

[54] **AUTOMATICALLY OPENABLE AND CLOSABLE UMBRELLA**

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 [22] Filed: **July 30, 1970**
 [21] Appl. No.: **59,389**

[30] **Foreign Application Priority Data**

Aug. 6, 1969	Japan.....	44/62113
Aug. 6, 1969	Japan.....	44/74615
Aug. 6, 1969	Japan.....	44/62114
Jan. 29, 1970	Japan.....	45/7915

[52] U.S. Cl. **135/22, 135/24**
 [51] Int. Cl. **A45b 25/16**
 [58] Field of Search **135/20-31**

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Primary Examiner—J. Karl Bell
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[57] **ABSTRACT**

An easily and smoothly automatically openable and closable umbrella is obtained from the arrangement comprising a tubular shaft having an outer tubular shaft member slidably housing the rein an upper, an intermediate and a lower independent inner tubular shaft member, a first ring fixed to the upper shaft member for carrying ribs, an umbrella-opening compressible first spring means mounted on a core rod and provided between the intermediate and the lower shaft members in said shaft, an umbrella closing compressible spring means provided between said rib and said fixed ring at a spaced relation from the rib, a second ring fixed to the top of the outer shaft member and positioned below said first fixed ring and serving to support rib-supporting extensible rods, a third ring below said second ring to carry rods for supporting said extensible rods, a fourth ring for carrying spokes which support the ribs, an umbrella-opening compressible second spring means mounted on said shaft for urging the upper and intermediate members away, umbrella-opening latch means capable of engaging both the outer shaft member and the fourth ring, and umbrella-closing latch means provided in the lower shaft member.

5 Claims, 32 Drawing Figures

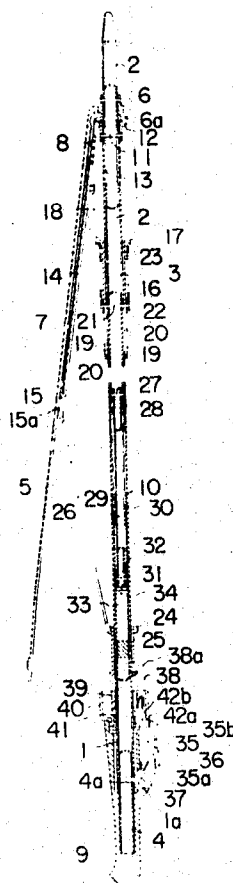


FIG. 1

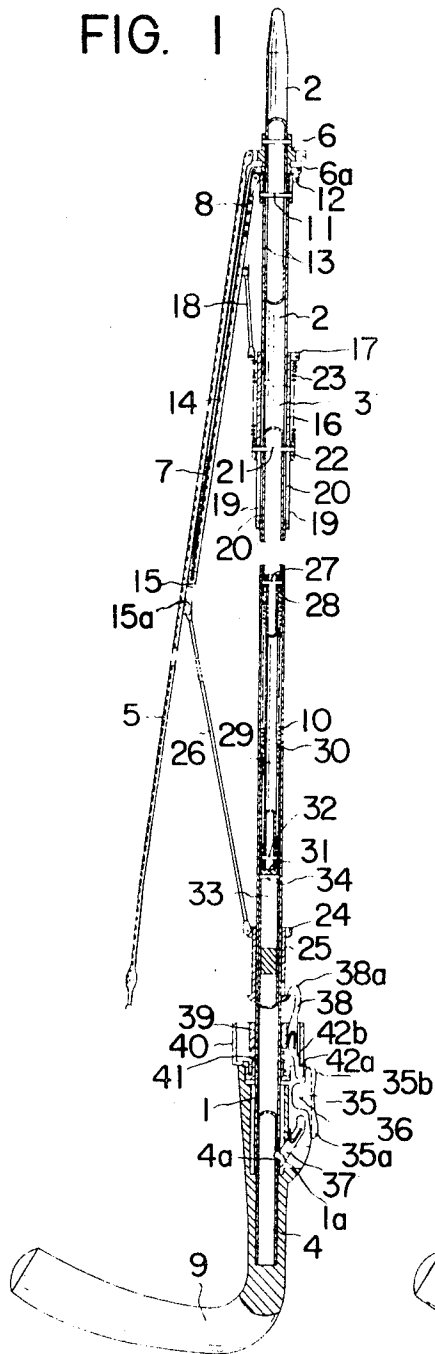
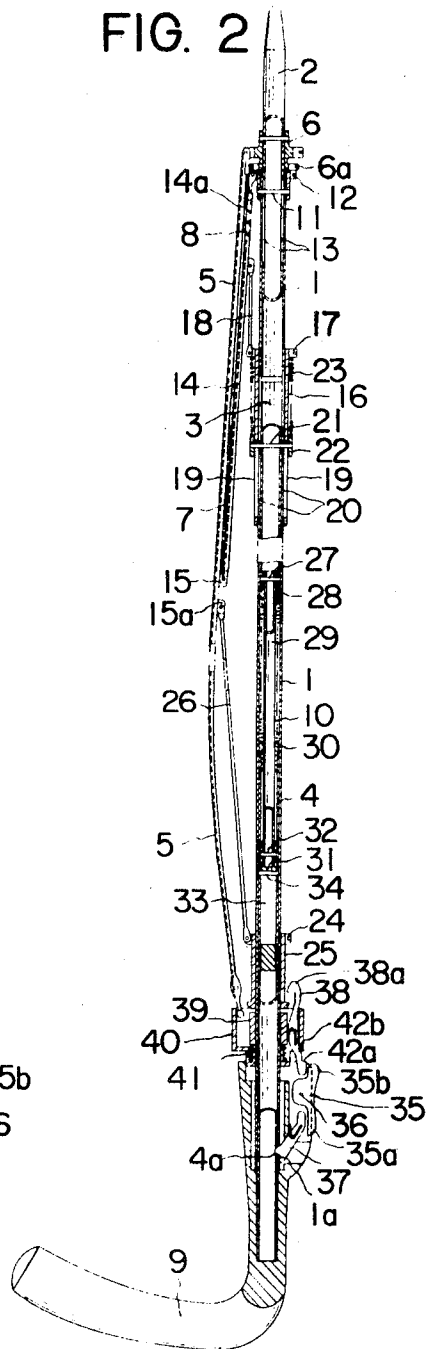


