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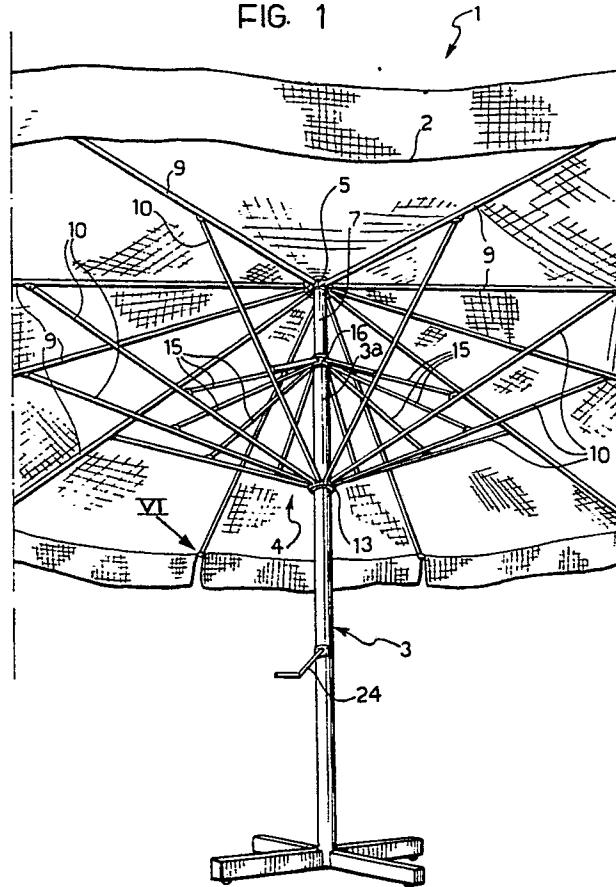
**A device for opening and closing umbrellas.**

A device for opening and closing an umbrella includes a rod (7) which is slidable in the upper part of the pole (3) for supporting the flexible canopy (2) of the umbrella (1) and to which is articulated a first array of spokes (9) connected to the pole by means of a second array of spokes (10) articulated to a collar (16) which is slidable along the pole, and a third array of spokes (15) which interconnect the spokes of the second array (10) and the pole above

the slidable collar (16). The rod can be moved between an extended position (corresponding to the closed condition of the umbrella) and a retracted position (corresponding to the open condition of the umbrella) by means of an external crank (24) and an internal rack-and-pinion transmission (21, 22), and a catch (26) is provided for locking the rod (7) in the extended position and in the retracted position.

**EP 0 392 989 A2**

FIG. 1



### A device for opening and closing umbrellas

The present invention relates to a device for opening and closing umbrellas comprising a flexible canopy fixed centrally to the top of a pole by means of a retaining member from which a first array of spokes for supporting the canopy extends, the spokes being pivotable between a raised position and a collapsed position, a collar slidable axially along the pole and carrying a second array of support spokes articulated to the spokes of the first array.

Conventionally, umbrellas of this type are opened and closed by the manual displacement of the slidable collar along the pole. This operation is inconvenient and difficult and involves considerable physical effort, particularly in the case of large umbrellas. Systems with cables and transmission pulleys have also been proposed for these umbrellas but they have similar problems.

The object of the present invention is to avoid these problems and to provide a device for opening and closing umbrellas of the type defined which not only reduces the manual effort, but also ensures the necessary stability of the umbrella under all conditions, even when it is windy.

According to the invention, this object is achieved by means of an opening and closing device, characterised in that it comprises:

- a third array of support spokes articulated to intermediate zones of the spokes of the second array and to a fixed collar of the pole, above the slidable collar,
- a rod mounted slidably in the upper part of the pole and carrying the retaining member,
- manual operating means for sliding the rod relative to the pole between an extended position and a retracted position, the operating means including a crank supported rotatably by the pole and transmission means inside the pole for transforming the rotation of the crank into a translation of the rod, and
- catch means for stopping the rod at the ends of its extension and retraction strokes.

The transmission means conveniently comprise a pinion supported for rotation by a radial spindle which is rotatable in the pole and is coupled to the crank, and an axial rack fixed to the rod and meshed with the pinion.

To advantage, the catch means include a radial spring pin carried by the pole and snap-engageable in corresponding upper and lower recesses in the rod, the pin being provided with an external grip for manual release.

