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(71) Applicants:
• **Chen, Jui-Chieh**
Hsinchu City, Taiwan (TW)

• **Liu, Yung-Hsiang**
Chiayi City, Taiwan (TW)

(72) Inventor: **Tan, Hong-Wei**
Chongqing City (CN)

(74) Representative: **Newstead, Michael John et al**
Page Hargrave
Southgate
Whitefriars
Lewins Mead
Bristol BS1 2NT (GB)

(54) **Automatic foldable umbrella**

(57) An automatic foldable umbrella includes a central shaft unit (30) having upper, lower and middle shafts (32, 31, 33) telescopically coupled to one another. A first force transmitting unit (80) is disposed to pull the upper shaft (32) to a stretched-out position relative to the middle shaft (33) when the middle shaft (33) is biased by a central spring (40) to move to an extended position, and to permit the upper shaft (32) to move downward to a retracted position when a rib-and-stretcher assembly (70) is collapsed. A second force transmitting unit (90) is disposed to permit movement of a runner (60) toward a top hub (50) when the upper shaft (32) is displaced to the stretched-out position, thereby rendering the folding operation convenient and effortless.

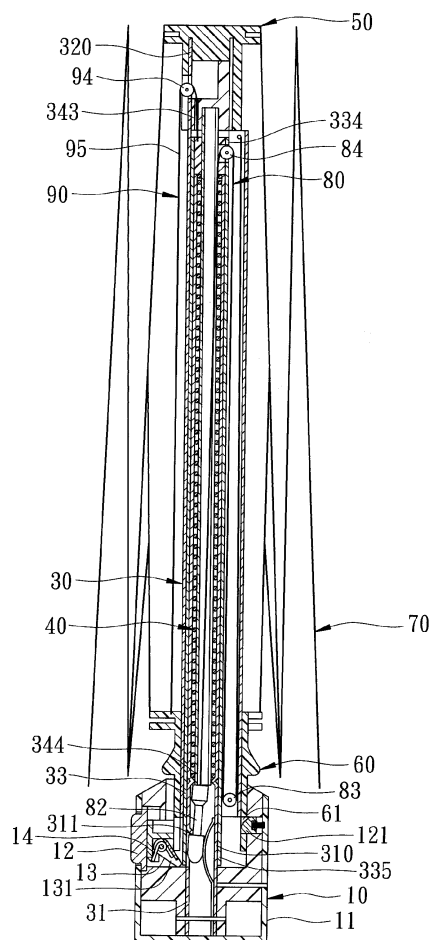


FIG. 4

Description

[0001] This invention relates to an automatic foldable umbrella, more particularly to an automatic foldable umbrella which is operable effortlessly.

[0002] Referring to Fig. 1, a conventional automatic foldable umbrella as disclosed in U.S. Patent No. 6,684,893 B2 is shown to include a handgrip 1, an operating unit 2, a central shaft unit 3, a central spring 4, a top hub 5, a runner 6, a rib-and-stretcher unit 7, and a cord unit 8. The operating unit 2 has a retained protrusion 202 disposed on a movable ring 201 to be retained in a retaining hole 602 in the runner 6 so as to hold the central shaft unit 3 in a folded position while the central spring 4 is in a compressed state, a spring-biased actuator 203 pivotally mounted on the movable ring 201 to be turnable to disengage from or engage a retained block 801, and a push button 204 manually operable to move the movable ring 201. The central shaft unit 3 includes lower, middle and upper shafts 301, 302, 303 telescopically coupled to one another. The cord unit 8 has a connected end secured to the top hub 5, and extends to be wound on a pulley 601 mounted on the runner 6 and a pulley 501 mounted on the top hub 5 to terminate at an anchoring end that is secured with the retained block 801. The retained block 801 is retained at a retaining region 301' of the lower shaft 301 to hold the cord unit 8 in a tensed state so as to maintain the rib-and-stretcher unit 7 in a spread position when the central shaft unit 3 is moved to an extended position by the biasing action of the central spring 4, as shown in Fig. 2, and is removed from the retaining region 301' upon a movement of the actuator 203 initiated by operation of the button 204 so as to release the tensed cord unit 8 to thereby permit the runner 6 and the rib-and-stretcher unit 7 to displace to a collapsed position, as shown in Fig. 3.

[0003] However, since the central spring 4 must be made to have a biasing force sufficient to move the central shaft unit 3, the runner 6, and the rib-and-stretcher unit 7 to open the umbrella, a relatively large manual force is required to compress the central spring 4 for folding the central shaft unit 3, which is inconvenient to the user, especially for a woman or a child, and which may cause injury to the user once the user inadvertently lets the umbrella slips from his/her grasp during folding.

[0004] An object of the present invention is to provide an automatic foldable umbrella which can be operated easily and effortlessly so as to reduce the risk of the umbrella slipping from a user's grasp during folding.

[0005] According to this invention, the automatic foldable umbrella includes: a central shaft unit having upper and lower shafts which are telescopically coupled to each other along an axis, and which respectively have top and bottom ends; at least one middle shaft having upper and lower ends which are respectively inserted into and sleeved on the upper and lower shafts; and an inner tube which has an attachment end that is disposed to be moved with one of the upper and middle shafts and which

extends downwardly to terminate at an abutment end. The lower shaft has a retaining region. A central spring is disposed in the lower shaft to bias the middle shaft to move relative to the lower shaft from a folded position to an extended position. A top hub is disposed on the top end of the upper shaft. A runner is sleeved on and movable relative to the upper shaft between distal and proximate positions relative to the top hub. A rib-and-stretcher assembly pivotally interconnects the top hub and the runner so as to be moved from a collapsed position to a spread position when the runner is displaced from the distal position to the proximate position. A first force transmitting unit includes: a first direction reversing member disposed on the upper shaft and distal from the top end; a second direction reversing member disposed on the middle shaft adjacent to the upper end; a first cord having a first connected end tensely moved with the top end of the upper shaft, a first cord segment which extends downwardly from the first connected end in the upper shaft to be wound on the first and second direction reversing members, and further downwardly into the inner tube, and which terminates at an anchoring end; and a retained member which is connected with the anchoring end and which is displaceable between retained and released states, where the retained member is retained with and removed from the retaining region, respectively. When the middle shaft is biased to move from the folded position to the extended position, and when the retained member is kept in the retained state, the first direction reversing member is pulled up by the first cord segment to move toward the second direction reversing member so as to displace the upper shaft to a stretched-out position. When the retained member is displaced to the released states, the first direction reversing member is set free and is allowed to descend, thereby permitting the upper shaft to move downward relative to the middle shaft to a retracted position while the rib-and-stretcher assembly is displaced to the collapsed position. A second force transmitting unit includes: a third direction reversing member disposed on the upper shaft adjacent to the top end, and a second cord having a second connected end tensely moved with the middle shaft, and a second cord segment which extends upwardly from the second connected end to be wound on the third direction reversing member and which is led downwardly to terminate at a third connected end that is connected to the runner. The runner is moved from the distal position to the proximate position when the upper shaft is displaced from the retracted position to the stretched-out position.

[0006] Since the upper shaft can be moved downward relative to the middle shaft when the rib-and-stretcher assembly is collapsed, a compression force required to displace the central shaft unit to the folded position is significantly reduced. Hence, the folding operation of the central shaft unit can be conducted in a convenient and effortless manner.