FIG. 2

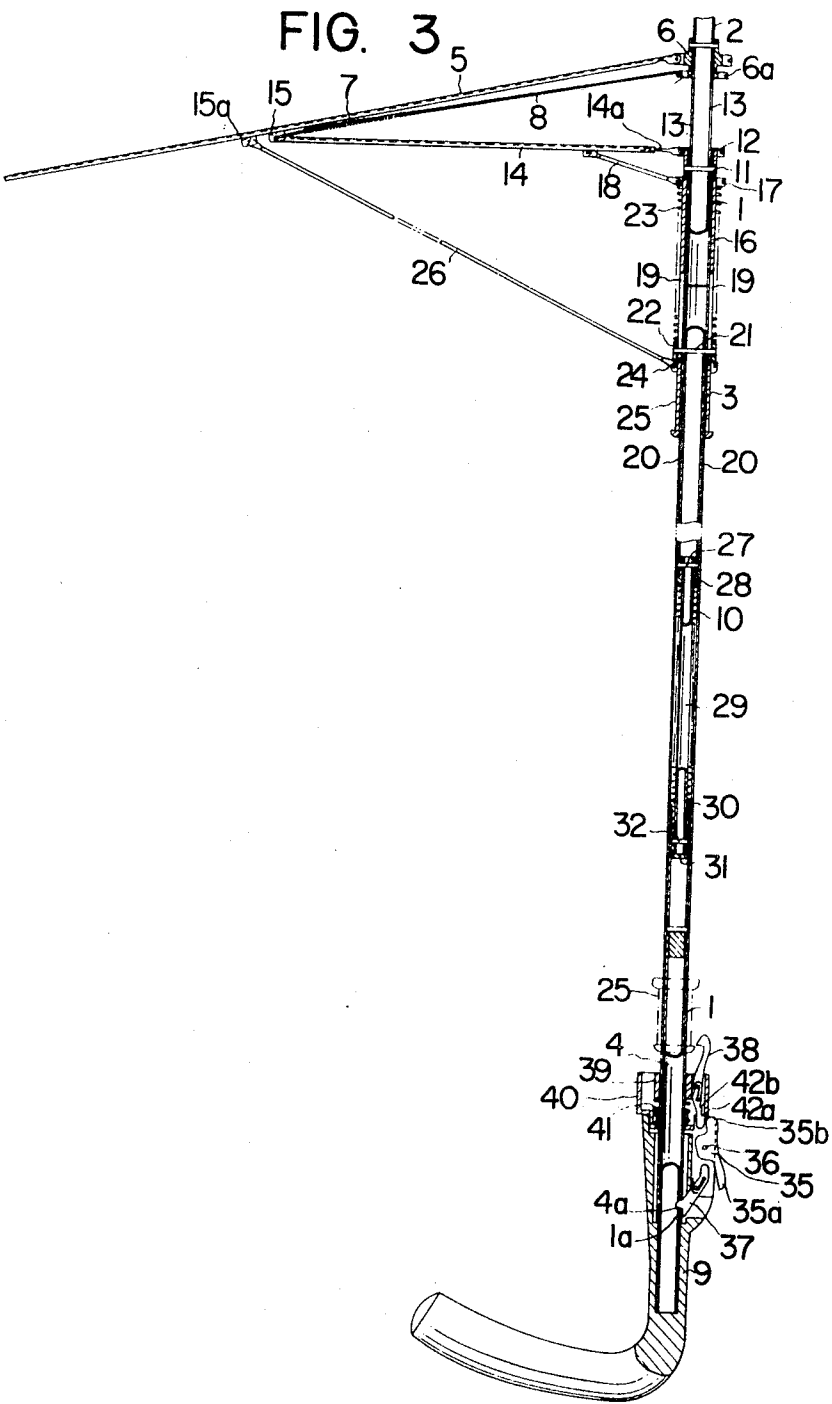


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FIG. 4

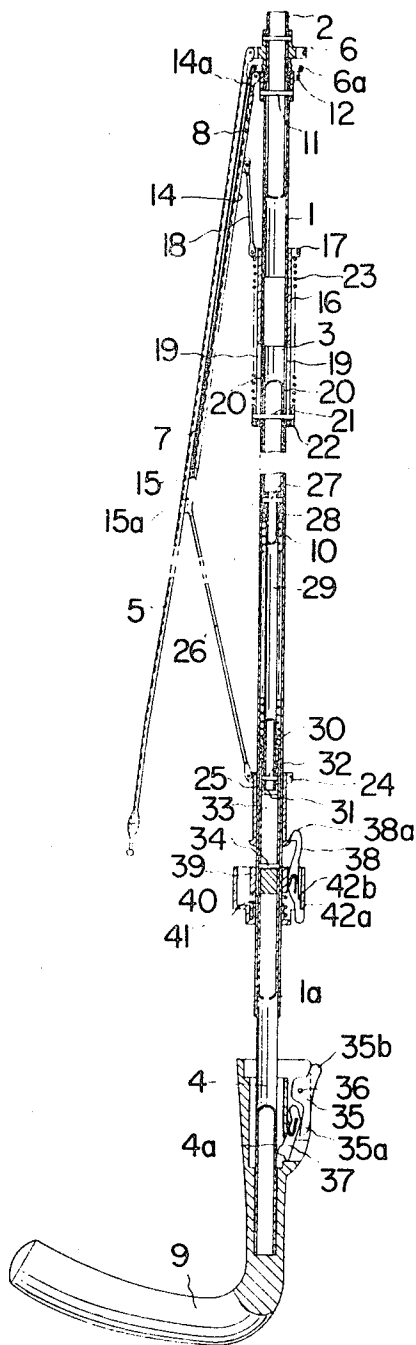
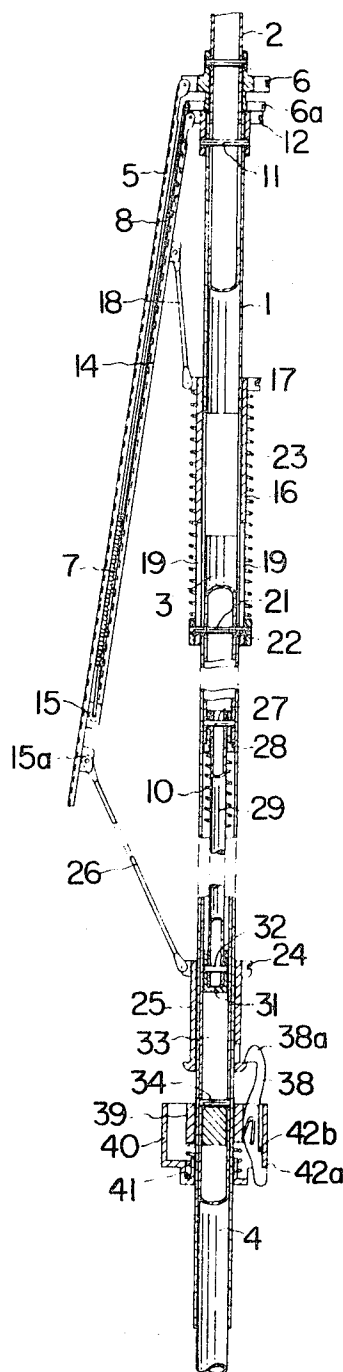


FIG. 8



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FIG. 6

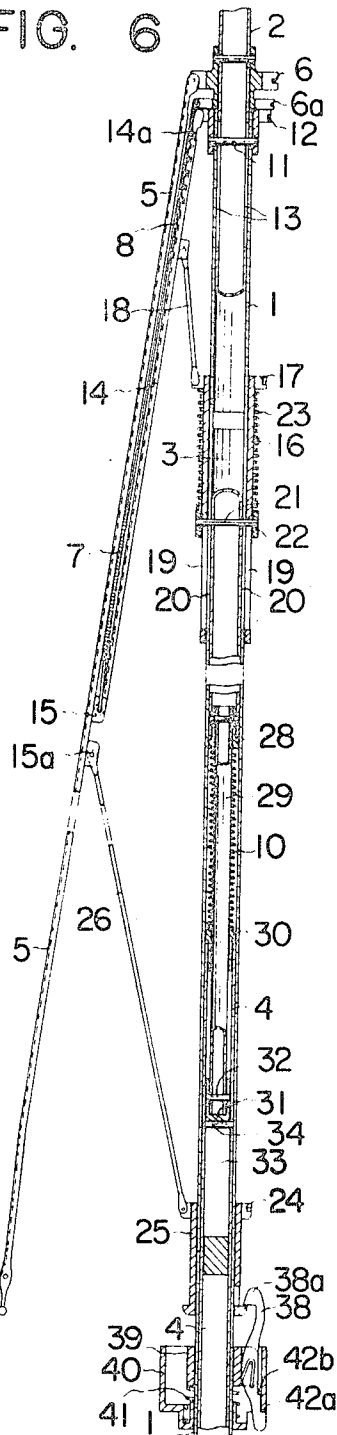
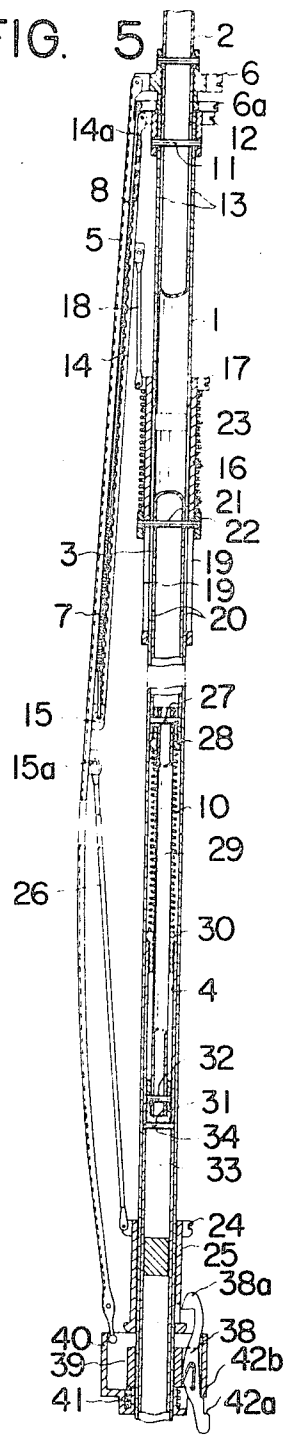


