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(54) **Automatic folding and unfolding device of umbrella**

(57) The present invention proposes an automatic folding and unfolding device of an umbrella, wherein a match weight (80) is arranged on a lower honeycomb (34) of the umbrella. A retaining hook set (50) is installed on the upper part of a central shaft (40). A top hook rod (70) is installed in the central shaft. A rolling shaft (74) is pivotally installed at the lower part of the top hook rod (70) to be pushed by a wedge part (61) at the bottom end of the rear part of a snap catch (60). A push post (71) is formed at the top end of the top hook rod (70). A resilient element (72) is placed at the top end of the top hook rod (70) so that the push post (71) of the top hook rod (70) does not contact with the retaining hook (56).

When the upper honeycomb (31) of the umbrella is held down, the snap catch (60) is pressed to let the positioning groove (73) of the lower honeycomb (34) be not restricted by the hook part (62). Through the help of the resilient force of the spring (33) and the weight of the match weight (80), the sub-stretchers will stretch the ribs (35). The lower honeycomb (34) will be locked and positioned by the retaining hook (50). Thereby, the object of automatically unfolding the canopy can be achieved. Contrarily, the positioning groove (44) of the lower honeycomb (34) will be locked and positioned by the hook part (62) of the snap catch (60), hence achieving the object of automatically folding the canopy.

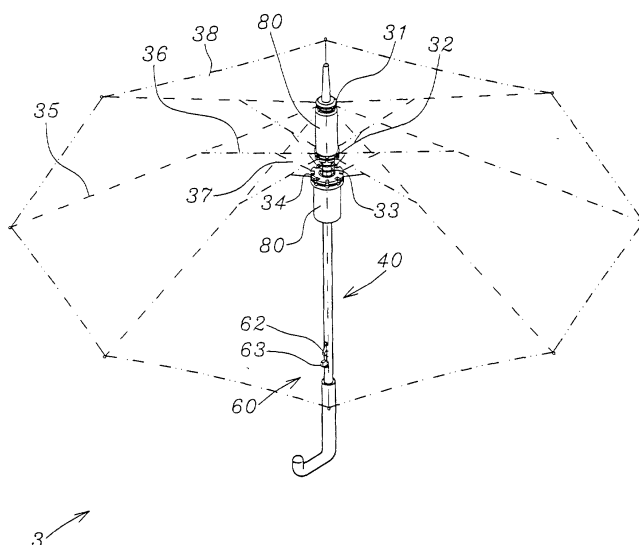


FIG.3

Description

Field of the invention

[0001] The present invention relates to an automatic folding and unfolding device of an umbrella, which device can be applied to various kinds of umbrellas such as parasols, beach umbrellas, oil-paper umbrellas, and regular umbrellas.

Background of the invention

[0002] The umbrella most used in prior art is a hand-operated umbrella shown in Fig. 1. The user holds a runner 11 below a lower honeycomb 10 and then pushes the runner 11 to an isolating sleeve 12 to let stretchers 13 stretch ribs 14 and the bottom edge of the runner 11 be positioned by a retaining snap hook 15. A canopy 16 is thus unfolded. If the canopy 16 is to be folded, the retaining snap hook 15 is pressed into a central shaft 20 manually. Thereby, the runner 11 can be pulled downwards and a positioning groove 111 on the runner 11 can be positioned by a snap catch 17 at the lower part of the central shaft 20. After modified, an automatic umbrella 2 shown in Fig. 2 is proposed. When a snap catch 21 of the central shaft 20 is pressed, a positioning groove 222 of a runner 221 of a lower honeycomb 22 is detached from the snap catch 21. Through the help of the resilient force of a spring 23, the distance between the lower honeycomb and a middle honeycomb will be stretched to lift the middle honeycomb. Stretchers 25 and sub-stretchers 26 will thus stretch each other. The sub-stretchers 26 will also stretch ribs 27 to let the top edge of the middle honeycomb 24 stick to an isolating sleeve 28. A canopy 29 is thus unfolded. If the canopy 29 is to be folded, the runner 221 of the lower honeycomb 22 is held and then pulled downwards to let the positioning groove 222 on the runner 221 be locked and positioned by the snap catch 21 at the lower part of the central shaft 20. However, the automatic umbrella 2 has only the function of automatically unfolding the canopy 29. Moreover, because the resilient coefficient of the spring 23 is too high (to prevent from being unable to unfold the canopy), the tips of the ribs 27 will often hurt vicinal people when unfolding the canopy 29. Furthermore, existent automatic umbrellas 2 can not achieve the function of automatically folding and unfolding the canopy 29 single-handedly. Therefore, further improvements are required.

[0003] Although an umbrella having a powered device has been proposed to automatically fold and unfold the canopy by pressing a switch, it requires a motor, a battery, a control circuit, and a driving mechanism installed therein. Therefore, the production cost is very high. Economical effect can not be achieved so that this kind of umbrella does not circulate in market.

Summary and objects of the present invention

[0004] The primary object of the present invention is to provide an automatic folding and unfolding device of an umbrella, wherein a simple four-link mechanism is exploited for the ribs and the stretchers. Through the upward or downward orientation of an upper honeycomb and matched with a match weight of a lower honeycomb, the object of automatically folding and unfolding a canopy can be achieved by controlling a retaining hook of a retaining hook set through a snap catch.

[0005] In the present invention, a match weight is arranged on a lower honeycomb of an umbrella. A retaining hook set is installed in the upper part of a central shaft. The retaining hook set comprises a positioning seat, a retaining hook, two resilient elements, and a raised positioning posts. The positioning seat has a gap at the lower part of one side thereof and a post groove at the upper part of the other side thereof. One end of the retaining hook can be pivotally installed in the gap via a pin, and a spring seat hole is formed at the inner side of the other end thereof. The two resilient elements are installed in the post groove and the spring seat hole, respectively. Part of the raised positioning post can be placed in the post groove. A top hook rod is installed in the central shaft. The lower part of the top hook rod has a groove hole so that the snap catch fixed below the central shaft can move therein. A rolling shaft is pivotally installed at the lower part of the groove hole to be pushed by a wedge part at the bottom end of the rear part of the snap catch. A push post is formed at the top end of the top hook rod. A resilient element is placed at the top end of the top hook rod so that the push post of the top hook rod does not contact with the retaining hook.

[0006] The various objects and advantages of the present invention will be more readily understood from the following detailed description when read in conjunction with the appended drawings, in which:

Brief description of drawing:

[0007]

Fig. 1 is a perspective view of a prior art hand-operated umbrella;

Fig. 2 is a perspective view of a prior art automatic umbrella;

Fig. 3 is a perspective view when the present invention is applied to an automatic umbrella;

Fig. 4 is a cross-sectional view when the present invention is applied to an automatic umbrella;

Fig. 4A is an enlarged view of Part A shown in Fig. 4;

Fig. 4B is an enlarged view of Part B shown in Fig. 4;

Fig. 5 is an exploded perspective view of a central shaft of the present invention;

Fig. 6 is a perspective view of a match weight, a middle honeycomb, a spring, and a lower honey-

comb of the present invention;

Fig. 7 is a diagram showing the situation when the canopy is unfolded according to an embodiment of the present invention;

Fig. 8 is a diagram showing the situation when the canopy is folded according to an embodiment of the present invention;

Fig. 9 is a partly exploded perspective view of a central shaft according to another embodiment of the present invention;

Fig. 10 is a cross-sectional view when the present invention is applied to another automatic umbrella.