[0007] Other features and advantages of the present invention will become apparent in the following detailed

description of the preferred embodiments of the invention, with reference to the accompanying drawings, in which:

Fig. 1 is a sectional view of a conventional automatic foldable umbrella in a folded state;

Fig. 2 is a sectional view of the conventional automatic foldable umbrella in a spread state;

Fig. 3 is a sectional view of the conventional automatic foldable umbrella in a collapsed but extended state;

Fig. 4 is a sectional view of the first embodiment of an automatic foldable umbrella according to this invention in a folded state;

Fig. 5 is a sectional view of the first embodiment in a spread state;

Fig. 6 is a sectional view of the first embodiment in a collapsed but extended state;

Fig. 7 is an exploded perspective view of a portion of a central shaft unit of the first embodiment;

Fig. 8 is a sectional view of the second embodiment of an automatic foldable umbrella according to this invention in a folded state;

Fig. 9 is a sectional view of the second embodiment in a spread state; and

Fig. 10 is a sectional view of the second embodiment in a collapsed but extended state.

[0008] Before the present invention is described in greater detail, it should be noted that same reference numerals have been used to denote like elements throughout the specification.

[0009] Referring to Figs. 4 and 5, the first embodiment of an automatic foldable umbrella according to the present invention is shown to comprise an operating unit 10, a central shaft unit 30, a central spring 40, a top hub 50, a runner 60, a rib-and-stretcher assembly 70, a first force transmitting unit 80, and a second force transmitting unit 90.

[0010] The operating unit 10 has a mounting shell 11, a spring-biased push button 12 which is manually movable relative to the mounting shell 11 and which has a retaining portion 121, an actuator 13 which is pivotally mounted on the push button 12 and which has an engageable end 131 that is turnable between non-actuable and actuatable positions, and a torsion spring 14 disposed to bias the actuator 13 to the actuatable position.

[0011] The central shaft unit 30 includes upper and lower shafts 32, 31 which are telescopically coupled to each other along an axis (L), and which respectively have top and bottom ends 320, 310 that are respectively mounted in the top hub 50 and the mounting shell 11, at least one middle shaft 33 having upper and lower ends 334, 335 which are respectively inserted into and sleeved on the upper and lower shafts 32, 31, and an inner tube 34 which has an attachment end 343 that is secured to the top hub 50 and which extends downwardly to termi-

nate at an abutment end 344 that is not beyond the upper shaft 32. In particular, the retaining portion 121 and the actuator 13 of the operating unit 10 are disposed opposite to each other in terms of the axis (L). Further, the lower shaft 31 has a retaining region 311 adjacent to the bottom end 310, and an abutment region 312 located above the retaining region 311.

[0012] With reference to Fig. 7, the upper shaft 32 has an outer passage 321 disposed offset from the axis (L). The middle shaft 33 has a plug 331 which is disposed in the upper end 334 and which has a through hole 333 that extends along the axis (L) such that the inner tube 34 is slidably fitted through the through hole 333. The inner tube 34 surrounds the axis (L) to define an inner passage 341, and an axial slot 342 configured to communicate the outer passage 321 with the inner passage 341.

[0013] The central spring 40 is a compression spring 40 which is disposed in the lower shaft 31 and which abuts against the abutment region 312 and the plug 331 to bias the middle shaft 33 to move upwardly relative to the lower shaft 31 from a folded position to an extended position.

[0014] The runner 60 is sleeved on and movable relative to the upper shaft 32 between distal and proximate positions relative to the top hub 50.

[0015] The rib-and-stretcher assembly 70 pivotally interconnects the top hub 50 and the runner 60 so as to be moved from a collapsed position to a spread position when the runner 60 is displaced from the distal position to the proximate position.

[0016] The first force transmitting unit 80 includes a first direction reversing member 83 disposed in the outer passage 321 of the upper shaft 32 and distal from the top end 320, a second direction reversing member 84 disposed on the plug 331 of the middle shaft 33, a first cord 81 having a first connected end 811 which is secured in the outer passage 321 adjacent to the top end 320, a first cord segment 813 which is disposed in the outer passage 321, which extends downwardly from the first connected end 811 to be wound on the first and second direction reversing members 83, 84, and further downwardly through the axial slot 342 into the inner passage 341 of the inner tube 34, and which terminates at an anchoring end 812, and a retained member 82 which is connected with the anchoring end 812.

[0017] The second force transmitting unit 90 includes a third direction reversing member 94 disposed on the upper shaft 32 adjacent to the top end 320, and a second cord 95 having a second connected end 91 secured to the plug 331 of the middle shaft 33, and a second cord segment 93 which extends upwardly from the second connected end 91 to be wound on the third direction reversing member 94 and which is led downwardly to terminate at a third connected end 92 that is connected to the runner 60.

[0018] In this embodiment, the first, second and third direction reversing members 83, 84, 94 are pulleys which are pivotally mounted on a lower portion of the upper

shaft 32, the upper end 334 of the middle shaft 33, and an upper portion of the upper shaft 32, respectively.

[0019] As shown in Fig. 4, when the automatic foldable umbrella according to this embodiment is in a folded state, the runner 60 is held in the distal position by engagement of the retaining portion 121 in a retained hole 61 thereof to thereby place the central spring 40 in a compressed state, while the retained member 82 is in a retained state to be retained with the retaining region 311. In the meantime, the actuator 13 is kept by the lower end 335 of the middle shaft 33 in the non-actuable position where the engageable end 131 is disengaged from the retained member 82.

[0020] As shown in Fig. 5, when it is desired to open the umbrella, the push button 12 is pressed manually to remove the retaining portion 121 from the retained hole 61 so as to release the runner 60. At this time, the middle shaft 33 is forced by the central spring 40 to move from the folded position to the extended position. Meanwhile, as a result of the retained member 82 being kept in the retained state, the first direction reversing member 83 is pulled up by the first cord segment 813 to move toward the second direction reversing member 84 so as to displace the upper shaft 32 to a stretched-out position, while the runner 60 is displaced from the distal position to the proximate position, thereby spreading the rib-and-stretcher assembly 70.

[0021] At this stage, the actuator 13 is turned to the actuable position by means of the torsion spring 14 where the engageable end 131 is engaged with the retained member 82.

[0022] Referring to Fig. 6, when it is desired to close the umbrella, the push button 12 is pressed manually to move the actuator 13 to remove the retained member 82 from the retaining region 311 so as to place the retained member 82 in a released state. In the absence of a counteracting force exerted on the first cord segment 813 by the retained member 82, the first direction reversing member 83 is set free and is allowed to descend so as to permit the upper shaft 32 to move downward relative to the middle shaft 33 to a retracted position, while the rib-and-stretcher assembly 70 is displaced to the collapsed position. Further, the inner tube 34 is moved downward to permit the abutment end 344 to abut against the retained member 82.

[0023] When a manually pressing force is applied to move the top hub 50 and the mounting shell 11 toward each other for displacing the middle shaft 33 relative to the lower shaft 31 to the folded position, the inner tube 34 is pushed downward with the retained member 82 so as to being the retained member 82 back to the retained state. In the meantime, the middle shaft 33 is moved to displace the actuator 13 to the non-actuable position, and the runner 60 is moved to and held in the distal position. Thus, the umbrella is locked in the folded state as shown in Fig. 4.