FIG. 5



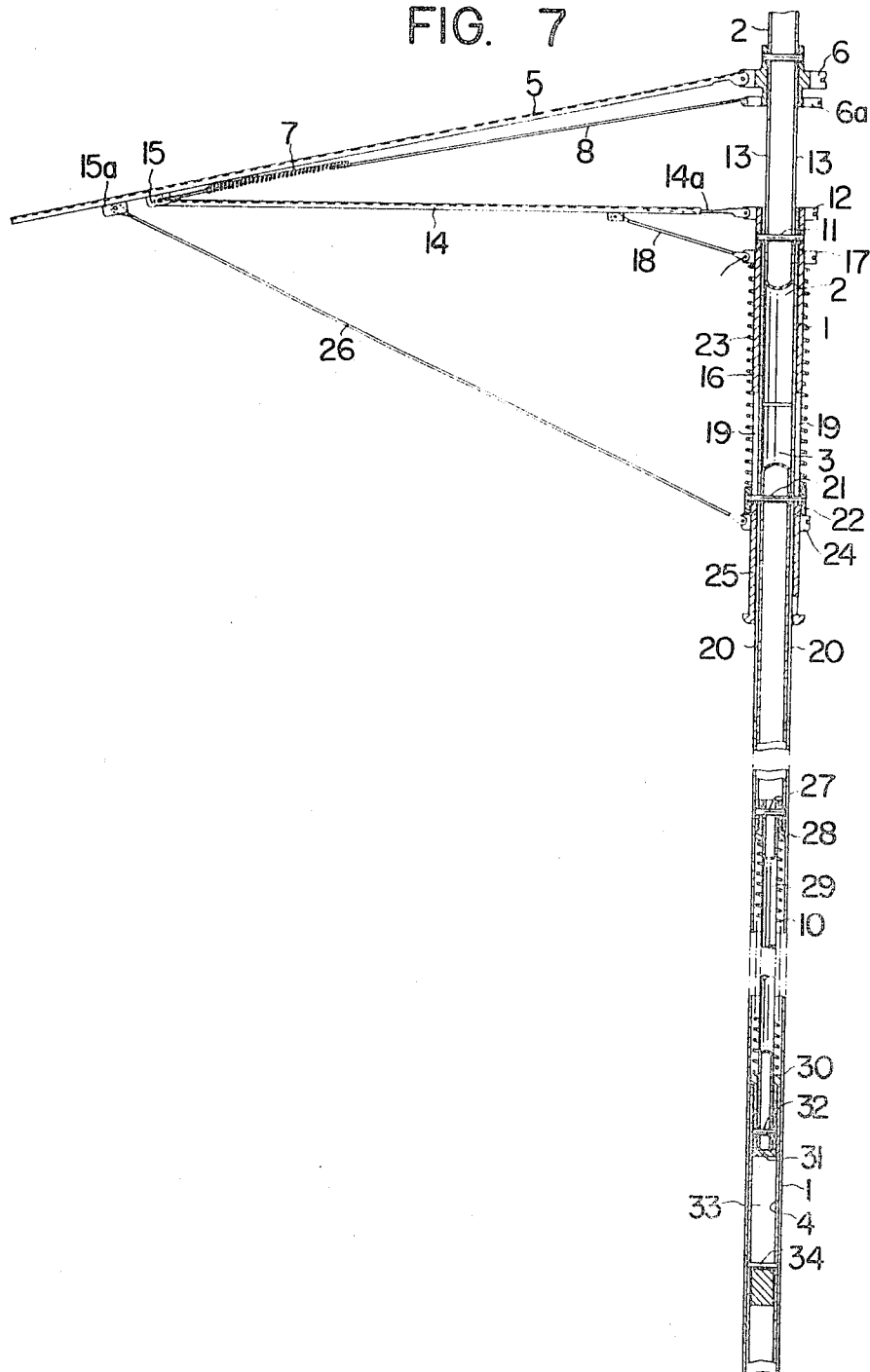
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FIG. 7



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FIG. 9

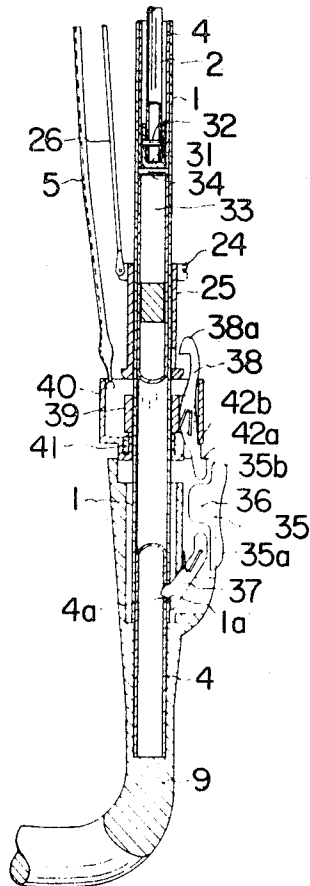
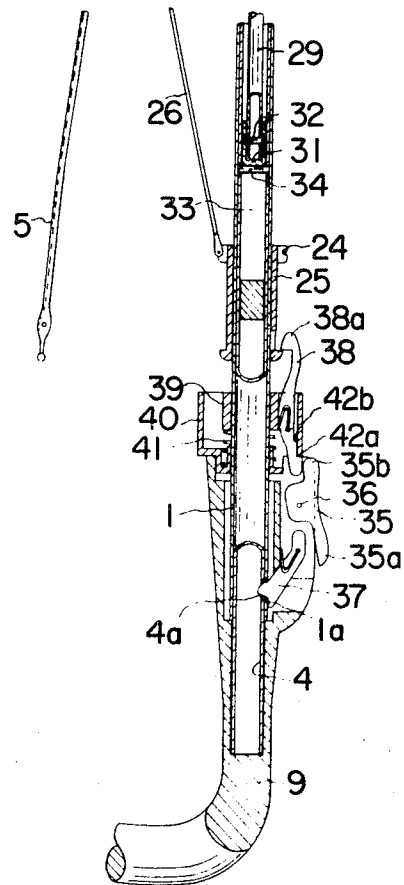


FIG. 10



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FIG. 11

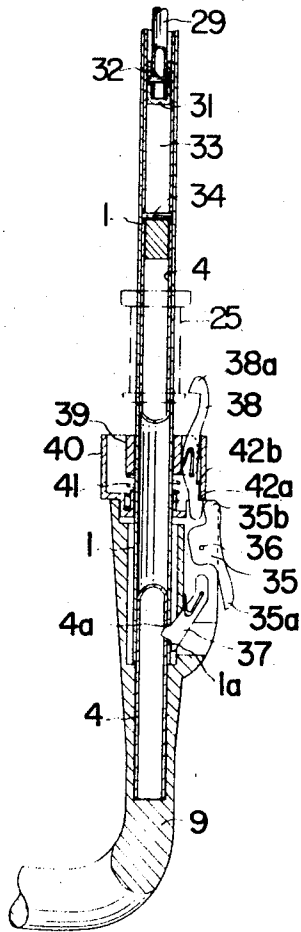
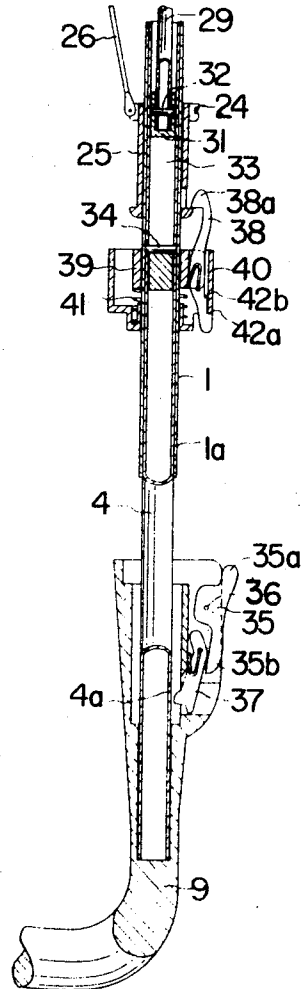