Detailed description of preferred embodiment

[0008] As shown in Figs. 3 to 5, an upper honeycomb 31 of an automatic umbrella 3 of the present invention is fixed at the upper part of a central shaft 40. A middle honeycomb 32 is installed below the upper honeycomb 31. A spring 33 is installed below the middle honeycomb 32. A lower honeycomb 34 is installed below the spring 33. A plurality of ribs 35 are annularly installed on the upper honeycomb 31. A plurality of stretchers 36 are pivotally installed between predetermined positions of the ribs 35 and the middle honeycomb 32. A plurality of sub-stretchers 37 are installed between predetermined positions of the stretchers 36 and the lower honeycomb 34. A canopy 38 is spread over the ribs 35. An automatic folding and unfolding device of an umbrella according to the present invention comprises at least a retaining hook set 50 fixed at the upper part of the central shaft 40, a snap catch 60 fixed at the lower part of the central shaft 40, a top hook rod 70 installed in the central shaft 40 and controlled by the snap catch 60, and a match weight 80. As shown in Fig. 4A, the retaining hook set 50 comprises a positioning seat 53, a retaining hook 56, two resilient elements 57 and 58, and a raised positioning posts 59. The positioning seat 53 has a gap 51 at the lower part of one side thereof and a post groove 52 at the upper part of the other side thereof. One end of the retaining hook 56 can be pivotally installed in the gap 51 via a pin 54, and a spring seat hole 55 is formed at the inner side of the other end thereof. The two resilient elements 57 and 58 are installed in the post groove 52 and the spring seat hole 55, respectively. Part of the raised positioning post 59 can be placed in the post groove 52.

[0009] The snap catch 60 is an arc sheet having a wedge part 61 at the lower part of the back thereof. A raised hook part 62 and a raised press part 63 are installed at the lower part of the front of the snap catch 60.

[0010] The top hook rod 70 can control the retaining hook 56 of the retaining hook set 50 to retract into the central shaft 40. The top hook rod 70 is a long post having a push post 71 at the top thereof. A resilient element 72 (e.g., a compression spring) is telescoped on the push post 71. A straight groove hole 73 is formed at the lower part of the top hook rod 70 so that the snap catch

60 can move therein. A rolling shaft 74 is installed in the lower part of the straight groove hole 73 and fixedly penetrated via a fixing pin 75 to reduce its friction coefficient. It is also feasible to only let the fixing pin 75 penetrate through the lower part of the straight groove hole 73.

[0011] A positioning hole 41 and a through groove 42 are formed at the upper part of the central shaft 40 so that the positioning post 59 can be positioned and part of the retaining hook 56 can protrude out, respectively. A positioning hole 43 and a through hole 44 are formed at the lower part of the central shaft 40 so that one end of the snap catch 60 can be positioned and the other end thereof can protrude out, respectively.

[0012] The middle honeycomb 32 has a retaining groove 321 therein so that the retaining hook 56 of the retaining hook set 50 can be positioned.

[0013] Please also refer to Fig. 4B. The match weight 80 is installed on the lower honeycomb 34 and the middle honeycomb 32. The match weight can be integrally formed with or separately formed from the lower honeycomb 34 or the middle honeycomb 32. A spring seat 341 can be installed at the upper part of the lower honeycomb 34 to bear one end of the spring 33.

[0014] When installed, the retaining hook set 50 can first be fixedly installed in the central shaft 40. The top hook rod 70 is then pushed into the central shaft 40 so that the resilient element 72 telescoped on the push post 71 of the top hook rod 70 can stick to the bottom edge of the retaining hook set 50. Next, one end of the snap catch 60 is fixed in the positioning hole 43 of the central shaft 40. Finally, a raised bottom rod 45 is installed at the bottom of the central shaft 40 (it is also feasible to transversally installed a fixing pin at a predetermined position of the central shaft 40) so that the top hook rod 70 will not prolapse from the central shaft 40. Through pressing the press part 63, the wedge part 61 of the snap catch 60 can push the rolling shaft 74 or the fixing pin 75 to lift the top hook rod 70 so that the push post 71 will push the retaining hook 56 into the central shaft 40. If the press part 63 is released, the resilient element 72 will push the top hook rod 70 away so that the push post 71 will be detached from the retaining hook 56 and part of the retaining hook 56 will protrude out of the central shaft 40.

[0015] It is feasible not to install the retaining groove 321 in the middle honeycomb 32. Instead, a retaining groove (not shown) is installed in the lower honeycomb 34 so that the retaining groove of the lower honeycomb 34 can be locked and positioned by the retaining hook 56 after the canopy 38 is unfolded. It is also feasible not to install a retaining groove in both the middle honeycomb 32 and the lower honeycomb 34. After the canopy 38 is unfolded, the bottom edge of the lower honeycomb 34 can be positioned by the retaining hook 56.

[0016] As shown in Fig. 6, the upper part of the middle honeycomb 32 has a bushing having the same function as that of an isolating sleeve. The middle honeycomb 32 is a bushing sheathed by the match weight 80. An

annular groove 322 is formed on the side of the bottom of the middle honeycomb 32. A plurality of deeper grooves 323 are annularly formed on the annular groove 322. One end of each of the stretchers 36 can be inserted into one of the grooves 323. A wire 324 is used to penetrate through one end of each of the stretchers 36. The wire 324 is then fixedly arranged in the annular groove 322 so that the wire 324 becomes a pivot of one end of the stretchers 36. The lower honeycomb 34 is also a bushing sheathed by the match weight 80. An annular groove 342 is formed on the side of the lower honeycomb 34. A plurality of deeper grooves 343 are annularly formed on the annular groove 342. One end of each of the sub-stretchers 37 can be inserted into one of the grooves 343. A wire 344 is used to penetrate through one end of each of the sub-stretchers 37. The wire 344 is then fixedly arranged in the annular groove 342 so that the wire 344 becomes a pivot of one end of the sub-stretchers 37. A spring 33 is placed between the middle honeycomb 32 and the lower honeycomb 34.

[0017] As shown in Fig. 7, when the upper honeycomb 31 of the automatic umbrella 3 is held down, the press part 63 is pressed to let the positioning groove 345 of the lower honeycomb 34 be not restricted by the hook part 62. Through the help of the resilient force of the spring 33 and the weight of the match weight 80, the distance between the middle honeycomb 32 and the lower honeycomb 34 will be stretched to lift the middle honeycomb 32. The stretchers 36 and the sub-stretchers 37 will thus stretch each other. The sub-stretchers 37 will also stretch the ribs 35. The retaining groove 321 of the middle honeycomb 32 will be locked and positioned by the retaining hook 56. Thereby, the object of automatically unfolding the canopy 38 can be achieved. Because it is not necessary to raise the umbrella 3 to unfold the canopy 38, the operation is more laborsaving. Moreover, because the resilient coefficient of the adopted spring 33 is much smaller than that of the prior art spring, the situation that the tips of the ribs may hurt vicinal people when abruptly unfolding the canopy 38 can be avoided, hence achieving safer operation. Furthermore, the closer the stretchers 36 to the ends of the ribs 35 or the closer the sub-stretchers 37 to the ends of the stretchers 36, the more laborsaving effect can be achieved by the formed pivotal connection. Therefore, the weight of the selected match weight 80 can be relatively reduced so that even through the spring 33 is not installed, the function of automatically unfolding the canopy 38 will not be influenced.