[0024] Referring to Fig. 6, since the upper shaft 32 can be moved downward relative to the middle shaft 33 when

the rib-and-stretcher assembly 70 is collapsed, the compression force required to displace the central shaft unit 30 to the folded position is significantly reduced. Hence, the folding operation of the central shaft unit 30 can be conducted in a convenient and effortless manner, and the risk of the umbrella inadvertently slipping from a user's grasp during folding can be minimized. Furthermore, since only a smaller biasing force is needed for the central spring 40 to displace the middle shaft 33 relative to the lower shaft 31 to the extended position, possible injury to the user can be avoided.

[0025] Furthermore, since the first cord segment 813 is guided by and extends through the axial slot 342, the first direction reversing member 83 can be smoothly pulled without interfering with the movement of the middle and upper shafts 33, 32 and the central spring 40.

[0026] Referring to Figs. 8 to 10, the second embodiment of the automatic foldable umbrella according to this invention is shown to be similar to the first embodiment in construction. In the second embodiment, the attachment end 343' of the inner tube 34' is secured to the plug 331' of the middle shaft 33' and extends downwardly in the middle shaft 33' such that the abutment end 344' is not beyond the lower end 335' of the middle shaft 33'.

Claims

1. An automatic foldable umbrella comprising:

a central shaft unit (30) including upper and lower shafts (32, 31) which are telescopically coupled to each other along an axis (L), and which respectively have top and bottom ends (320, 310), at least one middle shaft (33, 33') having upper and lower ends (334, 335, 335') which are respectively inserted into and sleeved on said upper and lower shafts (32, 31), and an inner tube (34, 34') which has an attachment end (343, 343') that is disposed to be moved with one of said upper and middle shafts (32, 33, 33') and which extends downwardly to terminate at an abutment end (344, 344'), said lower shaft (31) having a retaining region (311);

a central spring (40) disposed in said lower shaft (31) to bias said middle shaft (33, 33') to move relative to said lower shaft (31) from a folded position to an extended position;

a top hub (50) disposed on said top end (320) of said upper shaft (32);

a runner (60) sleeved on and movable relative to said upper shaft (32) between distal and proximate positions relative to said top hub (50); and

a rib-and-stretcher assembly (70) pivotally interconnecting said top hub (50) and said runner (60) so as to be moved from a collapsed position to a spread position when said runner (60) is displaced from the distal position to the proximate position.

mate position, **characterized in that** said automatic foldable umbrella further comprising:

a first force transmitting unit (80) including:

a first direction reversing member (83) disposed on said upper shaft (32) and distal from said top end,
 a second direction reversing member (84) disposed on said middle shaft (33, 33') adjacent to said upper end,
 a first cord (81) having a first connected end (811) tensely moved with said top end of said upper shaft (32), a first cord segment (813) which extends downwardly from said first connected end (811) in said upper shaft (32) to be wound on said first and second direction reversing members (83, 84), and further downwardly into said inner tube (34, 34'), and which terminates at an anchoring end (812), and
 a retained member (82) which is connected with said anchoring end (812) and which is displaceable between retained and released states, where said retained member (82) is retained with and removed from said retaining region (311), respectively, such that, when said middle shaft (33, 33') is biased to move from the folded position to the extended position, and when said retained member (82) is kept in the retained state, said first direction reversing member (83) is pulled up by the first cord segment (813) to move toward said second direction reversing member (84) so as to displace said upper shaft (32) to a stretched-out position, and such that when said retained member (82) is displaced to the released state, said first direction reversing member (83) is set free and is allowed to descend, thereby permitting said upper shaft (32) to move downward relative to said middle shaft (33, 33') to a retracted position while the rib-and-stretcher assembly (70) is displaced to the collapsed position;

a second force transmitting unit including
 a third direction reversing member (94) disposed on said upper shaft (32) adjacent to said top end (320), and
 a second cord (90) having a second connected end (91) tensely moved with said middle shaft (33, 33'), and a second cord segment (93) which extends upwardly from

said second connected end (91) to be wound on said third direction reversing member (94) and which is led downwardly to terminate at a third connected end (92) that is connected to said runner (60) such that said runner (60) is moved from the distal position to the proximate position when said upper shaft (32) is displaced from the retracted position to the stretched-out position.

2. The automatic foldable umbrella as claimed in Claim 1, **characterized in that** said first, second and third direction reversing members (83, 84, 94) are pulleys which are pivotally mounted on said upper shaft (32) distal from said top end (320), said middle shaft (33, 33'), and said upper shaft (32) adjacent to said top end (320), respectively.
3. The automatic foldable umbrella as claimed in Claim 2, **characterized in that** said upper shaft (32) has an outer passage (321) which is disposed offset from the axis (L) to permit extension of said first cord segment (813) from said first connected end (811) of said first cord (81) to said first direction reversing member (83) and to permit said first cord segment (813) to be wound on said first direction reversing member (83), said inner tube (34, 34') surrounding the axis (L) to define an inner passage (341) for accommodating said first cord segment (813), and an axial slot (342) configured to communicate said outer passage (321) with said inner passage (341) for passage of said first cord segment (813) therethrough.
4. The automatic foldable umbrella as claimed in Claim 3, **characterized in that** said attachment end (343) of said inner tube (34) is secured to said top hub (50), said middle shaft (33) having a plug (331) which is disposed in said upper end for permitting said second direction reversing member (84) to be mounted thereon and which has a through hole (333) that extends along the axis (L) such that said inner tube (34) is slidably fitted through said through hole (333).
5. The automatic foldable umbrella as claimed in Claim 4, **characterized in that** said abutment end (344) of said inner tube (34) is configured not to extend beyond said upper shaft (32).
6. The automatic foldable umbrella as claimed in Claim 3, **characterized in that** said middle shaft (33') has a plug (331') disposed in said upper end for permitting said second direction reversing member (84) to be mounted thereon, said attachment end (343') of said inner tube (34') being secured to said plug (331') and extending downwardly in said middle shaft (33') such that said abutment end (344') is not beyond said lower end (335') of said middle shaft (33').

7. The automatic foldable umbrella as claimed in Claim 1, further **characterized by** an operating unit (10) including:

a mounting shell (11) which is configured to permit said bottom end (310) of said lower shaft (31) to be mounted therein, 5
 a push button (12) which has a retaining portion (121) disposed to hold said runner (60) in the distal position against biasing action of said central spring (40), and which is manually movable relative to said mounting shell (11) to permit said retaining portion (121) to release said runner (60), and 10
 an actuator (13) which is pivotably mounted on said pushbutton (12), and which has an engageable end (131) that is turnable between a non-actuable position where said engageable end (131) is disengaged from said retained member (82), and an actuable position where said engageable end (131) is engaged with said retained member (82) such that, in response to a manual pressing action on said push button (12), said retained member (82) is actuated to displace from the retained state to the released state, and 25
 a torsion spring (14) disposed to bias said actuator (13) to the actuable position.