The invention will now be described in detail with reference to the appended drawings, provided purely by way of non-limiting example, in which:

Figure 1 is a schematic perspective view of an umbrella provided with an opening and closing device according to the invention,

Figure 2 is a partial elevational view of the device on an enlarged scale, in the open configuration of the umbrella,

Figure 3 is a view similar to Figure 2, showing the device in the closed configuration of the umbrella,

Figure 4 is a cross-section taken on the line IV-IV of Figure 2, on an enlarged scale,

Figure 5 is a section taken on the line V-V of Figure 4, on an enlarged scale, and

Figure 6 shows the detail indicated by the arrow VI in Figure 1, in longitudinal section and on an enlarged scale.

With reference initially to Figure 1, an umbrella is generally indicated 1 and includes a flexible canopy 2 supported on a vertical pole 3 by means of an opening and closing device, generally indicated 4.

With reference in greater detail to Figure 2, the device 4 includes essentially a generally circular retaining member 5, normally of metal, to which the central part of the flexible canopy 2 is fixed by means of a cap 6.

The retaining member 5 is fixed to the top of a tubular rod 7 which can slide axially, in the manner made clear below, in the upper part 3a of the pole 3 which, as can be seen better in Figures 4 and 5, is hollow.

The retaining member 5 has a ring of paired tabs 8 to which an array of spokes or ribs 9 supporting the flexible canopy 2 is articulated. As shown in detail in Figure 6, spoke 9 has a telescopic free end defined by an end part 10 which can be retracted into the spoke 9 against the action of an opposing spring 11. The end portions 10 are inserted in corresponding pockets 12 in the flexible canopy 2 so as to tension it correctly.

The spokes 9 are adapted to pivot between the raised position shown in Figure 2, which corresponds to the open condition of the umbrella 1 shown in Figure 1, and the collapsed position shown in Figure 3, which corresponds to the closed condition of the umbrella.

A second array of spokes 10 is articulated to the array of spokes 9 at a certain distance from the retaining member 5 and at their lower ends are articulated in turn to a collar 13 which is slidable axially along the upper part 3a of the pole 3. The collar 13 is normally of metal and has an inner sliding ring 14 of self-lubricating plastics material in contact with the outer surface of the pole 3.

A third array of shorter spokes 15 is articulated

to the spokes 10 at a certain distance from the slidable collar 13 and their upper ends are articulated in turn to a collar 16 which is fixed to the top of the pole 3, that is, above the collar 13. The articulations between the spokes 10 and the slidable collar 13 and between the spokes 15 and the fixed collar 16 are similar to the articulations between the spokes 9 and the retaining member 5. These enable the spokes 10 and 15 to pivot between the angled position shown in Figure 2, which, as stated, corresponds to the open configuration of the umbrella, and the condition shown in Figure 3, in which they are arranged substantially vertically when the umbrella is in the closed condition.

As can be seen in Figures 4 and 5, the rod 7 is guided slidably in the upper tubular part 3a of the pole 3 by means of a pair of rings, an upper ring 17 and an intermediate ring 18, also of self-lubricating plastics material. In order to facilitate assembly, the guide ring 18 is conveniently formed in two parts. A diametral shaft 19 passes rotatably through this ring and is supported at its ends by a pair of bushes 20 fixed radially to the pole 3 and positioned by means of a pair of opposing longitudinal slots 25 in the rod 7. A pinion 21 is keyed to the shaft 19 and meshes with a vertical rack 22 which is fixed, for example, by means of screws 23, to the inside of the rod 7.

A crank 24 is fixed to one end of the shaft 19 and can be operated manually to rotate the shaft 19 and, by means of the pinion 21 and the rack 22, to move the rod 7 vertically relative to the pole 3.

A pin, indicated 26, is mounted for sliding through a radial passage 27 formed in the wall of the pole 3 and through the sliding ring 18 and has a head 28 at its inner end which is adapted to engage one or other of two holes, an upper hole and a lower hole respectively, formed in the rod 7. Only one of these holes is shown, indicated 29, in Figure 4.

The rod 26 is urged radially inwardly of the pole 3 by the action of a spring 30 and has a gripping knob 31 at its outer end, whereby it can be retracted radially so as to be released from one or other of the holes 29 against the action of the spring 27.

In use, in order to close the umbrella from the open configuration shown in Figures 1 and 2, it suffices to retract the pin 26 manually so as to release the rod 7 and to rotate the crank 24 in the sense which corresponds to the extension or raising of the rod 7 from the pole 3. As a result of this operation, the spokes 9 pivot towards the collapsed position, whilst the slidable collar 13 moves downwards until it reaches the configuration shown in Figure 3 and corresponding to the closure of the umbrella. When the rod 7 is fully extended, the

head 28 of the pin 26 snap-engages the lower hole 29 under the action of the spring 30.