[0018] As shown in Fig. 8, when the upper honeycomb 31 is held up, the press part 63 is pressed to let the retaining groove 321 of the middle honeycomb 32 be not restricted by the retaining hook 56. Through the help of the weight of the match weight 80, the distance between the middle honeycomb 32 and the lower honeycomb 34 will be reduced to lower the middle honeycomb 32. The stretchers 36 and the sub-stretchers 37 will thus retractably grip each other. The stretchers 36

will also fold the ribs 35. the positioning groove 345 of the lower honeycomb 34 can be locked and positioned by the hook part 62. Thereby, the object of automatically folding the canopy 38 can be achieved.

[0019] Fig. 9 shows a partly exploded perspective view of a central shaft 40A according to another embodiment of the present invention. As compared to Fig. 5, it can be seen that another retaining hook set 50A is added in the central shaft 40A. Speaking more clearly, a positioning hole 41A and a through groove 42A are added at predetermined positions of the central shaft 40A. A guide post 701A and another push post 71A are installed at predetermined positions of the top hook rod 70A. A guide groove 531A is formed at each of two outer sides of the positioning seat 53A of the retaining hook set 50A. The movement of the top hook rod 70A can be controlled by the wedge part 61 of the snap catch 60 so that the push posts 71 and 71A can push the two retaining hooks 56 and 56A into the central shaft 40A simultaneously.

[0020] Fig. 10 shows a cross-sectional view when the present invention is applied to another automatic umbrella. The shape of a match weight 80A on the lower honeycomb is narrower so that the moment of resistance to lift the canopy 38 after the canopy 38 is unfolded is smaller, hence achieving more laborsaving operation. Moreover, a gap 81A can be added at one side of the match weight 80A according to necessity to be penetrated through by the press part 63 of the snap catch 60 so that the pressed part 63 can be pressed by the user. Furthermore, a crooked handle 90 can be added at the bottom end of the central shaft 40 to facilitate manual holding. A groove 91 can be formed at the upper part of the handle 90 to receive part of the narrow match weight 80A.

[0021] The above automatic umbrella can be a general hand-operated umbrella comprising a central shaft, an upper honeycomb, at least a honeycomb (lower or middle honeycomb), a plurality of ribs, a plurality of stretchers, and a canopy. The automatic folding and unfolding device of the present invention can be installed on the hand-operated umbrella. When the canopy is unfolded, the retaining hook of the retaining hook set can be positioned at the bottom edge of the honeycomb or in the retaining groove formed in the honeycomb. When the canopy is folded, the positioning groove of the honeycomb can be locked and positioned by the hook part of the snap catch. Thereby, the function of automatically folding and unfolding the canopy can be achieved. Moreover, the honeycomb can have a match weight itself or be licked with a match weight. One side of the honeycomb can be varied to have a predetermined number of raised lugs annularly installed, each lug being pivotally joined with one end of one of the stretchers. An outer thread can be formed at one side of the honeycomb to be screwed with a match weight tube having an inner thread so that a match weight tube of more proper weight can be selected. A straight handle or a crooked

handle can be added at the bottom end of the central shaft to facilitate manual holding. Additionally, a tie belt can be added on the canopy to close the canopy so as to prevent the canopy from unfolding when the upper honeycomb is held down. The cross section of the central shaft and the cross sections of the positions of the upper honeycomb and the honeycomb joined with the central shaft can have the same polygon-shaped profile to prevent the stretchers from being damaged when the canopy is twisted by an external force. The match weight can also be applied to a retractable umbrella.

[0022] To sum up, the present invention proposes an automatic folding and unfolding device of an umbrella, wherein a simple four-link mechanism is exploited for the ribs and the stretchers. Through the up or down orientation of an upper honeycomb and matched with a match weight of a lower honeycomb, the object of automatically folding and unfolding a canopy can be achieved by controlling a retaining hook of a retaining hook set through a snap catch.

[0023] Although the present invention has been described with reference to the preferred embodiments thereof, it will be understood that the invention is not limited to the details thereof. Various substitutions and modifications have been suggested in the foregoing description, and others will occur to those of ordinary skill in the art. Therefore, all such substitutions and modifications are intended to be embraced within the scope of the invention as defined in the appended claims.

Claims

1. An automatic folding and unfolding device installed on an umbrella comprising a central shaft, an upper honeycomb, at least a honeycomb, a plurality of ribs, a plurality of stretchers, and a canopy, said automatic folding and unfolding device comprising:

at least a retaining hook set fixed at the upper part of said central shaft, said retaining hook set comprising a positioning seat, a retaining hook, two resilient elements, and a positioning post, said positioning seat having a gap at the lower part of one side thereof and a post groove at the upper part of the other side thereof, one end of said retaining hook being pivotally installed in said gap via a pin, and a spring seat hole being formed at the inner side of the other end thereof, said two resilient elements being respectively installed in said post groove and said spring seat hole, part of said positioning post being placed in said post groove; a snap catch fixed at the lower part of said central shaft, said snap catch having a wedge part, a raised hook part, and a raised press part; a top hook rod installed in said central shaft, a push post being installed at the top of said top

hook rod, a resilient element being telescoped on said push post, a straight groove hole being formed at the lower part of said top hook rod so that said snap catch can move therein, said straight groove hole being penetrated through by a fixing pin; and a match weight installed on at least one said honeycomb;

whereby when said press part is pressed, said wedge part will push said fixing pin to lift said top hook rod so as to let said push post push said retaining hook into said central shaft.

2. The automatic folding and unfolding device as claimed in claim 1, wherein said honeycomb is a lower honeycomb.
3. The automatic folding and unfolding device as claimed in claim 1, wherein said honeycomb is a lower honeycomb, a spring seat being installed at the upper part of said honeycomb to bear one end of a spring, a middle honeycomb being installed at the other end of said spring, said stretchers being pivotally installed on said middle honeycomb, said sub-stretchers being pivotally installed between predetermined positions of said stretchers and said lower honeycomb.
4. The automatic folding and unfolding device as claimed in claim 1, wherein said central shaft has a positioning hole and a through groove added at predetermined positions thereof, a guide post and another push post being installed at predetermined positions of said top hook rod, a guide groove being formed at each of two outer sides of a positioning seat of another retaining hook set so that the bottom edge of said honeycomb can be positioned by said another retaining hook set when said canopy is not completely unfolded.
5. The automatic folding and unfolding device as claimed in claim 1, wherein said honeycomb and said match weight are integrally formed.
6. The automatic folding and unfolding device as claimed in claim 1, wherein the profiles of the cross sections of said central shaft along with the positions of said upper honeycomb and said honeycomb joined with said central shaft can be of the same polygon shape.
7. The automatic folding and unfolding device as claimed in claim 1, wherein a handle is installed at the bottom end of said central shaft, and a groove is formed at the upper part of said handle so that part of said match weight can move therein.

8. The automatic folding and unfolding device as claimed in claim 1, wherein a tie belt is installed on said canopy to close and fix said canopy.

9. The automatic folding and unfolding device as claimed in claim 1, wherein a fixing pin is transversally installed at a predetermined position of said central shaft so that said top hook rod will not prolapse from said central shaft.

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10. The automatic folding and unfolding device as claimed in claim 1, wherein a bottom rod is installed at the bottom of said central shaft so that said top hook rod will not prolapse from said central shaft.