8. The automatic foldable umbrella as claimed in Claim 7, **characterized in that** said retaining portion (121) and said actuator (13) are disposed opposite to each other in terms of the axis (L). 30

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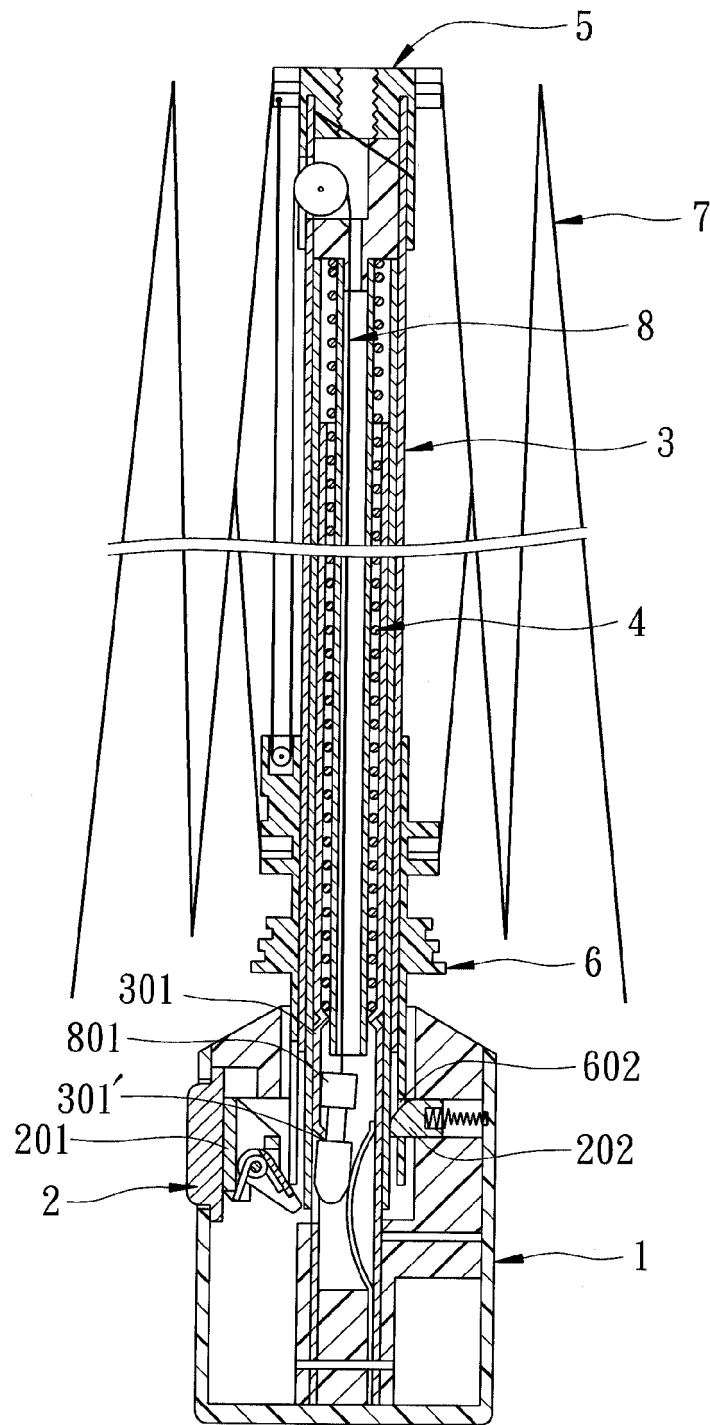


