published 15 January 1974, Gaurriello	14
X	US, A, 3,791,070, Published 12 February 1974, Roberts	14
X	US, A, 3,902,692, Published 02 September 1975, Skinner	8-13
X	US, A, 4,020,592, Published 03 May, 1977, Saunders	2, 3, 5
(Continued On Supplemental Sheet 2)		
<p>* Special categories of cited documents: ¹⁵</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>"A" document defining the general state of the art</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document cited for special reason other than those referred to in the other categories</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> </div> <div style="width: 45%;"> <p>"P" document published prior to the international filing date but on or after the priority date claimed</p> <p>"T" later document published on or after the international filing date or priority date and not in conflict with the application, but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search ²	Date of Mailing of this International Search Report ²	
12 December, 1979	15 JAN 1980	
International Searching Authority ¹	Signature of Authorized Officer ²⁰	
RO/US	 J.R. Feyrer	

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

III

X	US,A, 4,048,752, Published 20 September 1977 Anderson	14
X	DE,C 874,221, Published 12 March 1953, Hergenroder	14

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹⁰

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers because they relate to subject matter ¹² not required to be searched by this Authority, namely:

2. ☐ Claim numbers because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out ¹³, specifically:

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ¹¹

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.