In order to open the umbrella from this condition, it suffices to retract the pin 26 again and rotate the crank in the opposite sense from that described above so as to retract the rod 7 into the pole 3 again. As a result of the lowering of the rod 7, the spokes 9 pivot upwardly and the collar 13 moves upwards until the spokes 10 and 15 are again arranged in the configuration shown in Figure 2. When the rod 7 is fully retracted, the head 28 of the pin 26 automatically snap-engages the corresponding upper hole 29 to lock the device 4 firmly in the configuration in which the umbrella is open.

## Claims

1. A device for opening and closing an umbrella comprising a flexible canopy (2) fixed centrally to the top of a pole (3) by means of a retaining member (5) from which a first array of spokes (9) for supporting the canopy (2) extends, the said spokes being pivotable between a raised position and a collapsed position, a collar (13) slidable axially along the pole (3) and carrying a second array of support spokes (10) articulated to the spokes of the first array (9), characterised in that it comprises:

- a third array of support spokes (15) articulated between intermediate zones of spokes of the second array (10) and a fixed collar (16) of the pole (3) above the slidable collar (13)
- a rod (7) mounted slidably in the upper part (3a) of the pole (3) and carrying the retaining member (5),
- manual operating means for sliding the rod (7) relative to the pole (3) between an extended position and a retracted position, the operative means including a crank (24) supported rotatably by the pole (3) and transmission means (19, 21, 22) inside the pole (3) for transforming the rotation of the crank (24) into a translation of the rod (7), and
- catch means (26, 29) for stopping the rod (7) at the ends of its extension and retraction strokes.

2. A device according to claim 1, characterised in that the transmission means comprise a pinion (21) supported for rotation by a radial shaft (19) which is rotatable in the pole (3) and is coupled to the crank (24) and an axial rack (22) fixed to the rod (7) and meshed with the pinion (21).

3. A device according to Claim 1 or Claim 2, characterised in that the catch means include a radial pin (26) with a spring (30) carried by the pole (3) and snap-engageable in corresponding upper and lower holes (29) in the rod (7), the pin (26) having an external grip (31) for manual release.

4. A device according to any one of the preceding claims, characterised in that the spokes of the first array (9) have resiliently-contractible, telescopic outer ends (10, 11) engaged in corresponding retaining parts (12) of the flexible canopy (2).