FIG. 1
PRIOR ART

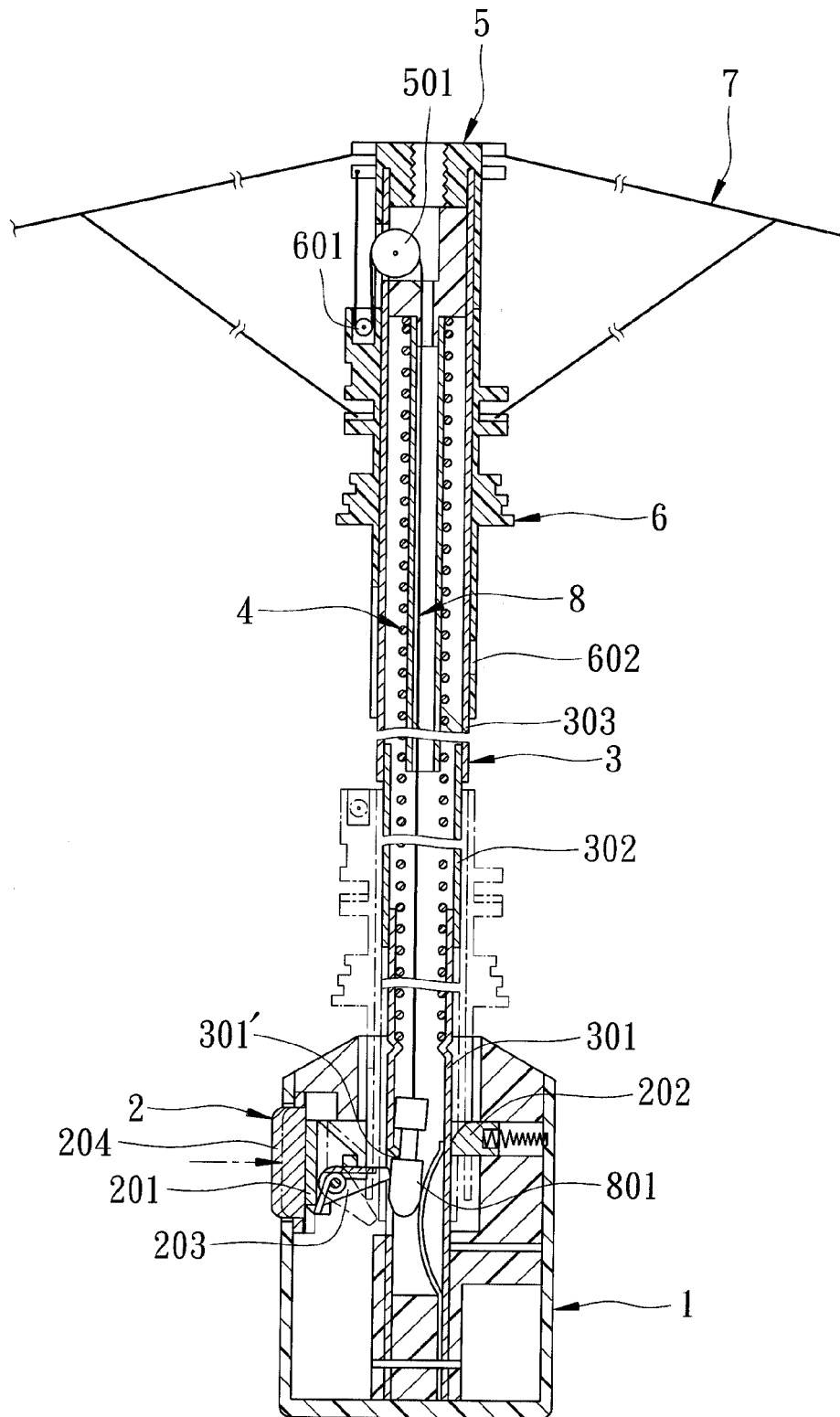


FIG. 2
PRIOR ART

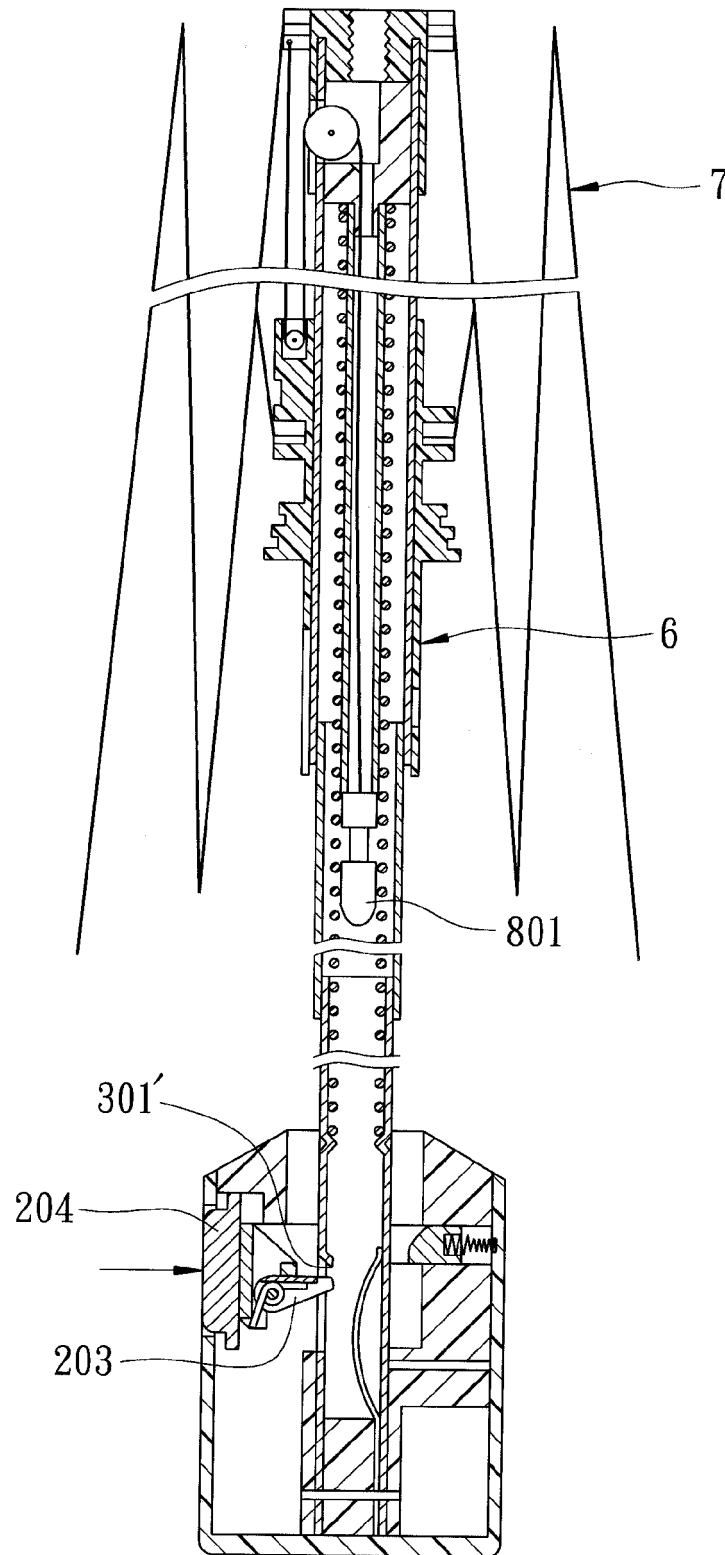


FIG. 3