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11. The automatic folding and unfolding device as claimed in claim 1, wherein a gap is formed at one side of said match weight to be penetrated through by said press part of said snap catch.

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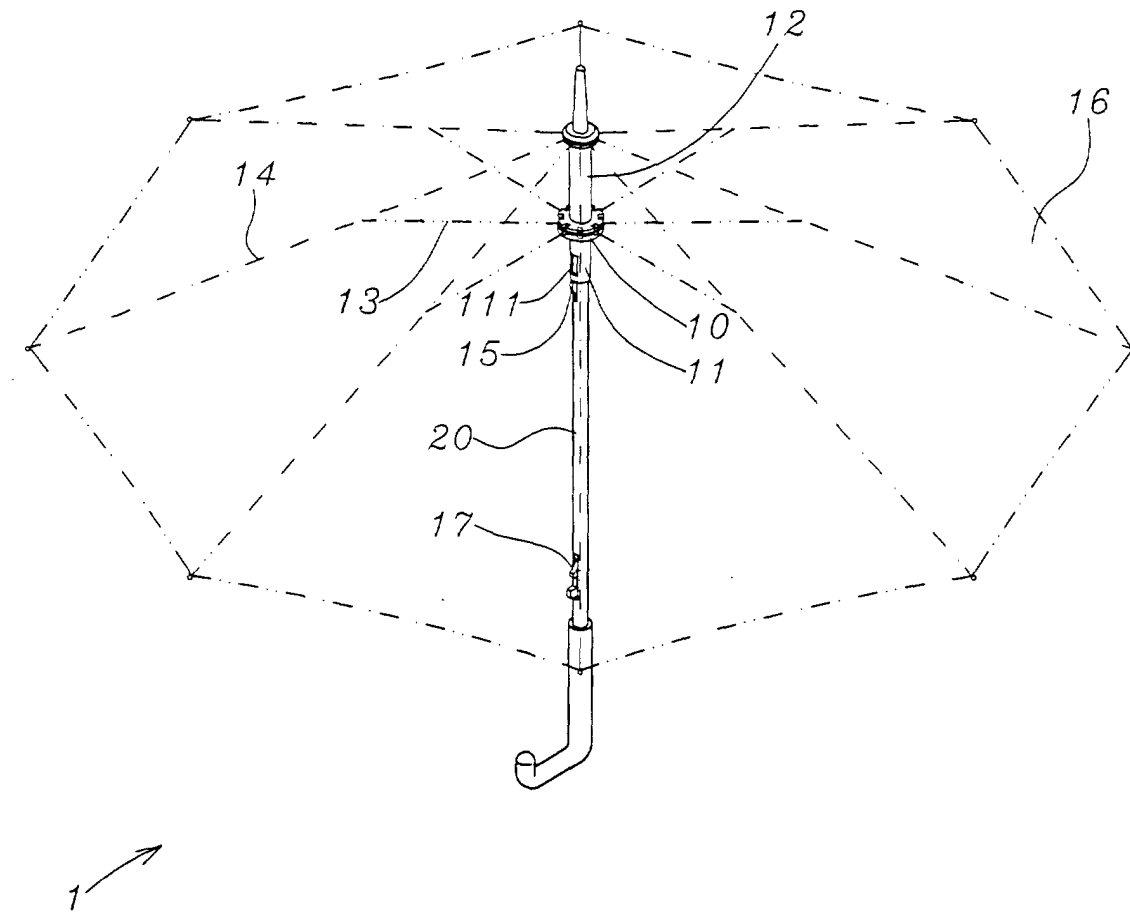