FIG. 12



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FIG. 19



FIG. 16



FIG. 17



FIG. 20



FIG. 18

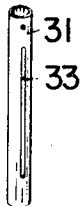


FIG. 13

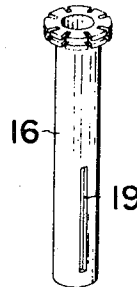
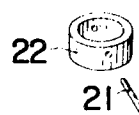


FIG. 14



FIG. 15



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FIG. 22

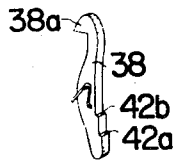


FIG. 21

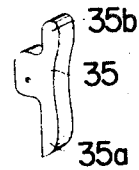


FIG. 23



FIG. 24

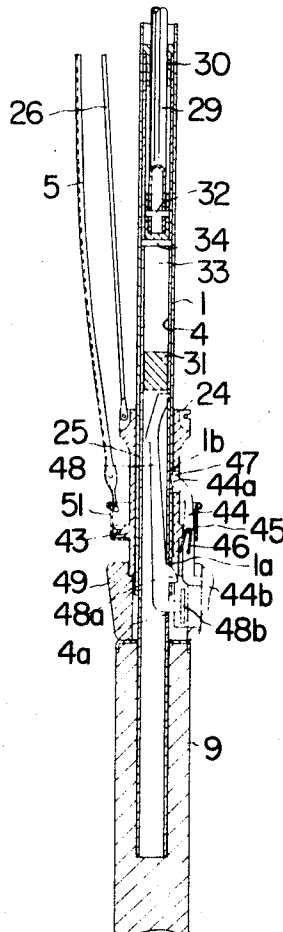
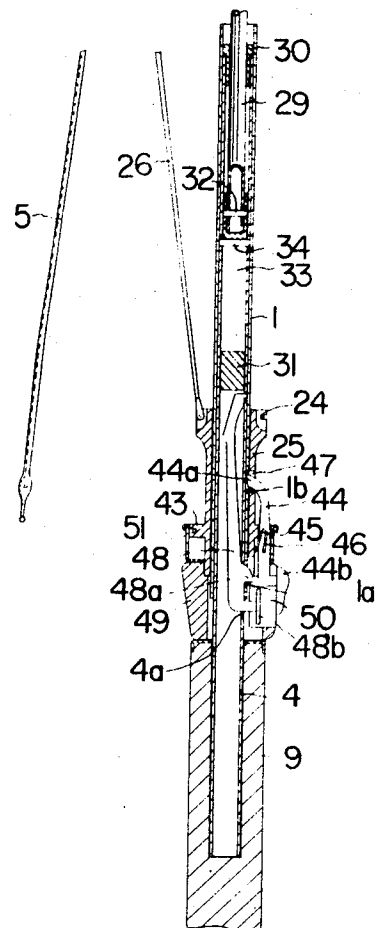


FIG. 25

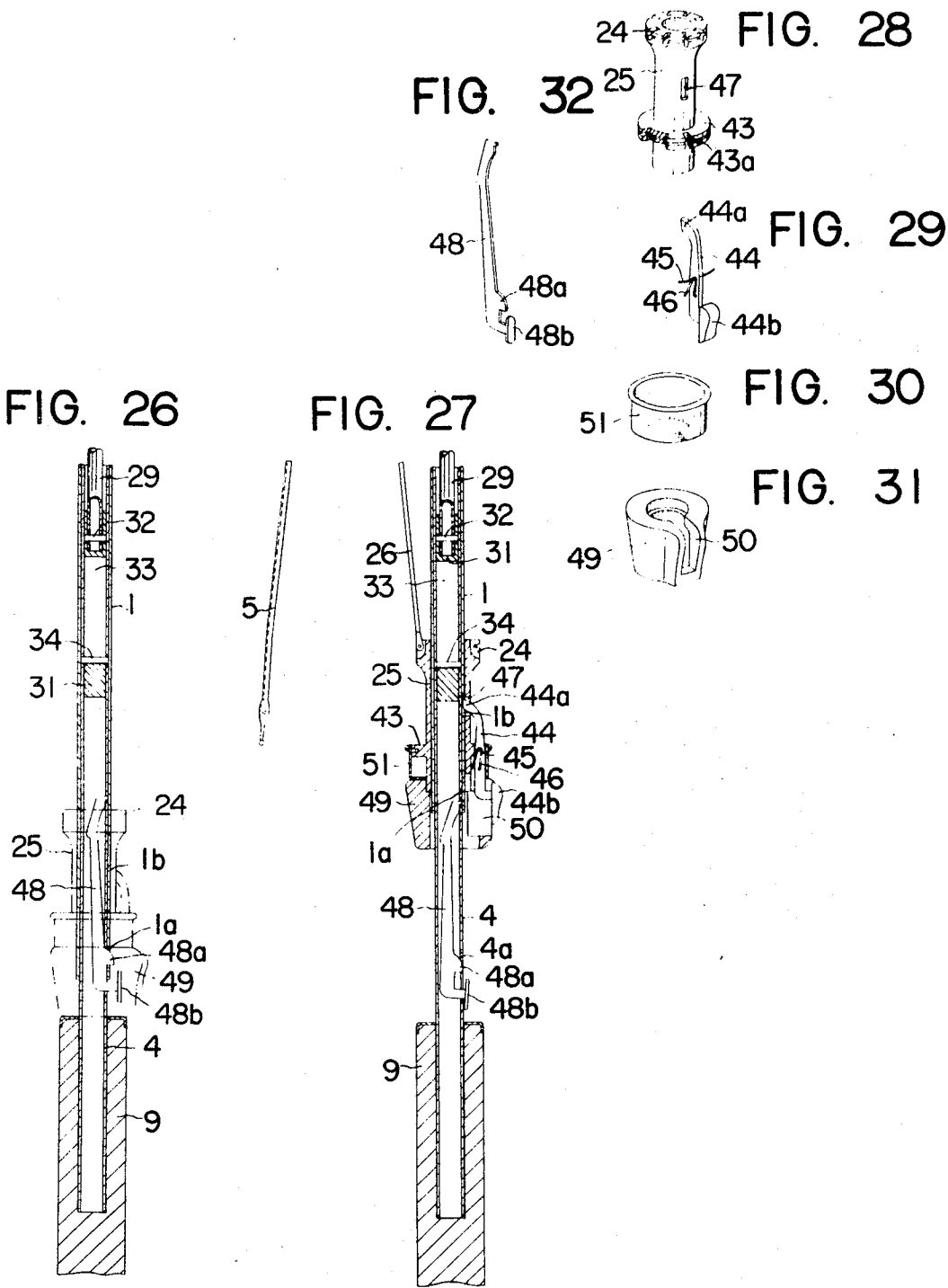


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AUTOMATICALLY OPENABLE AND CLOSABLE UMBRELLA

The present invention is concerned with an umbrella and more particularly it relates to an umbrella which permits the user to perform automatic smooth opening and closing of the umbrella by the mere depression of a depressable button. Still more particularly, the present invention relates to an umbrella comprising a tubular shaft having, in combination, a tubular outer shaft member slidably housing therein an upper, an intermediate and a lower tubular shaft member; a compressible first coil spring provided in a compressed state between the intermediate and the lower shaft members within the outer shaft member; and a compressible second coil spring mounted on a sleeve member of a third ring mounted on the outer shaft member, said umbrella being operative so that these two coil springs are allowed to extend while mutually associating with each other to thrust the upper shaft member through the upper end of the outer shaft member and to thereby spread the ribs pivoted to the first ring secured to the upper shaft member, thus automatically opening the umbrella and concurrently extending the umbrella-closing compressible coil spring coupled to each rib and, at space relation therefrom, to the fixed first ring resulting in the accumulation of its restoring force, said umbrella further being operative so that, by releasing the outer shaft member of its engagement with the lower shaft member to allow said outer shaft member to move upwardly, the upper shaft member is progressively received into the outer shaft member as mutual relative movements to thereby automatically close the umbrella. This improved umbrella features that the compressible first coil spring housed within the outer shaft member is mounted on a guide core rod and that the expansion of this coil spring is restricted by the tubular stopper member located at the lower end of the guide core rod and further that the automatic opening and closing of the umbrella is performed very easily and smoothly by the manipulation of either the double-acting depressable button or the push button provided on the lower end portion of the lower shaft member.