PRIOR ART

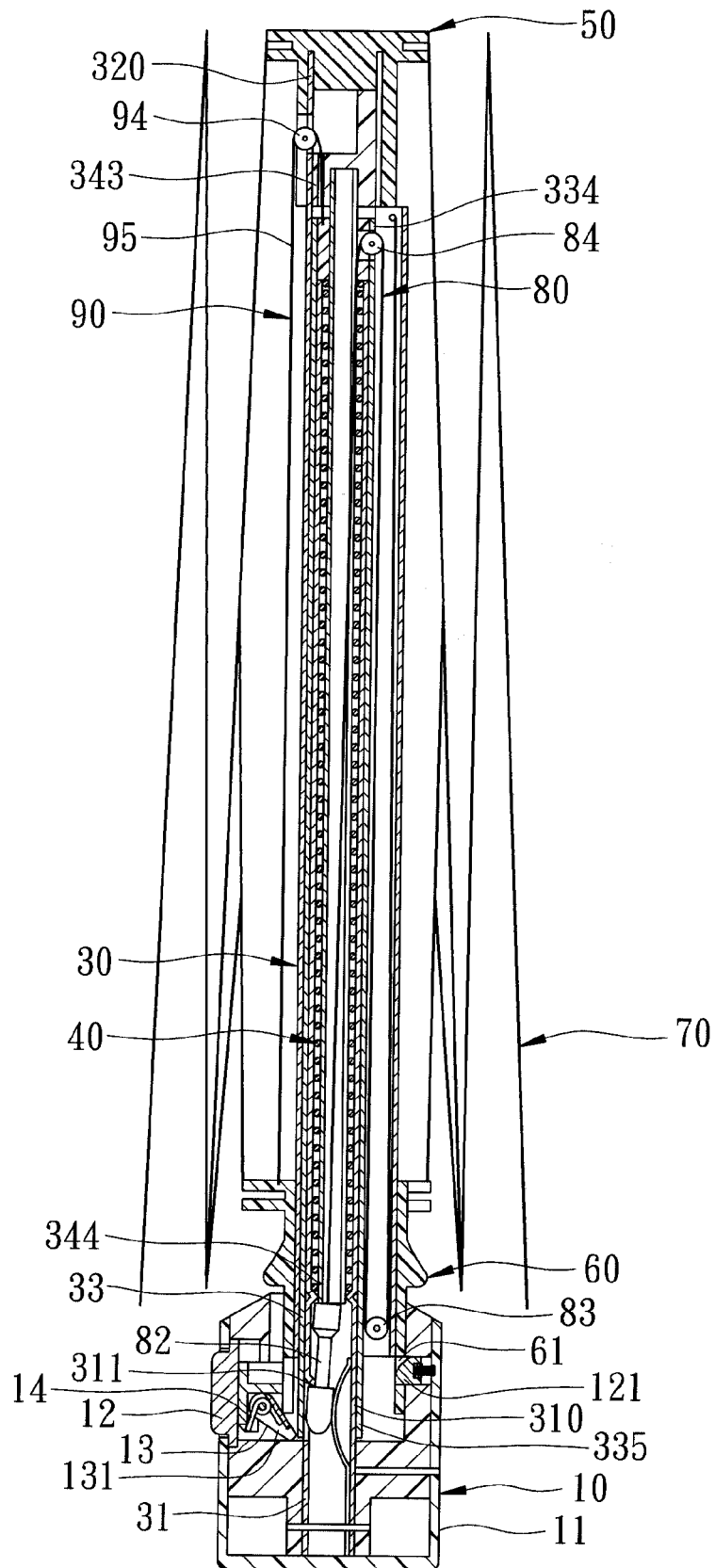
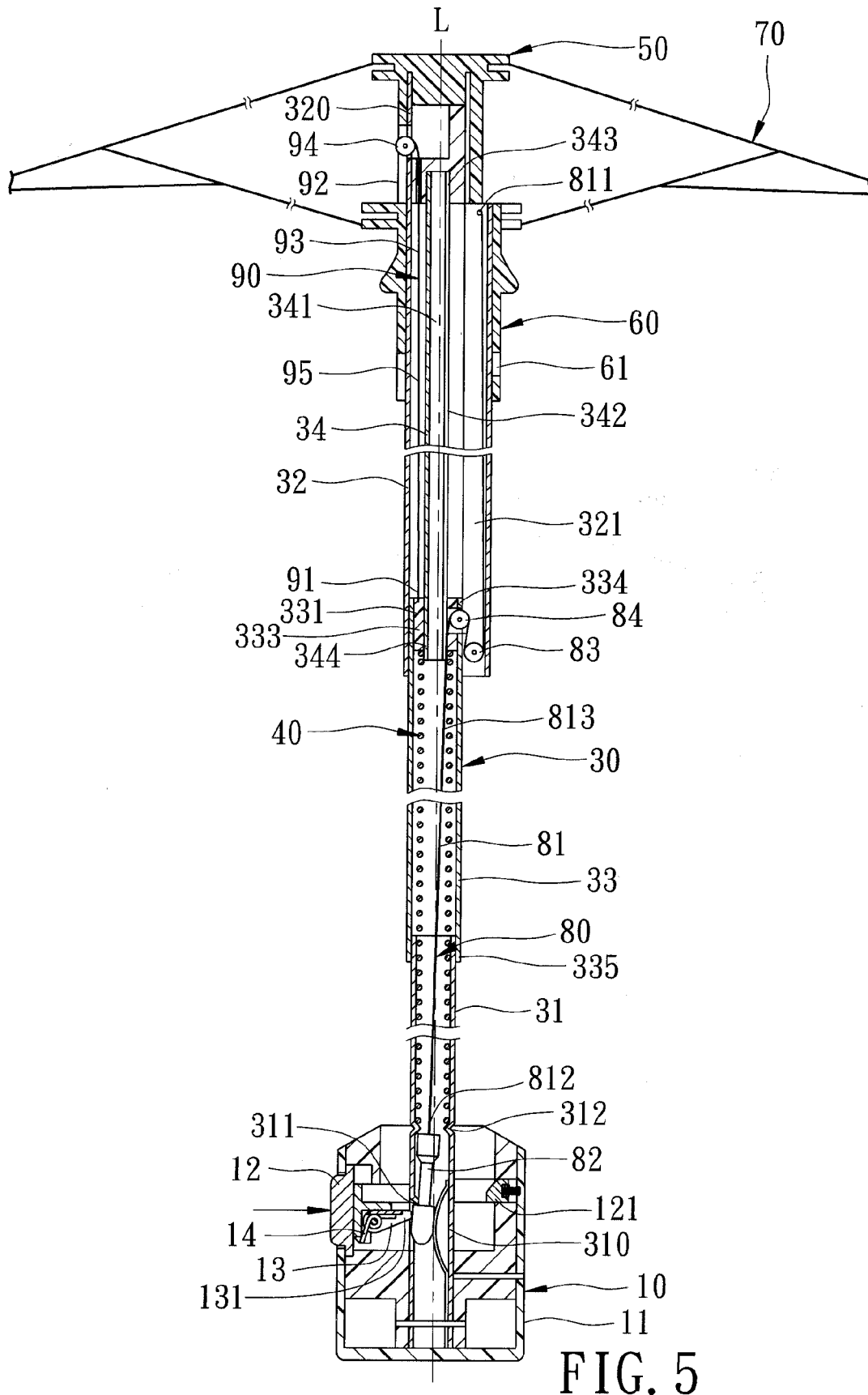
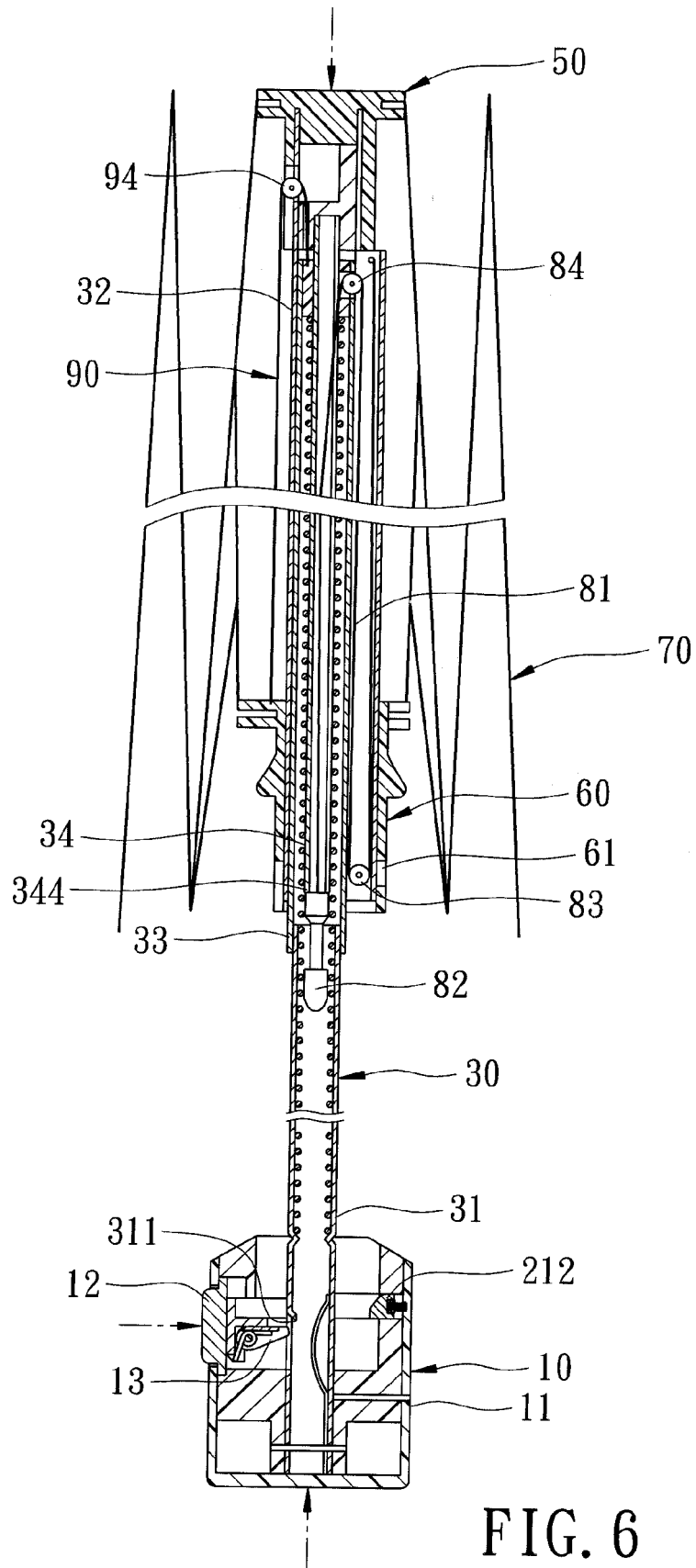