FIG.1

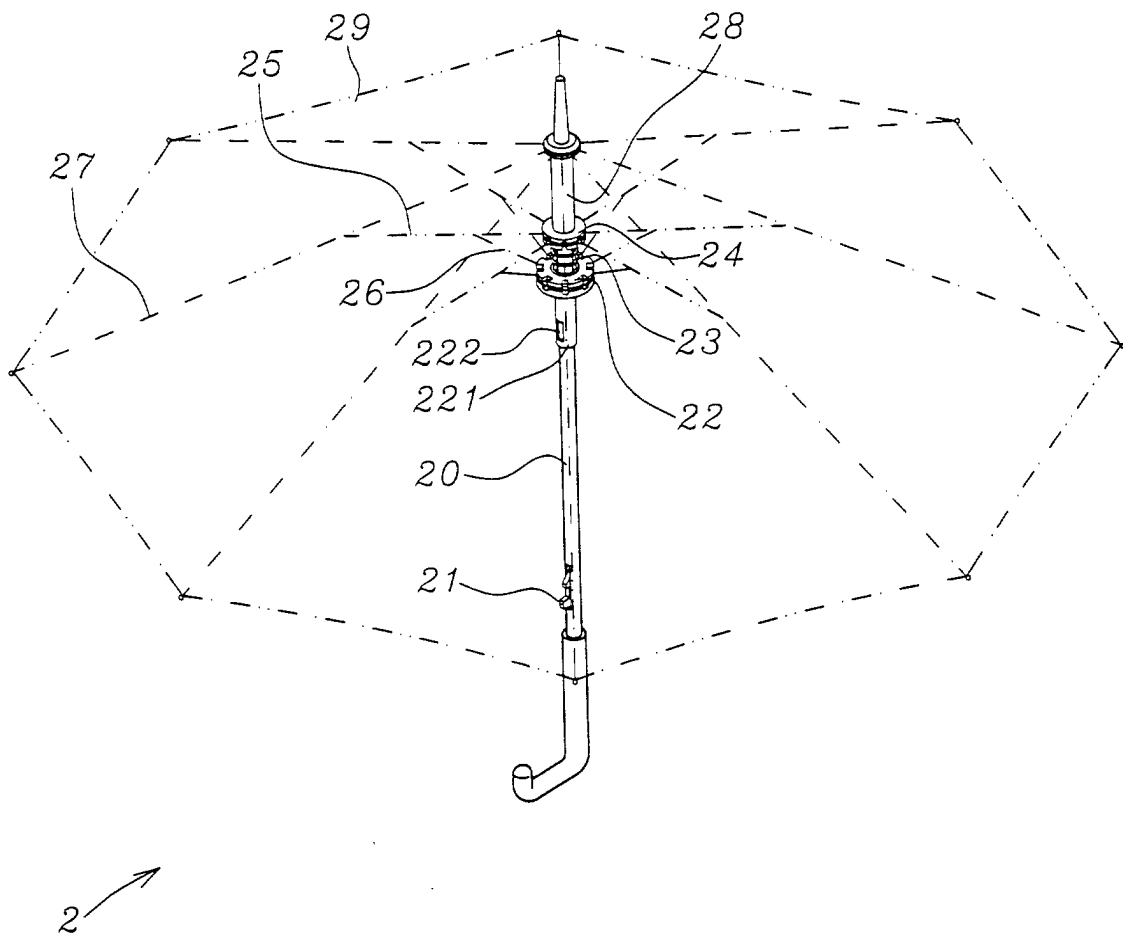


FIG.2

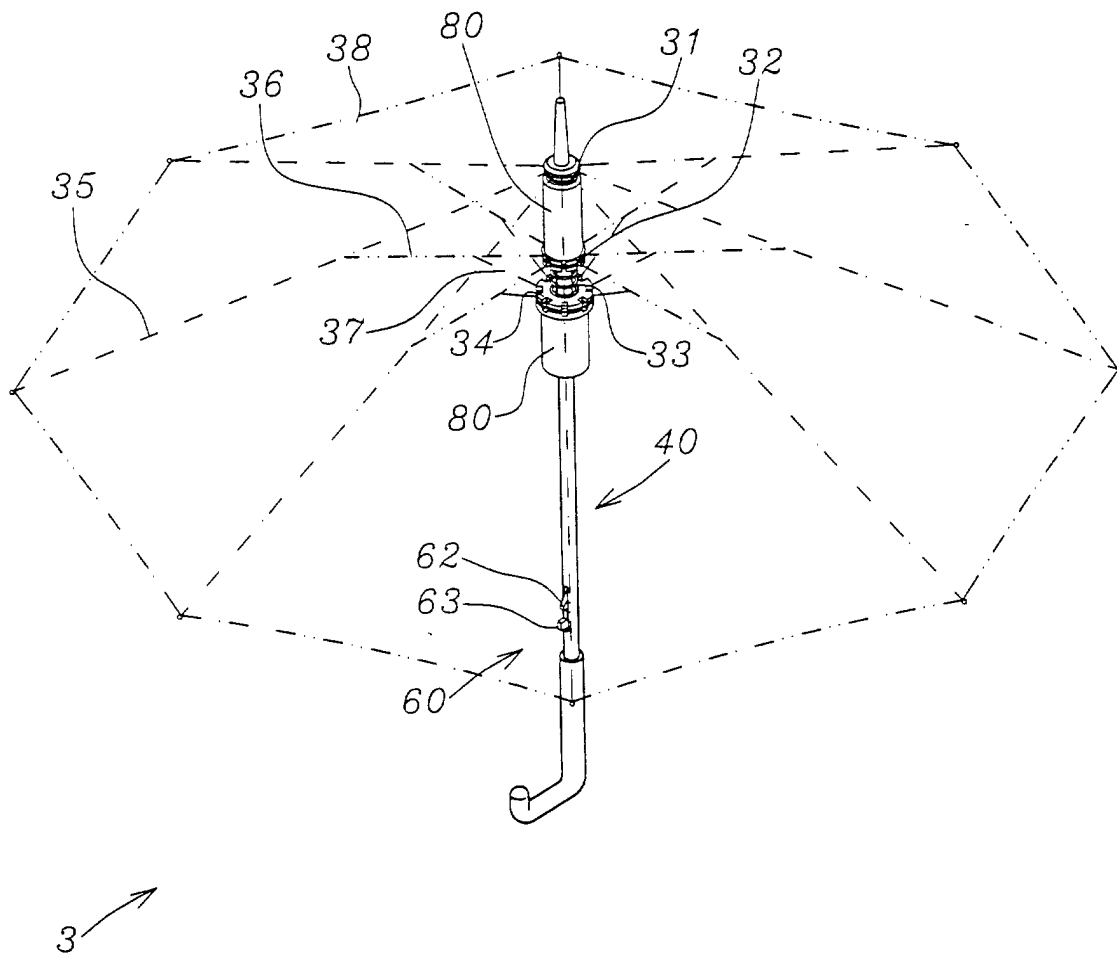
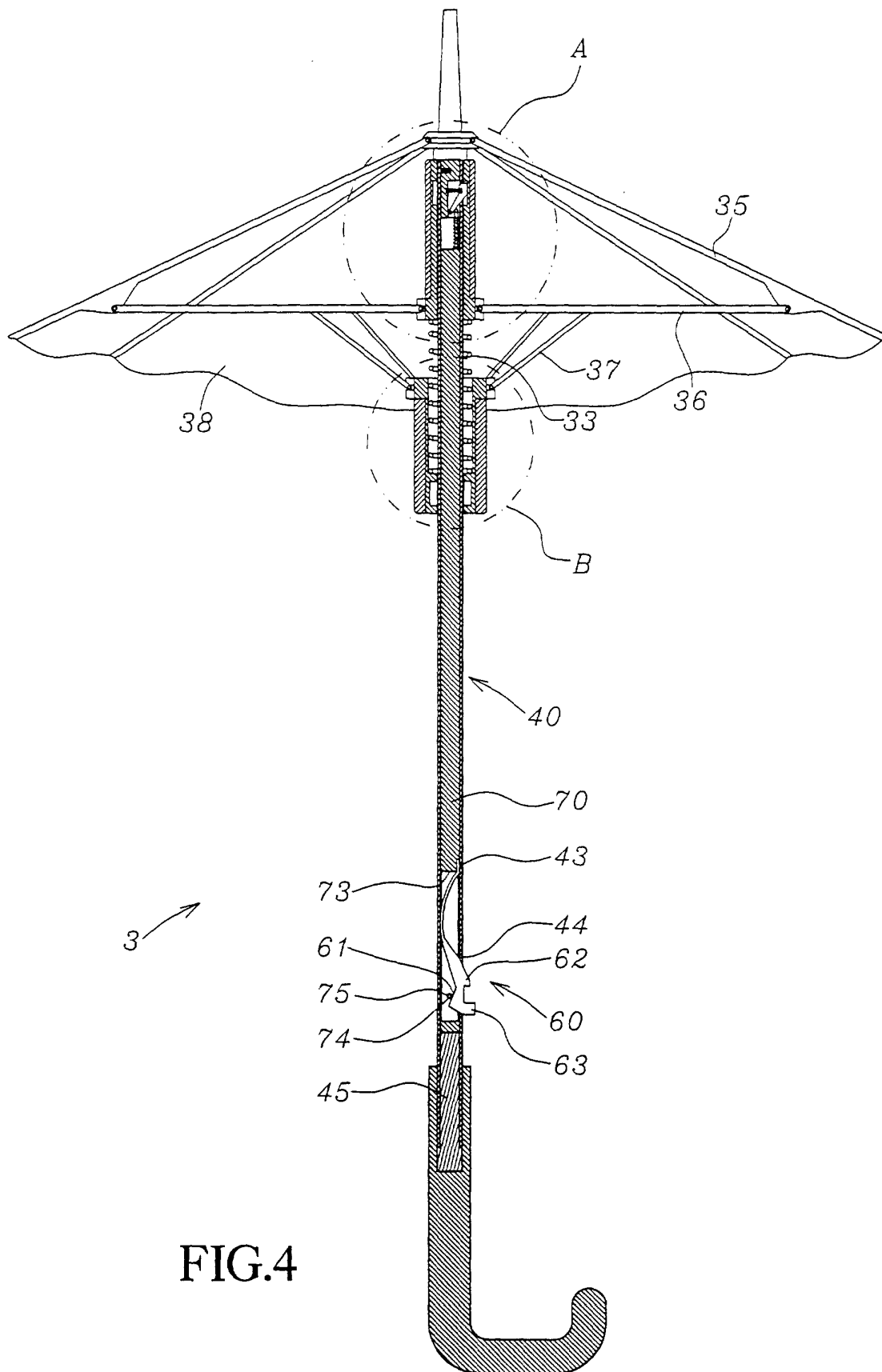