The drawings show a couple of preferred embodiments of the automatically openable and closable umbrella of the present invention by way of example, in which:

FIG. 1 is a side elevation, partly in section, of the umbrella frame of the present invention, showing the positional relationship between the tubular outer shaft member and the three inner tubular shaft members of a shaft when the umbrella is closed and the ribs are gathered and the beads formed at the free ends of the ribs are engaged inside the open top of the bead-anchoring ring;

FIG. 2 is a side elevation, partly in section, of the same umbrella frame, showing the state in which the bead-anchoring ring is pushed downwardly and the ribs are released;

FIG. 3 is a side elevation, partly in section, of the same umbrella frame, showing the state in which it is opened;

FIG. 4 is a side elevation, partly in section, of the same umbrella frame, showing the state in which the umbrella is automatically closed as a result of releasing the outer shaft member with respect to the inner lower shaft member;

FIG. 5 is a larger scale side elevation, partly in section, of the upper portion of the shaft of the same umbrella frame shown in FIG. 1;

FIG. 6 is a larger scale side elevation, partly in section, of the upper portion of the shaft of the same umbrella frame shown in FIG. 2;

FIG. 7 is a larger scale side elevation, partly in section, of the upper portion of the shaft of the same umbrella frame shown in FIG. 3;

FIG. 8 is a larger scale side elevation, partly in section, of the upper portion of the shaft of the same umbrella frame shown in FIG. 4;

FIG. 9 is a larger scale side elevation, partly in section, of the bead-anchoring portion shown in FIG. 1;

FIG. 10 is a larger scale side elevation, partly in section, of the bead-anchoring portion shown in FIG. 2;

FIG. 11 is a larger scale side elevation, partly in section, of the bead-anchoring portion shown in FIG. 3;

FIG. 12 is a larger scale side elevation, partly in section, of the bead-anchoring portion shown in FIG. 4;

FIG. 13 is a perspective view of a sleeve member of the third ring mounted on the outer shaft member and adapted to slide on said outer shaft member by being urged by a compressible second coil spring mounted on said sleeve member;

FIG. 14 is a perspective view of the compressible coil spring mounted on the sleeve member in FIG. 13;

FIG. 15 is a perspective view of a washer ring and a pin for supporting, in combination, the lower end of the compressible coil spring shown in FIG. 14;

FIG. 16 is a perspective view of the compressible first coil spring housed within the outer shaft member and adapted to expand between the intermediate and the lower member;

FIG. 17 is a perspective view of a guide core rod for guiding the said compressible first coil spring housed within the outer shaft member;

FIG. 18 is a perspective view of a tubular stopper member mounted on the lower end of the guide core rod;

FIG. 19 is a perspective view of a tubular washer for supporting the compressible first coil spring provided at the lower end of the intermediate inner shaft member;

FIG. 20 is a perspective view of a tubular washer for supporting the compressible first coil spring provided at the upper end of the lower inner shaft member;

FIG. 21 is a perspective view of a double-acting depressable button for actuating two spring-actuated locking member;

FIG. 22 is a perspective view of a spring-actuated locking member pivotably attached to stopper ring securely mounted on the outer shaft member within the bead-anchoring ring;

FIG. 23 is a perspective view of a spring-actuated locking member adapted to engage or released from the engaging hole formed in the lower end portion of the outer shaft member;

FIGS. 24 through 32 show another embodiment utilizing spring-actuated locking members of different types in place of the double-acting depressable button; in which

FIG. 24 is a larger scale side elevation, partly in section, of the portion of the umbrella frame in which the fourth ring is provided when the umbrella is in the state shown in FIG. 1;

FIG. 25 is a larger scale side elevation, partly in section, of the portion of the umbrella frame in which the fourth ring is provided when the ribs are released from the bead-anchoring ring representing the state of the umbrella frame shown in FIG. 2;

FIG. 26 is a larger scale side elevation, partly in section, of the portion of the umbrella frame in which the spring-actuated locking member of the lower inner shaft member is provided when the umbrella frame is in the state shown in FIG. 3;

FIG. 27 is a larger scale side elevation, partly in section, of the portion of the umbrella frame in which the fourth ring is provided when the umbrella frame is in the state shown in FIG. 4 in which the spring-actuated locking member is depressed;

FIG. 28 is a perspective view of the fourth ring and its tubular grip sleeve;

FIG. 29 is a perspective view of a locking member pivotably attached to the projecting flange of the tubular grip sleeve;

FIG. 30 is a perspective view of a bead-anchoring ring;

FIG. 31 is a perspective view of a cover member mounted on the lower end portion of the tubular grip sleeve of the fourth ring; and

FIG. 32 is a perspective view of a spring-actuated locking member.

It is to be understood that like reference numerals indicate like or corresponding parts.

The present invention will hereunder be described on the first embodiment by referring to the drawings.

A shaft of the umbrella of the present invention comprises, in combination, a tubular outer shaft member 1 slidably housing therein three tubular inner members, i.e., an upper shaft member 2, an intermediate shaft member 3, and a lower shaft