FIG. 4





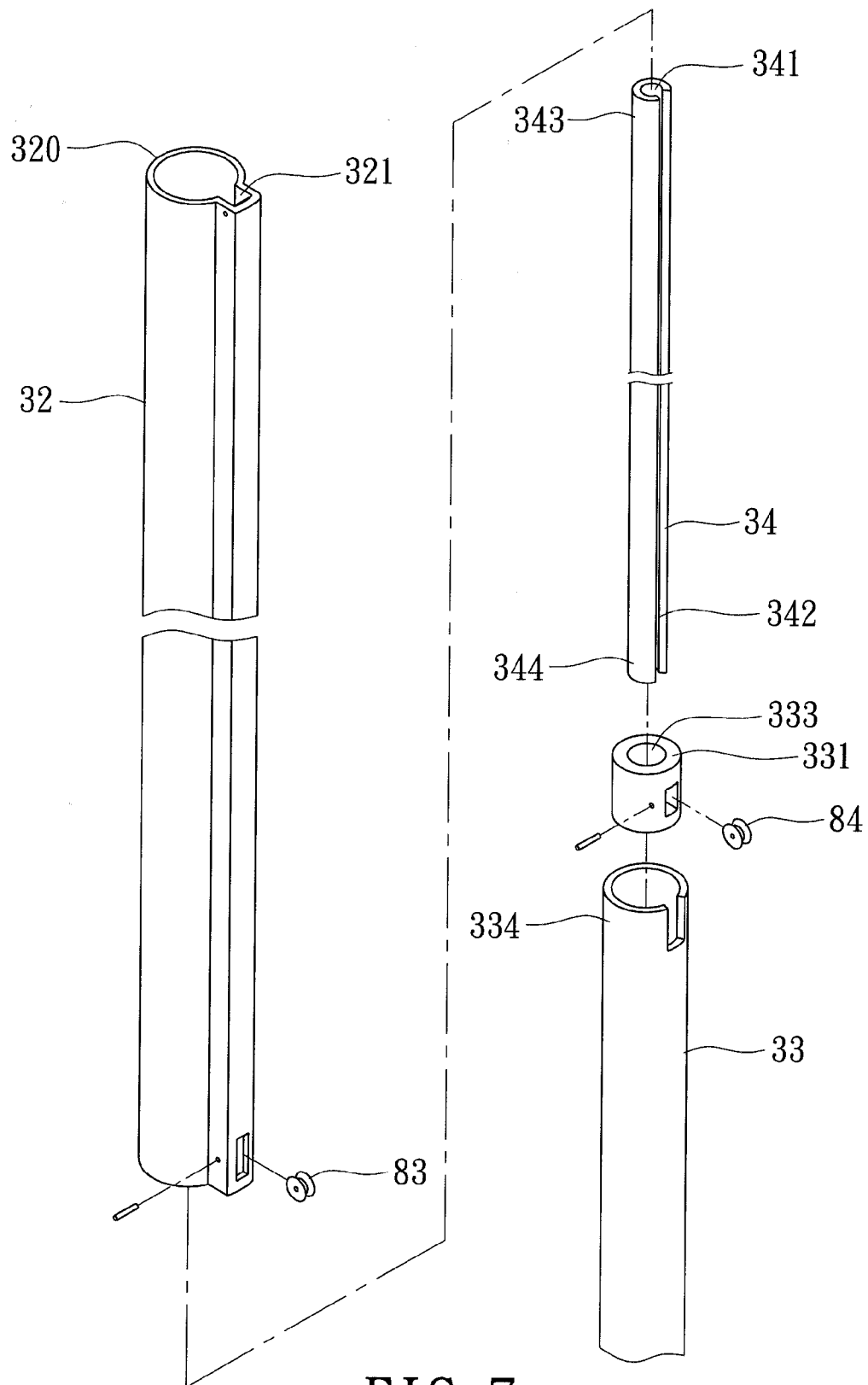


FIG. 7

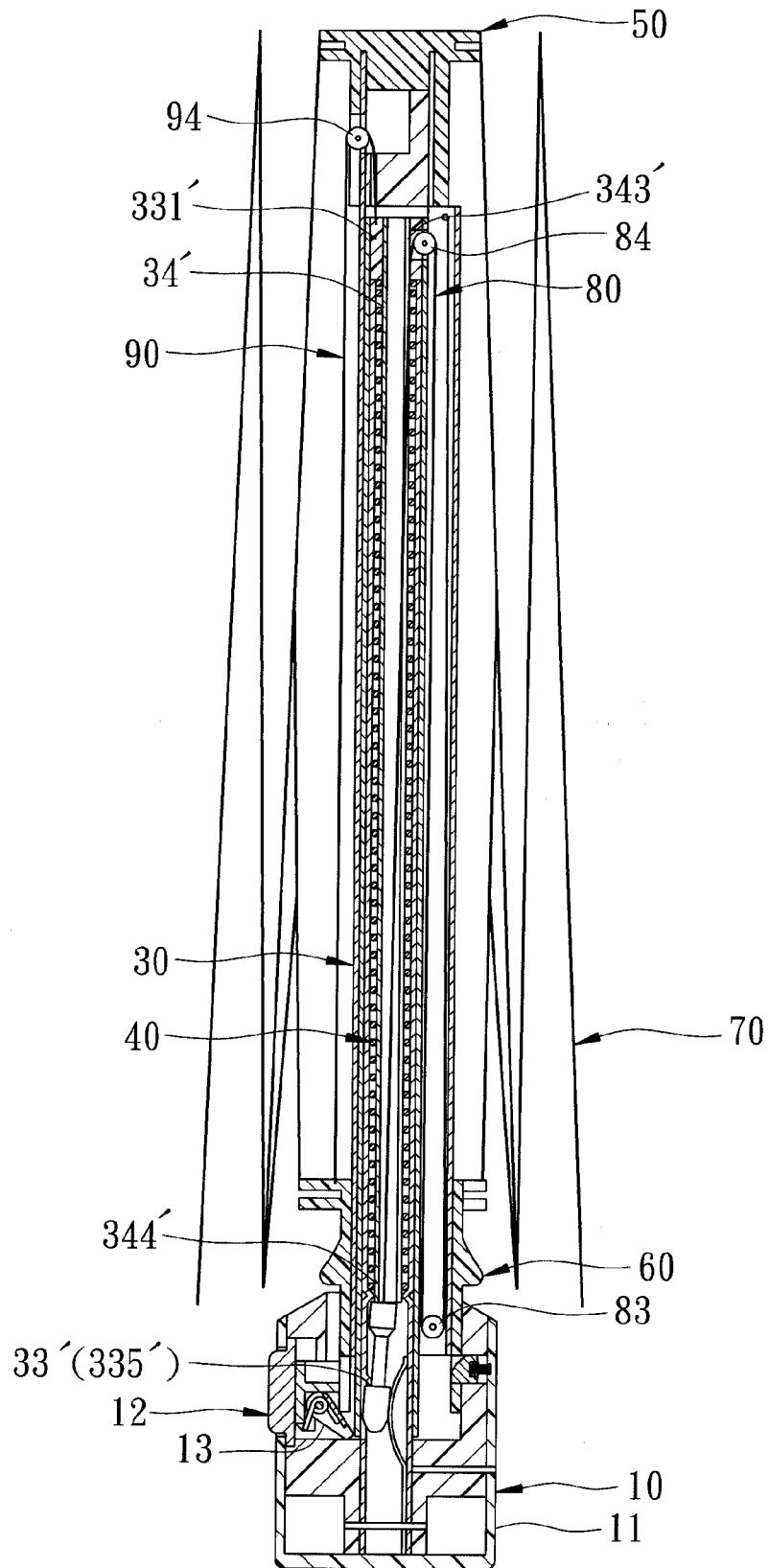


FIG. 8

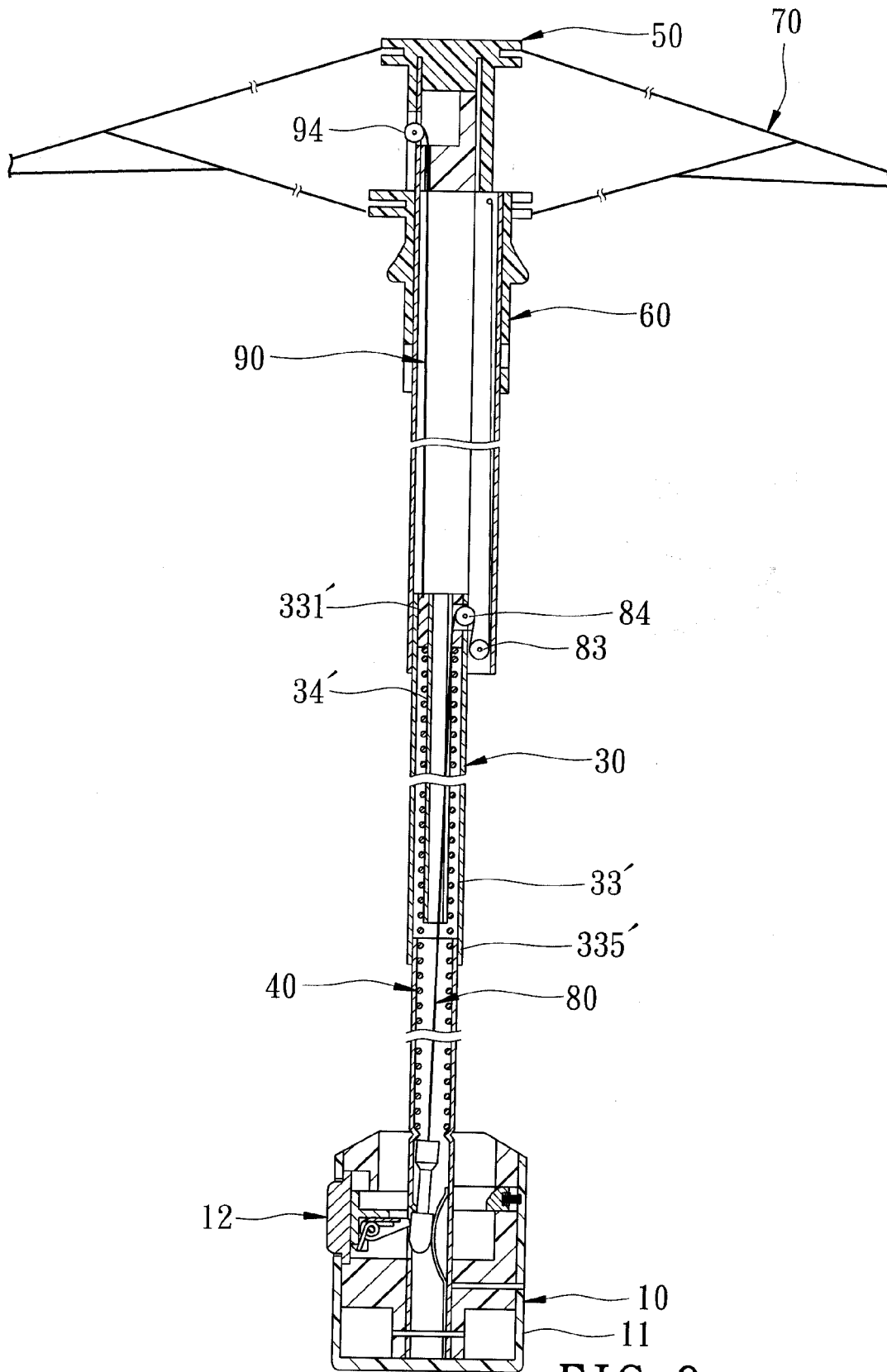


FIG. 9

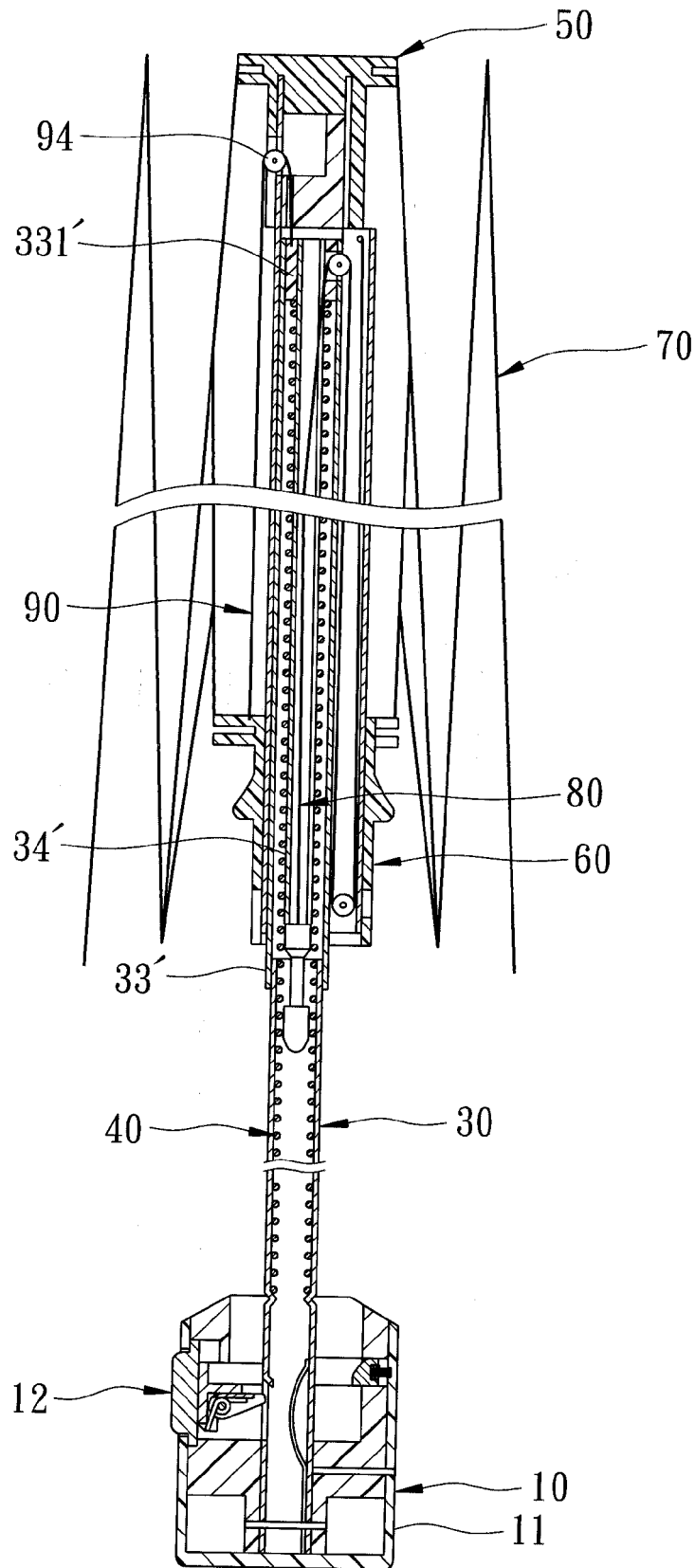


FIG. 10



EUROPEAN SEARCH REPORT

Application Number
EP 12 16 6291

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	US 6 684 893 B2 (KUO SHIH-SHIN [TW]) 3 February 2004 (2004-02-03) * page 1, line 41 - page 2, line 13; figures 1-4 * -----	1-8	INV. A45B25/14
			TECHNICAL FIELDS SEARCHED (IPC)
			A45B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 27 July 2012	Examiner Ionescu, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document 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 03.82 (P04C01)

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

EP 12 16 6291

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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27-07-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
US 6684893	B2	03-02-2004	DE 20117032 U1	13-12-2001
		US 2003062074 A1		03-04-2003

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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