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FIG. 1

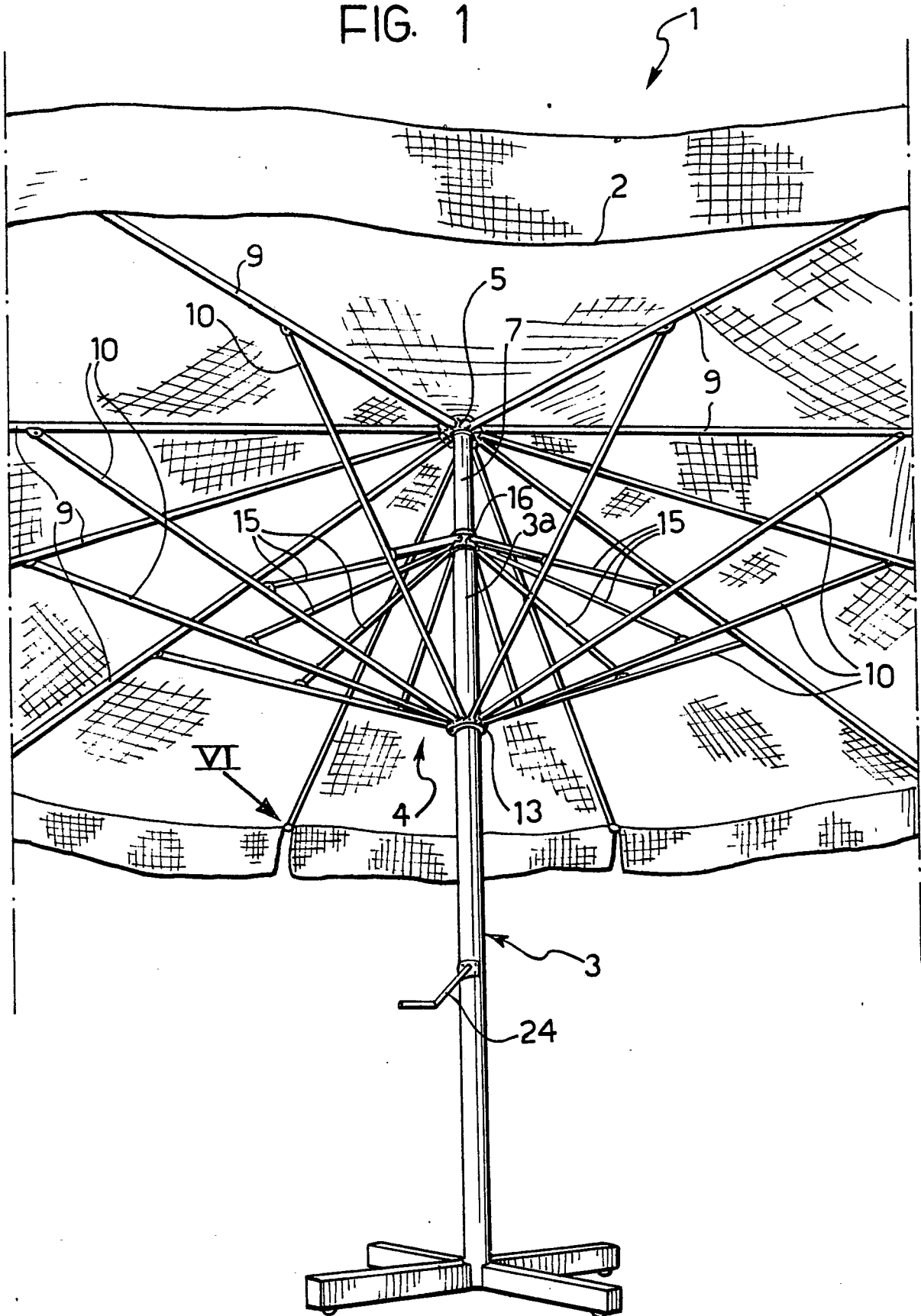