member 4. Said upper shaft member 2 protrudes outwardly from the upper end edge of the outer shaft member 1. A first ring 6 carrying ribs 5 pivotably attached at one end is fixed to said upper shaft member 2. This first ring 6 has an auxiliary ring 6a provided integrally at the lower end of the first ring 6. A pulling rod 8 coupled at one end to a compressible coil spring 7 is pivotably attached at the other end to said auxiliary ring 6a. Said compressible coil spring 7 is adapted to expand when the rib 5 spreads so that the coil spring 7 accumulates its restoring force during its expansion. The lower inner shaft member 4 protrudes outwardly from the lower end edge of the outer shaft member 1 and received in and secured to the central recess or bore of a grip 9. A compressible first coil spring 10 is provided for free expansion within the outer shaft member 1 between the intermediate shaft member 3 and the lower shaft member 4. A second ring 12 is fixed by a pin 11 at the upper end of the outer shaft member 1. This pin 11 passes through the elongated slits 13 and 13 formed diametrically in the upper shaft member 2. A short auxiliary rod 14a is pivotably attached at one end to the second ring 12. A tubular extensible rod 14 is slidably mounted at one end on said auxiliary rod 14a and pivotably attached at the other end to a fitting 15 which, in turn, is secured to an appropriate intermediate site of the rib 5. The other end of said compressible coil spring 7 is secured to said fitting 15. A tubular sleeve member 16 is slidably mounted on the outer shaft member 1. A third ring 17 is secured to the upper end of the tubular sleeve member 16. A supporting rod 18 is pivotably coupled to said third ring 17 and to an appropriate intermediate site of the extensible rod 14. A pin 21 passes transversely through the wall of the intermediate shaft member 3. The opposite end portions of this pin 21 further pass through the elongated slits 19 and 19 formed diametrically through the wall of the tubular sleeve member 16 and also through the elongated slits 20 and 20 formed diametrically through the wall of the outer shaft member 1. The opposite ends of the pin 21 are secured to washer ring 22 which, in turn, is mounted on the tubular sleeve member 16. A compressible second coil spring 23 is mounted on the tubular sleeve member 16 between the washer ring 22 and third ring 17. A tubular grip sleeve 25 for a fourth ring 24 is slidably mounted on the outer shaft member 1 below the tubular sleeve member 16. A spoke 26 is pivotably coupled at one end to the fourth ring 24 and at the other end to a fitting 15a which is secured to the rib 5 at an outer position close to the fitting 15. A tubular washer 28 and the upper portion of a guide core rod 29 are secured by a pin 27 to the lower end of the intermediate shaft member 3. The guide core rod 29 extends downwardly along the central axis of the outer shaft member 1 within this latter member 1 and is loosely received through a tubular washer 30 (see FIG. 7) which, in turn, is securely mounted on top of the lower shaft member 4. The lower end of the guide core rod 29 is secured by a pin 32 to a tubular stopper member 31 which is slidably received in the tubular lower shaft member 4. The compressible first coil spring 10 which is provided between the intermediate shaft member 3 and the lower shaft member 4 is mounted around the guide core rod 29 between the tubular washers 28 and 30. The opposite end portions of a pin 34 which is secured across the lower shaft member 4 are received through the elongated slits 33 and 33 which are formed diametrically in the wall of the tubular stopper member 31. A double-acting depressable button 35 is pivotably attached at its central portion by a pin 36 to the outer face of the grip 9 which is secured to the lower end portion of the lower shaft member 4. A spring-actuated locking member 37 adapted to be actuated upon depression of a touch piece 35a which constitutes the lower portion of the double-acting depressable button 35 is received in an engaging hole 4a formed in the lower shaft member 4 through an engaging hole 1a formed in the lower end portion of the outer shaft member 1. On the other hand, a spring-actuated locking member 38 adapted to be actuated upon depression of a touch piece 35b which constitutes the upper portion of the double-acting depressable button 35 is pivotably attached to a stopper

ring 39 which is securely mounted on the lower end of the outer shaft member 1. A compressible coil spring 41 is mounted between said stopper ring 39 and a bead-anchoring ring 40 which, in turn, is slidably mounted on the lower shaft member 4 and adapted to be received in the top opening of the grip 9. The spring-actuated locking member 38 is provided with two engaging notches 42a and 42b which are formed in two upper and lower stages in the lower end portion of the locking member 38. In the expanded position of the compressible coil spring 41 which is effected when the bead-anchoring ring 40 is moved downwardly on the lower shaft member 4 relative to the stopper ring 39, the lower engaging notch 42a is brought into engagement with the lowermost end edge of the bead-anchoring ring 40. On the other hand, in the compressed position of the compressible coil spring 41 which is effected when the bead-anchoring ring 40 is moved upwardly relative to the stopper ring 39, the upper engaging notch 42b is brought into engagement with the lowermost end edge of the bead-anchoring ring 40.

Let us now assume that the umbrella frame having the foregoing arrangement is in the closed position shown in FIG. 1. Upon a slight depression of the upper touch piece 35b of the double-acting depressable button 35, the upper engaging notch 42b of the spring-actuated locking member 38 is relieved of its engagement with the lowermost end edge of the bead-anchoring ring 40. Whereby, this bead-anchoring ring 40 is caused to move downwardly on the lower shaft member 4 owing to the expansion of the compressible coil spring 41. Along with this, the lowermost free ends of the ribs 5 which have till then been engaged inside the open top of the bead-anchoring ring 40 are released therefrom. As a consequence, the umbrella frame is rendered to a slightly open position as shown in FIG. 2. Concurrently therewith, the engaging notch 42a of the locking member 38 is brought into engagement with the lowermost end edge of the bead-anchoring ring, and a hook 38a formed at the upper end of the locking member 38 is brought into engagement with the lowermost end edge of the tubular grip sleeve of the fourth ring 24. Thus, the opening movement of the umbrella frame is positively halted in a slightly open position. In this state of the umbrella frame, a further and greater pressure may be applied to the upper touch piece 35b of the double-acting depressable button 35. Whereupon, the engaging notch 42a of the locking member 38 is disengaged from the lowermost end edge of the bead-anchoring ring 40 and accordingly the hook 38a is relieved of its engagement with the lower end edge of the tubular grip sleeve 25, to enable both the first coil spring 10 and the second coil spring 23 to expand freely. Let us assume that the lower shaft member 4 and the outer shaft member 1 which engages this lower shaft member 4 by the spring-actuated locking member 37 are both stationary because the grip 9 is held by the hand of the user. The expansion of the first coil spring 10 causes an increase in the distance between the two tubular washers 28 and 30 which are housed in the outer shaft member 1. As a result, the intermediate shaft member 3 is pushed upwardly within the outer shaft member 1. Concurrently therewith, the second coil spring 23 which is mounted around the tubular sleeve member 16 is allowed to expand. However, the opposite ends of the pin 21 which passes across the intermediate shaft member 3 are fixed to the opposing side walls of the washer ring 22 after passing transversely therethrough, said washer ring 22 supporting the lower end of the second coil spring 23. Therefore, this washer ring 22 is subjected to the upward driving force exerted by the first coil spring 10 and also to the downward driving force imparted by the second coil spring 23. When these two driving forces are balanced, the expansion of the first coil spring 10 stops. Whereupon, the expanding force of the second coil spring 23 acts in such a direction as will push the sleeve member 16 and the third ring 17 upwardly along the outer shaft member 1. With the eventual attenuation of the expanding force of the second coil spring 23, the first coil spring 10 is again actuated to push the washer ring 22 upwardly. In this way, these two

coil springs 10 and 23 are actuated in alternately associated fashion to expand gradually. During the foregoing operation, the limit of distance covered by the intermediate shaft member 3 as it is pushed upwardly by the first coil spring 10 corresponds to the length of the elongated slit 33 of the tubular stopper member 31 which is provided at the bottom of the guide core rod 29 which is coupled to the lower end of the intermediate shaft member 3. The intermediate shaft member 3 stops its upward movement at a position in which the pin 34 which passes across the lower shaft member 4 hits the bottom of the said elongated slit 33. On the other hand, as the third ring 17 moves upwardly along the outer shaft member 1 and as this third ring 17 approaches the second ring 12 provided at the upper end of the outer shaft member 1, the supporting rod 18 is caused to spread. Concurrently therewith, the tubular extensible rod 14 which is pivotably attached, by an auxiliary rod, to the second ring 12 is extended for a small distance from the auxiliary rod 14a, and as a result, the umbrella frame opens completely. If the second ring 12 is coupled to the fitting 15 by a non-extensible rod having a fixed length in place of the extensible rod 14, there will be encountered a great difficulty in opening and closing the umbrella frame, causing a twisting stress in the second ring 12 with respect to the outer shaft member 1. This automatic opening operation cannot be regulated manually, and therefore when such an umbrella is to be opened automatically by utilizing spring force, it will become impossible to expect smooth opening of the umbrella. In order to avoid this inconvenience, the present invention provides an extensible rod 14 having a tubular open end portion in which is slidably received one end portion of a short auxiliary rod 14a of which the other end is pivotably attached to the second ring 12 fixed to the slidable outer shaft member 1. As a consequence, it will be understood that when the umbrella is opened, the auxiliary rod 14a extends for a small distance from the open end of the tubular rod 14 as shown in FIG. 3 to increase the distance of connection between the second ring 12 of the outer shaft member 1 and the fitting 15. Conversely, as the umbrella is closed, the free end of the auxiliary rod 14a is received progressively into the tubular rod 14 as shown in FIG. 4 to decrease the distance of connection between said two members 12 and 15. Thus, when this umbrella is quickly opened automatically by utilizing spring force, the ribs may be spread smoothly without any difficulty or stress developing in the frame parts.