FIG.3



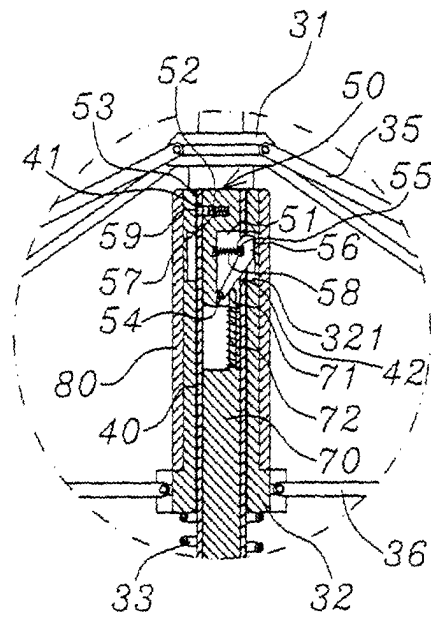


FIG. 4A

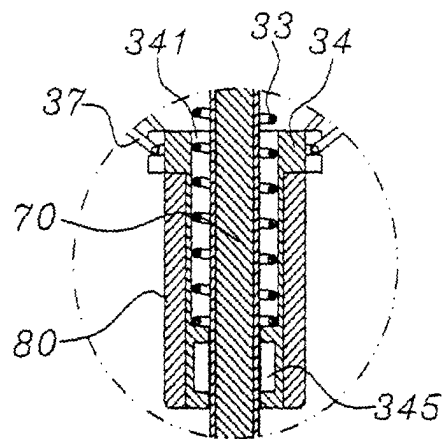
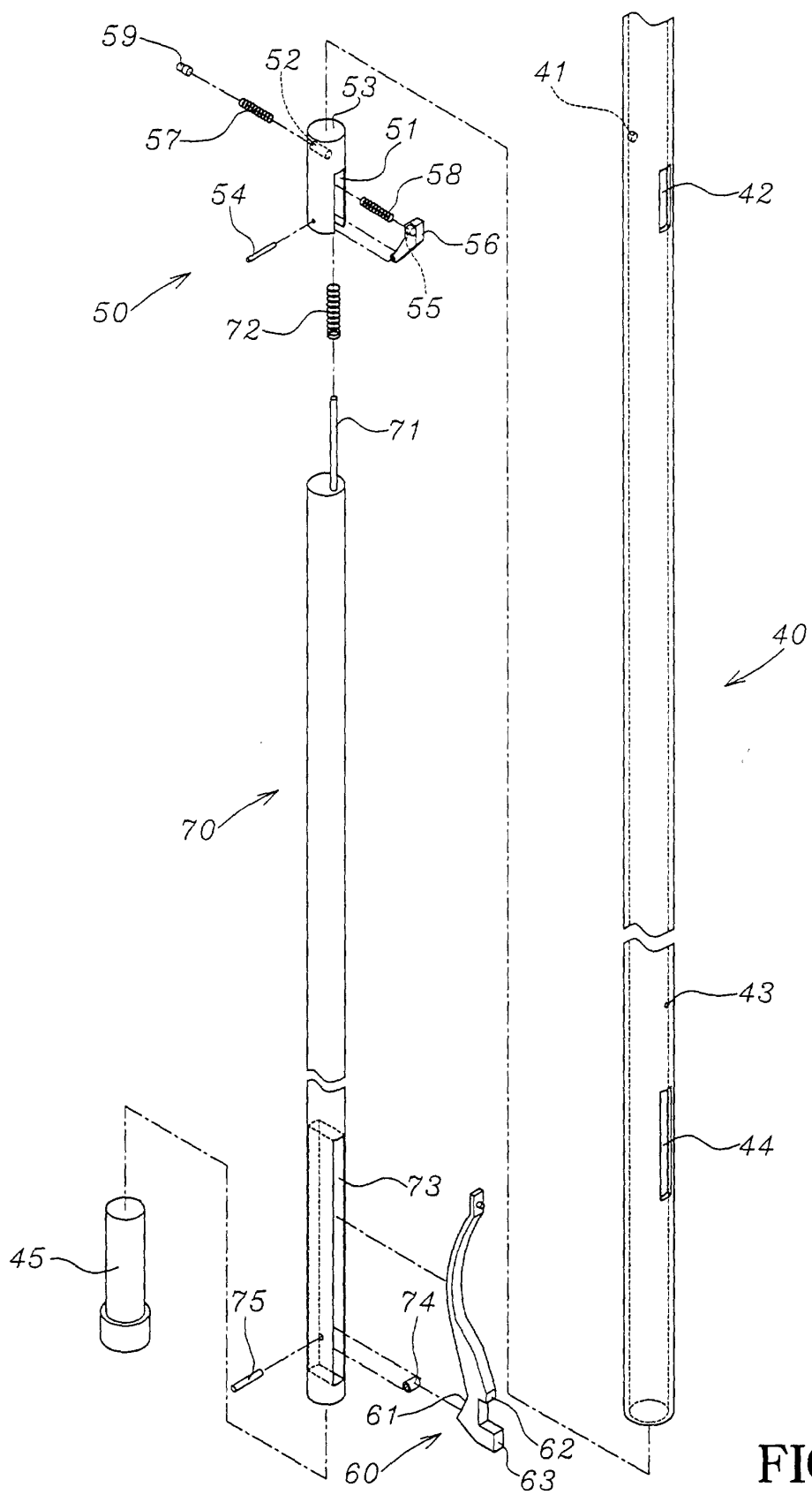