In a manner as described, the upper shaft member 2 is pushed upwardly by the intermediate shaft member 3. During this course of upward movement of the upper shaft member 2 along the elongated slits 13 and 13, the upper shaft member 2 protrudes progressively from the upper end edge of the outer shaft member 1 while increasing the distance between the second ring 12 and the fixed first ring 6 and thereby progressively spreading the ribs 5. Along with this, the fourth ring 24 as well as the tubular grip sleeve 25 are pulled upwardly along the outer shaft member 1 via the spokes 26 which are pivotably coupled to the fittings 15a, respectively. The automatic opening of the umbrella completes when the upper face of the fourth ring 24 hits the washer ring 22. During this movement, the coil spring 7 — which is coupled to each rib 5 via the pulling rod 8 which, in turn, is coupled to auxiliary ring 6a which is integral with but somewhat spaced from the fixed first ring 6 — is caused to expand to accumulate its restoring force.

Description will next be directed to the manner in which the umbrella is automatically closed. As shown in FIG. 4, the spring-actuated locking member 37 may be depressed by the application of a pressure onto the lower touch piece 35a of the double-acting depressable button 35, to release the locking member 37 from the engaging hole 1a formed in the lower end portion of the outer shaft member 1. Whereupon, the outer shaft member 1 as well as the bead-anchoring ring 40 are caused to move upwardly along the lower shaft member 4 by virtue of the restoring force of the coil spring 7 coupled to the rib 5. The upward movement of the outer shaft member 1 means the relative downward movement of the upper shaft

member 2 into the outer shaft member 1. This relative movement of these two shaft members causes a progressive reduction of the distance between the fixed first ring 6 and the second ring 12 provided at the upper end of the outer shaft member 1. Whereby, the ribs 5 are caused to close. Along with this, the tubular extensible rod 14 is caused to swing at its pivotal point at the fitting 15, while pushing, via the supporting rod 18, both the third ring 17 and the sleeve member 16 downwardly along the outer shaft member 1 up to the lower end of the elongated slits 20 and 20, and at the same time pushing, via the spoke 26, both the fourth ring 24 and the tubular grip sleeve 25 downwardly, so that the lower end edge of the tubular grip sleeve 25 is brought into engagement with the hook 38a of the spring-actuated locking member 38 which is housed in the bead-anchoring ring 40. It should be noted that, in this state, both the first coil spring 10 and the second coil spring 23 remain to be relaxed or expanded. Thereafter, the grip 9 may be pushed toward the top of the shaft. Whereupon, the lower shaft member 4 is accordingly caused to move upwardly. As a consequence, as shown in FIG. 2, the spring-actuated locking member 37 is brought into engagement with the engaging hole 1a formed in the lower end portion of the outer shaft member 1. Also, the bead-anchoring ring 40 makes a downward movement together with the outer shaft member 1, so that these two members are received in the top opening of the grip 9. Along therewith, the upward movement of the lower shaft member 4 acts to compress the first coil spring 10 which is provided between the intermediate shaft member 3 and the lower shaft member 4. Thus, the compressible first coil spring 10 accumulates its restoring force. Owing to pressure applied to the intermediate shaft member 3 by the first coil spring 10 as it is being compressed, the pin 21 which passes across the intermediate shaft member 3 is subjected to a pressure, resulting in that the washer ring 22 being pushed upwardly along the elongated slits 19 and 19 of the sleeve member 16 and along the elongated slits 20 and 20 of the outer shaft member 1 to compress the second coil spring 23, and thus the latter accumulates its restoring force. In this state, the hook 38a of the spring-actuated locking member 38 is brought into engagement with the lower end edge of the tubular grip sleeve 25 and the entire movement of the umbrella frame ceases. The free ends of the ribs 5 may now be gathered and the bead-anchoring ring 40 may be moved upwardly. Whereupon, the ribs 5 are anchored inside the top opening of the bead-anchoring ring 40 as shown in FIG. 1. Along with this, the coil spring 41 which is provided between the bead-anchoring ring 40 and the stopper ring 39 securely mounted on the outer shaft member 1 is compressed, and at the same time, the engaging notch 42a of the spring-actuated locking member 38 is brought into engagement with the lowermost end edge of the bead-anchoring ring 40. Thus, the umbrella now presents a configuration convenient for being carried along.

As stated above, the automatically openable and closable umbrella of the present invention is opened by the expanding forces of the two first and second coil springs 10 and 23 which are compressively mounted inside and outside the outer shaft member 1, respectively. Besides, these two coil springs 10 and 23 act in mutually associated relationship, so that the umbrella is opened gradually progressively and smoothly. Thus, the danger due to abrupt spreading may be avoided.

The conventional umbrella which is adapted to open automatically by relying on the expanding force of a single compressible coil spring mounted around the portion of the slidable lowermost ring had the drawback that it could not be opened smoothly because of, for example, the engagement or contact of the coil spring with the gathered ribs which arised during the initial course of opening. This drawback of the prior art is solved by the present invention in which the compressible second coil spring 23 is mounted around the tubular sleeve member 16 of the third ring 17. The shortage of the spring force of this second coil spring 23 is compensated for by the compressible first coil spring 10 which is provided

within the outer shaft member 1. Thus, there is no need to provide the outer second coil spring in a particularly large size, and thus, it is possible to provide the umbrella having an agreeable external appearance.

The first coil spring 10 housed in the outer shaft member 1 is wound around the guide core rod. Therefore, this coil spring 10 is able to expand or to be compressed linearly. In addition, the expansion of the coil spring 10 is restricted by the elongated slit formed in the tubular stopper member provided at the lower end of the guide core rod. Thus, the coil spring 10 may be expanded or compressed always not too tightly or too loosely. Furthermore, the provision of the double-acting depressable button 35 attached to the grip 9 permits the automatic opening and closing of the umbrella to be effected very easily and smoothly by the mere depression of the said button, so that the umbrella may be handled with a greatly simplified procedure.

According to the present invention, the aforesaid double-acting depressable button 35 may be substituted by the arrangement shown in FIGS. 24 through 32. More specifically, a projecting flange 43 is formed in the vicinity of the lower end of the tubular grip sleeve 25 formed integrally with the fourth ring 24 (see FIG. 24). This projecting flange 43 is provided with a notch or groove 43a. In this groove is received a locking member 44 (see FIGS. 26 and 27). This locking member 44 is pivotably attached to a steel wire 45 which is wound around the projecting flange 43. The locking member 44 has a forward end portion which constitutes a pawl 44a. Through an opening 47 of the tubular grip sleeve 25, this pawl 44a is forced into a small opening 1b which is formed near the lower end of the outer shaft member 1 and is held there in engagement in said opening 1b. The outer shaft member 1 is provided with an engaging hole 1a below said small opening 1b. The lower shaft member 4 houses therein a spring member 48 which has a hooking projection 48a near the lower end thereof. This hooking projection 48a is engaged in said engaging hole 1a after passing through an engaging hole 4a formed through the wall of the lower shaft member 4. The spring member 48 also has a push-button 48b at the lower end thereof. This push-button 48b located at the lower end of the spring member 48 is exposed outwardly in the vicinity of the upper end of the grip 9 through the engaging hole 4a of the lower shaft member 4. Whenever the fourth ring 24 is placed in its lowermost position, the push-button 48b is covered by a cover member 49 which is mounted to the lower end of the tubular grip sleeve 25 so that said push-button 48b is not exposed. In this state, the lower end of the locking member 44 is received in a recess 50 of the cover member 49, and only the press-button 44b of the locking member 44 is exposed outside the cover member 49. A bead-anchoring ring 51 which is manually moved vertically, with its inner side wall surface being in slidable contact with the external face of the projecting flange 43 of the tubular grip sleeve 25 is slidably mounted on the lower end of the tubular grip sleeve 25.