FIG. 4B



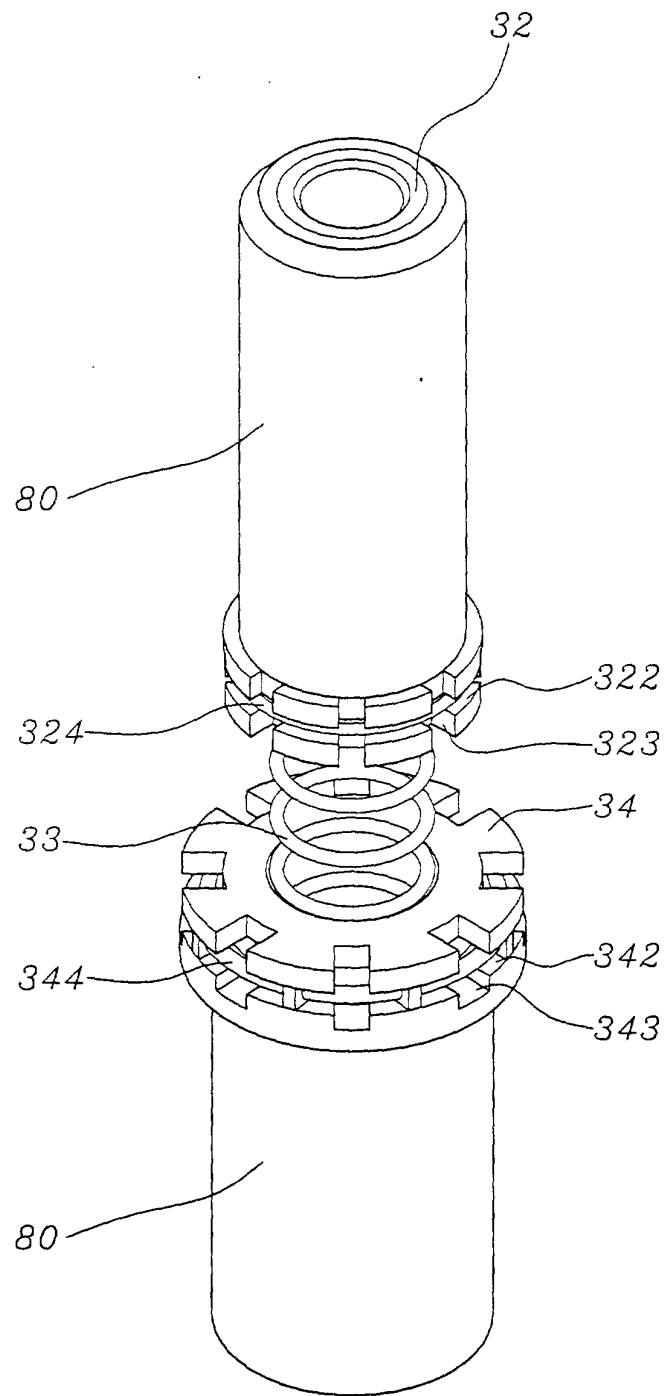


FIG.6

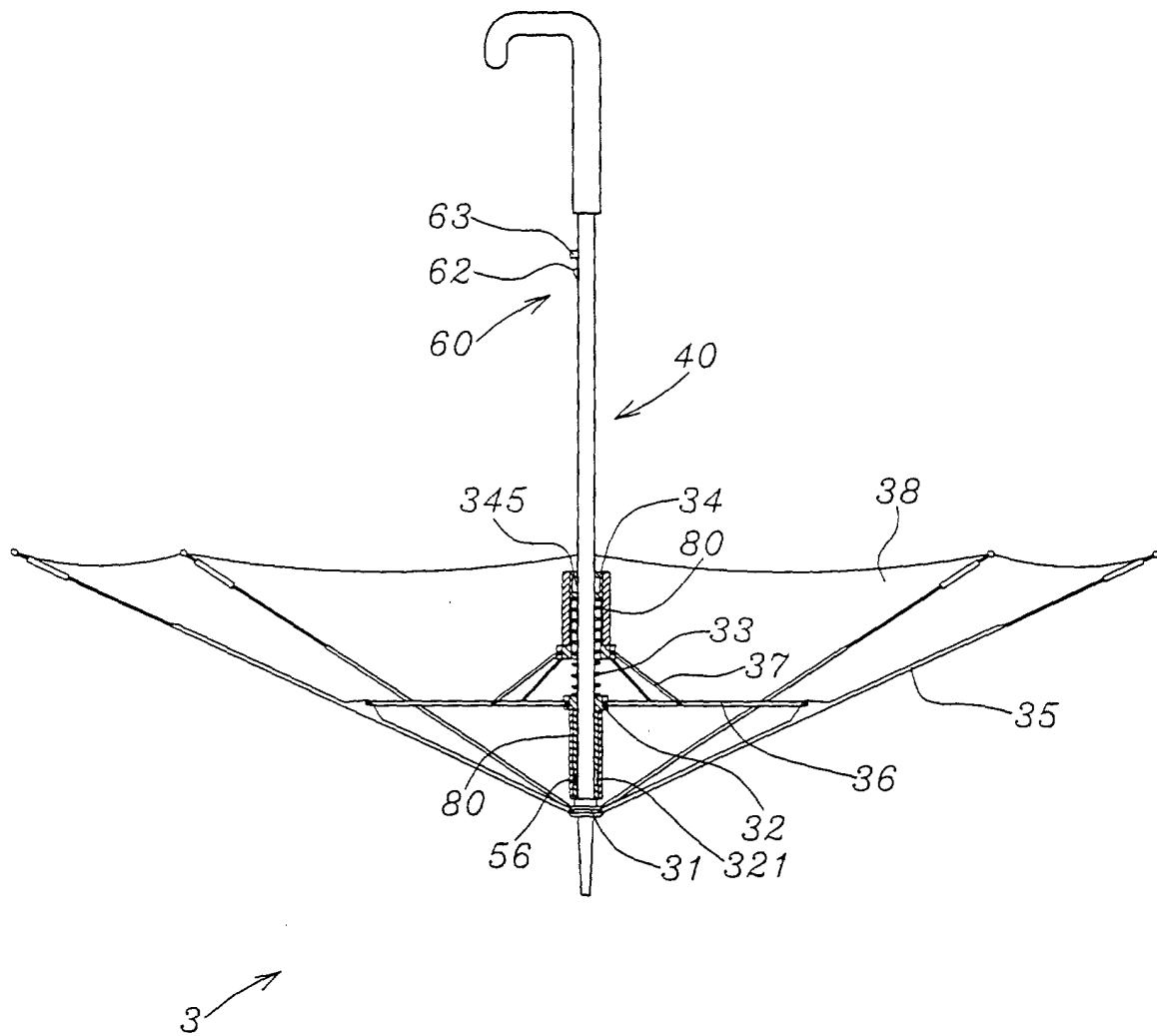


FIG.7

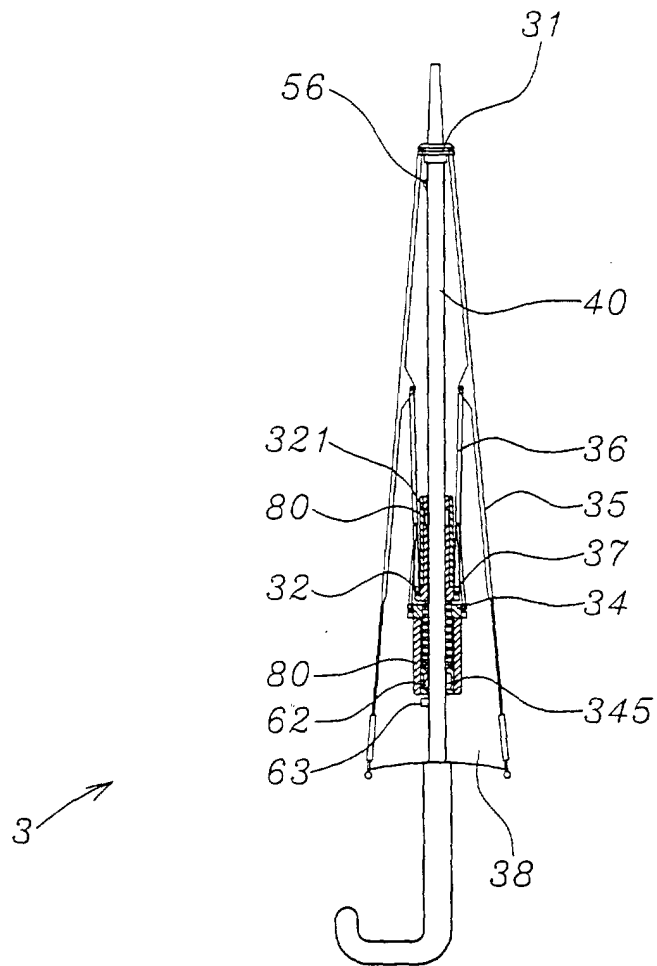


FIG.8

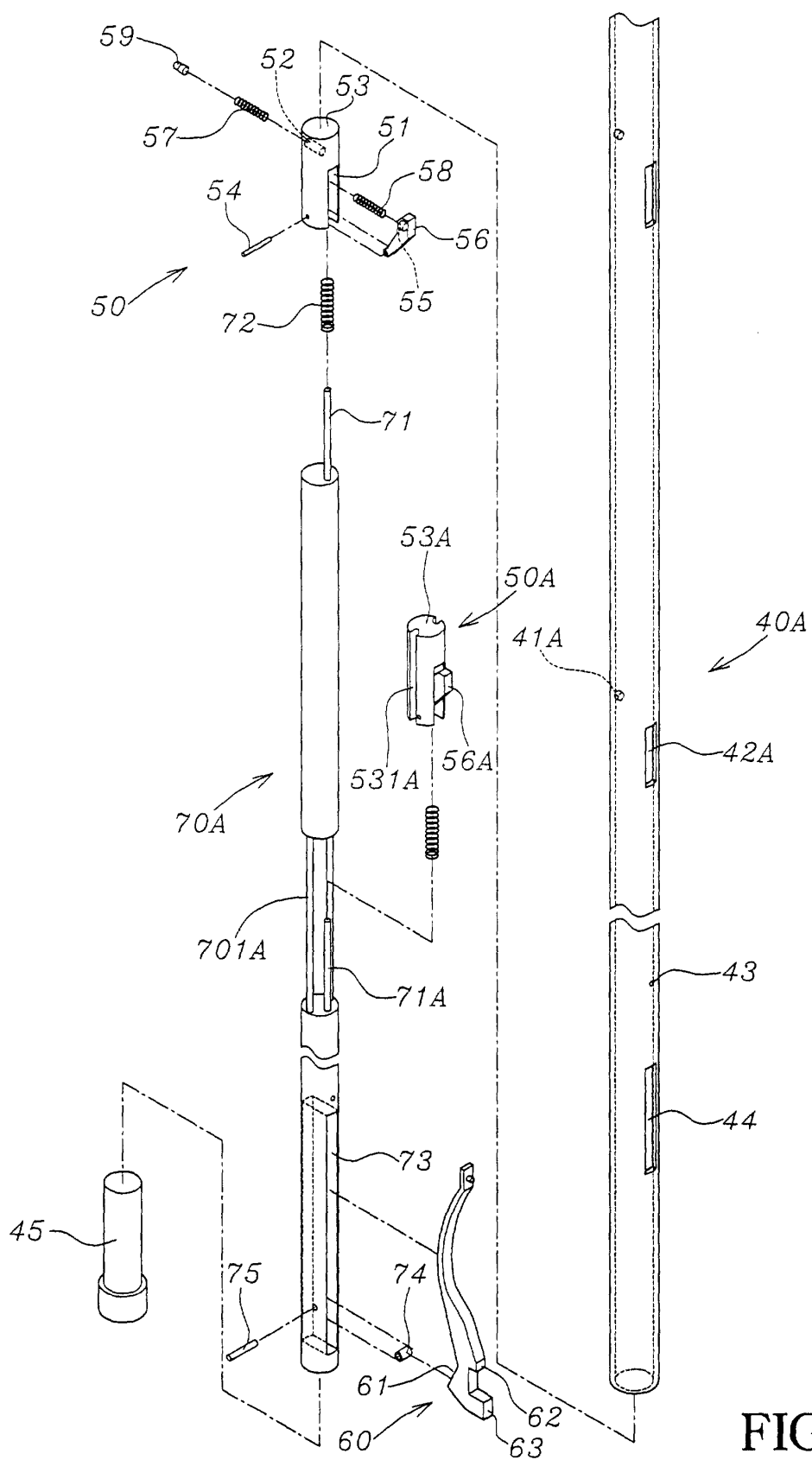


FIG.9

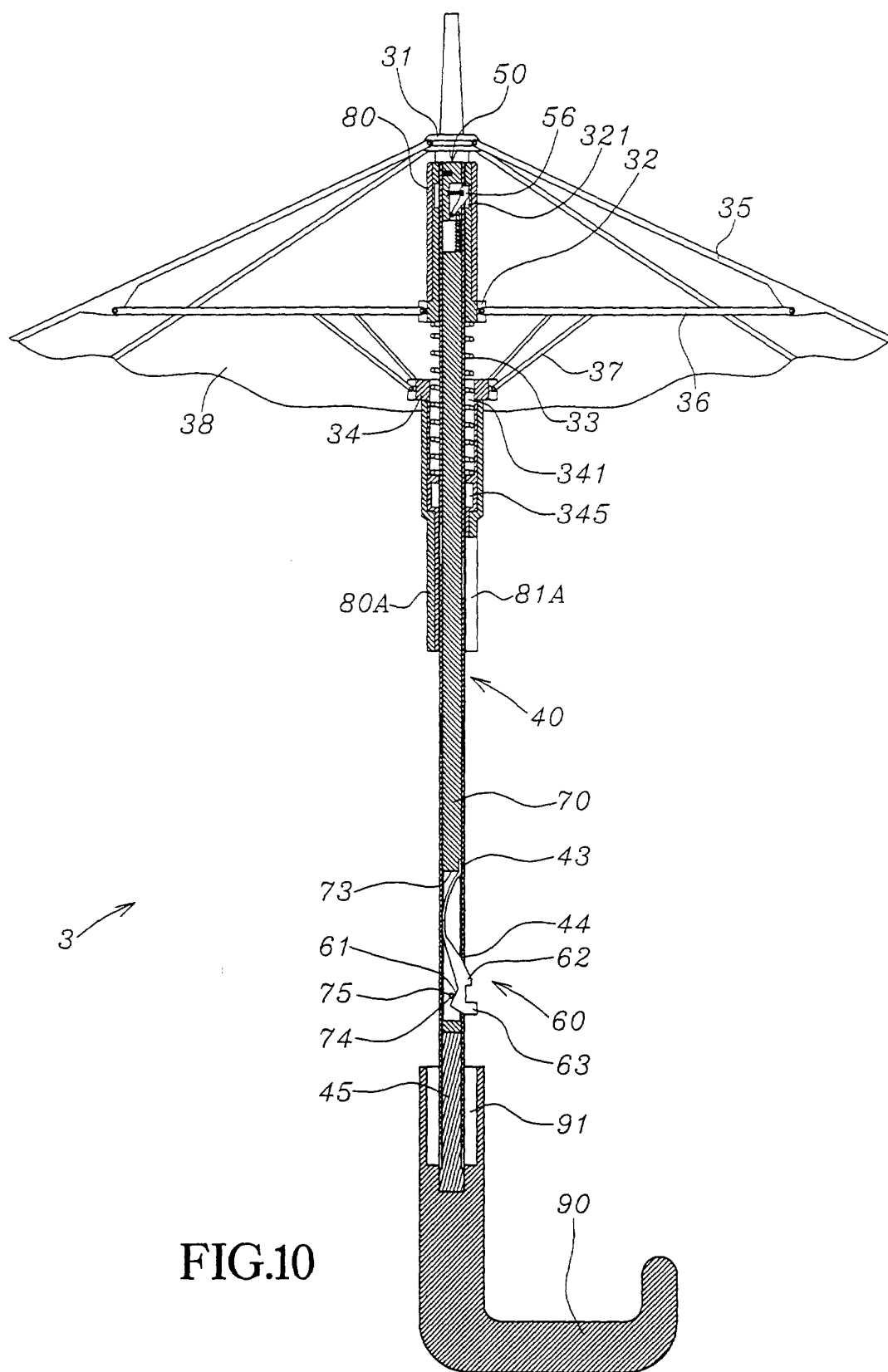


FIG.10



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 11 8004

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.CI.7)
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Place of search		Date of completion of the search	Examiner
THE HAGUE		22 February 2001	Amaro, H
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			

EPO FORM 1503 03/82 (P04C01)

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

EP 00 11 8004

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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