By the use of the umbrella having the foregoing arrangement, the bead-anchoring ring 51 is manually pushed downwardly from the closed position of the umbrella shown in FIG. 24 up to the position in which the bead-anchoring ring 51 is brought into contact with the upper face of the cover member 49. Whereupon, the lower free end of the rib 5 is released from the inside of the open top of the bead-anchoring ring 51 and the umbrella frame is rendered to a slightly open state as shown in FIG. 25. In this position of the umbrella, the press-button 44b which is exposed outside the cover member 49 may be depressed. Whereby, the pawl 44a of the locking member 44 is disengaged from the small opening 1b of the outer shaft member 1, and both the inner first coil spring 10 and the outer second coil spring 23 are allowed to expand freely. In a manner similar to that described in connection with the umbrella frame equipped with a double-acting depressable button, the umbrella is caused to open automatically. During this opening movement, the fourth ring 24 as well as the tubular grip sleeve 25, the cover member 49 and

the bead-anchoring ring 51 are pulled upwardly along the outer shaft member 1 via the spoke 26 coupled to the fitting 15a.

When it is intended to effect automatic closing of the umbrella, it should be noted that the push-button 48b which has been covered initially in the cover member 49 as shown by the phantom lines in FIG. 26 is caused to be exposed near the open top of the grip 9 as the result of the upward movement of the cover member 49 caused by the opening of the umbrella frame. This push-button 48b may be depressed. Whereupon, the locking projection 48a of the spring member 48 is disengaged from the small opening 1b of the outer shaft member 1 so that this latter shaft member 1 is released from its engagement with the lower shaft member 4 to close the umbrella. During this closing movement, the fourth ring 24, as well as the tubular grip sleeve 25, the cover member 49 and the bead-anchoring ring 51 are pushed downwardly up to the positions shown in FIG. 27. As a consequence, the pawl 44a of the locking member 44 provided in the tubular grip sleeve 25 is brought into engagement with the engaging hole 1a of the outer shaft member 1. In this state, neither the first coil spring 10 nor the second coil spring 23 is yet compressed but remains to be expanded.

Next, the grip 9 may be pushed toward the top of the shaft. Whereupon the lower shaft member 4 makes an upward movement. As a result, as shown in FIG. 25, the push-button 48b of the spring member 48 housed in the lower shaft member 4 is received inside the cover member 49 through the recess 50 of the cover member 49, while on the other hand the engaging hole 1a formed in the lower end portion of the outer shaft member 1 is brought into engagement with the locking projection 48a. Thereupon, the free ends of the ribs 5 may be gathered and thereafter the bead-anchoring ring 51 is manually moved upwardly. Whereby, the ribs 5 are brought into engagement with the inside of the open top of the bead-anchoring ring 51, and the umbrella frame resumes the initial position shown in FIG. 24 which is convenient for carriage.

As stated above, it will be noted that the press-button 44b of the locking member 44 which is actuated when the umbrella is opened automatically is exposed outside the cover member 49 which is mounted to the lower end of the tubular grip sleeve 25 of the fourth ring 24. In contrast to this, the push-button 48b of the spring member 48 which is used when the umbrella is closed automatically is hidden within the cover member 49. Thus, there arises no casual depression of the push-button 48b which is assigned for opening the umbrella automatically. Also, when the umbrella is closed automatically, both the fourth ring 24 and the cover member 49 make an upward movement along the outer shaft member 1 so that the push-button 48b is exposed at the lower end of the lower shaft member 4. Therefore, this push-button 48b is exposed at the lower end of the lower shaft member 4. Therefore, this push-button 48b may be depressed without failure. As such, this arrangement obviates the confusion which may arise in an umbrella equipped with a double-acting depressable button as to which of the upper and lower portions of the double-acting depressable button 35 should be depressed when it is intended to open or close the umbrella automatically. Thus, there is a clear differentiation in use of these two buttons.

What is claimed is:

1. An automatically openable and closable umbrella comprising:
 - a shaft having a tubular outer shaft member (1) slidably housing therein an upper (2), an intermediate (3) and a lower (4) tubular shaft members,
 - a first ring (6) fixed to the upper portion of said upper shaft member (1) and pivotably carrying ribs (5) and umbrella-closing compressible spring means (7), (8) fixed at one end to an intermediate portion of said ribs and at the other end to said fixed ring at a spaced position from the rib pivoted to said fixed ring,
 - a second ring (12) mounted on said shaft below said first ring (6) and fixed to said outer shaft member (1) and

pivotably carrying extensible rods (14) pivotably supporting said ribs (5),
 a third ring (17) mounted on said shaft below said second ring (12) and pivotably carrying supporting rods (18) pivotably supporting said extensible rods (14),
 a fourth ring (24) mounted on said shaft below said third ring (17) and pivotably carrying, at a site other than the pivotate point of each of said extensible rods (14), spokes (26) pivotably supporting said ribs (5),
 compressible first spring means (10) for opening the umbrella and provided between said intermediate (3) and said lower (4) shaft members to urge them apart,
 compressible second spring means (23) for opening the umbrella mounted on said shaft between said third ring (17) and a washer ring (22) securely attached to said intermediate shaft member (3) so as to slide on said outer shaft member (1), said second spring means being capable of urging said upper and intermediate shaft members (2), (3) apart with respect to said outer and lower shaft members (1), (4),
 latch means for opening the umbrella capable of disengageably engaging said fourth ring, and
 latch means for closing the umbrella provided in the lower portion of the lower shaft member (4) and capable of releasing the outer shaft member (1) from its engagement with the lower shaft member (4).

2. An automatically openable and closable umbrella according to claim 1, in which:
 said umbrella-closing compressible spring means comprises a compressible coil spring (7) and a rod (8) having one end secured to said coil spring (7) and the other end pivotably attached to said fixed first ring (6) at a position spaced from the rib pivoted to said first ring (6);
 a grip (9) is secured to the lower portion of the lower shaft member (4);
 said third ring (17) has a tubular sleeve (16) secured thereto and provided with a longitudinally extending slit (19);
 the secure attachment of said washer ring (22) to the intermediate shaft member (3) is effected by a pin (21) slidably received through an elongated slit (19) of said tubular sleeve (16) and through an elongated slit (20) of the outer shaft member (1);
 said extensible rod (14) comprises two members (14), (14a) one of which is slidably received in the other;
 said latch means for opening the umbrella comprises a member (38) capable of latching said fourth ring (24) with respect to the outer shaft member (1);

said latch means for closing the umbrella comprises a member (37) capable of latching said outer shaft member (1) with respect to the lower shaft member (4); and
 said two latch means are adapted to be actuated by a double-acting depressable means (35) provided between these two latch means.

3. An automatically openable and closable umbrella according to claim 1, in which:
 said umbrella-closing compressible first spring means (10) is a coil spring mounted on a guide core rod (29) received in the outer shaft member (1) for sliding axially thereof;
 said guide core rod (29) has an upper end portion secured to the lower end portion of the intermediate shaft member (3) and has a lower end portion secured to a tubular stopper member (31) having an elongated slit (33) for restricting the sliding movement of the lower shaft member (4) to cause the intermediate shaft member (3) to move closer to or away from the lower shaft member (4) via the umbrella-opening first spring means (10).

4. An automatically openable and closable umbrella according to claim 1, in which:
 said umbrella-opening latch means comprises a member (38) secured to the lower portion of the outer shaft member (1) to latch said fourth ring (24) with respect to said outer shaft member (1), said member (38) having two engaging portions (42a), (42b) capable of locking a rib-anchoring member (40) in two steps, said rib-anchoring member (40) being mounted slidably on the outer shaft member and housing therein a compressible spring means (41) normally urging the rib-anchoring member (40) to move downwardly with respect to the outer shaft member (1).

5. An automatically openable and closable umbrella according to claim 1, in which:
 said umbrella-opening latch means has a locking member (44) pivotably attached to the fourth ring (24) and adapted to engage a small opening (1b) formed in the lower portion of the outer shaft member (1),
 said umbrella-closing latch means has a spring member (48) received in the lower shaft member (4) and equipped with a locking projection (48a) formed integrally therewith for causing said outer shaft member (1) to disengageably engage the lower shaft member (4) through their aligned openings,
 said fourth ring (24) has a cover member (49) for preventing casual depression of the locking projection (48a) during the downward movement of said fourth ring (24).

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