FIG. 2

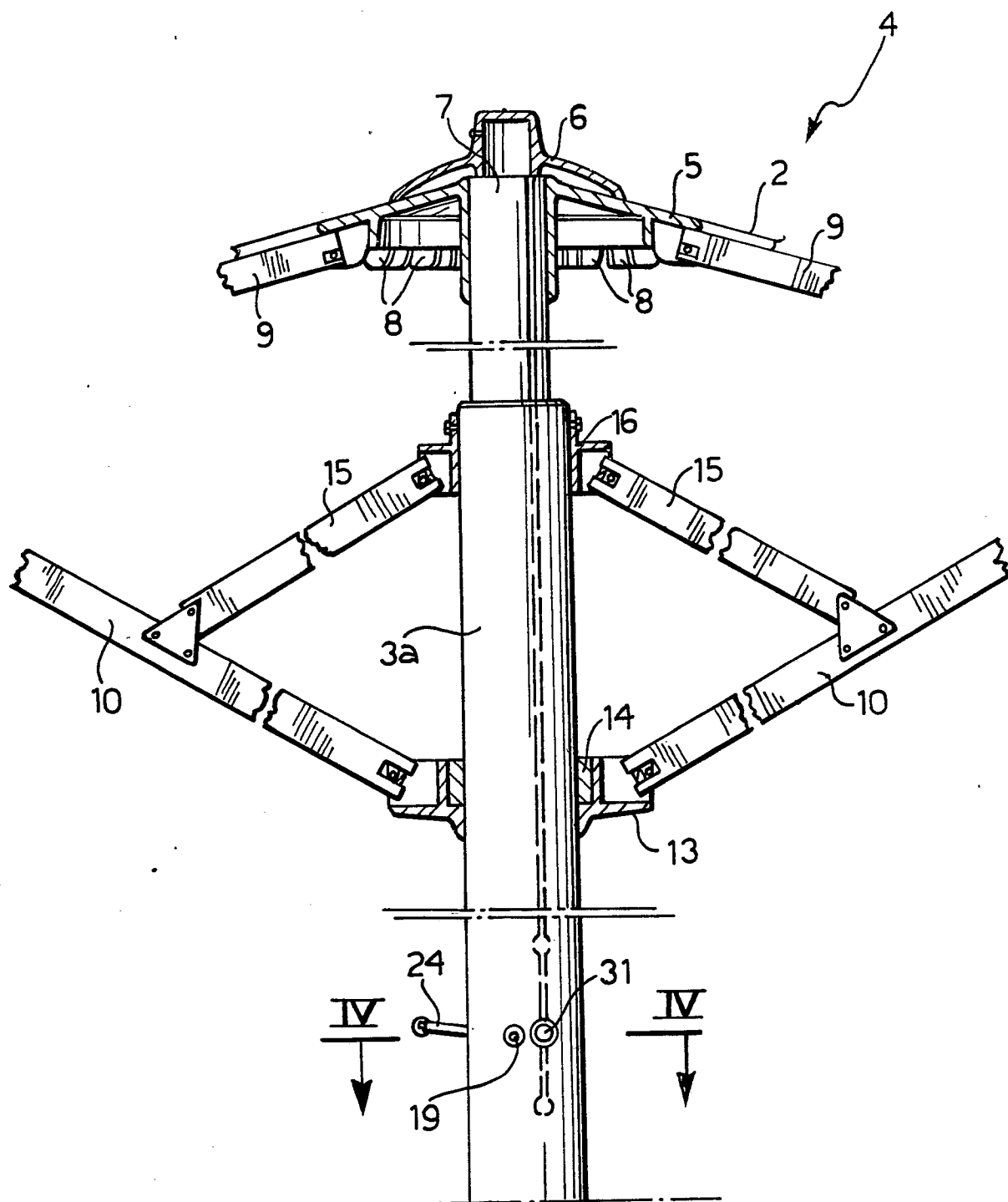


FIG. 3

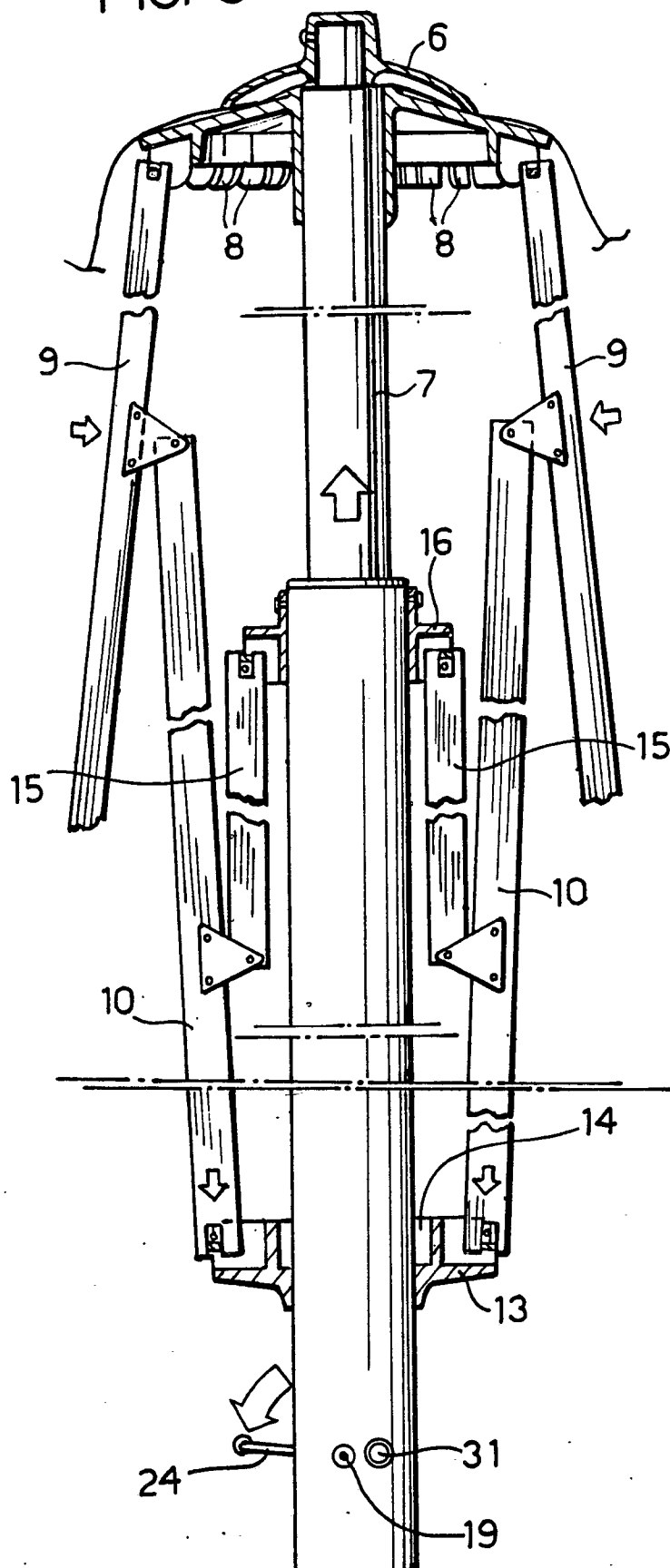




FIG. 4

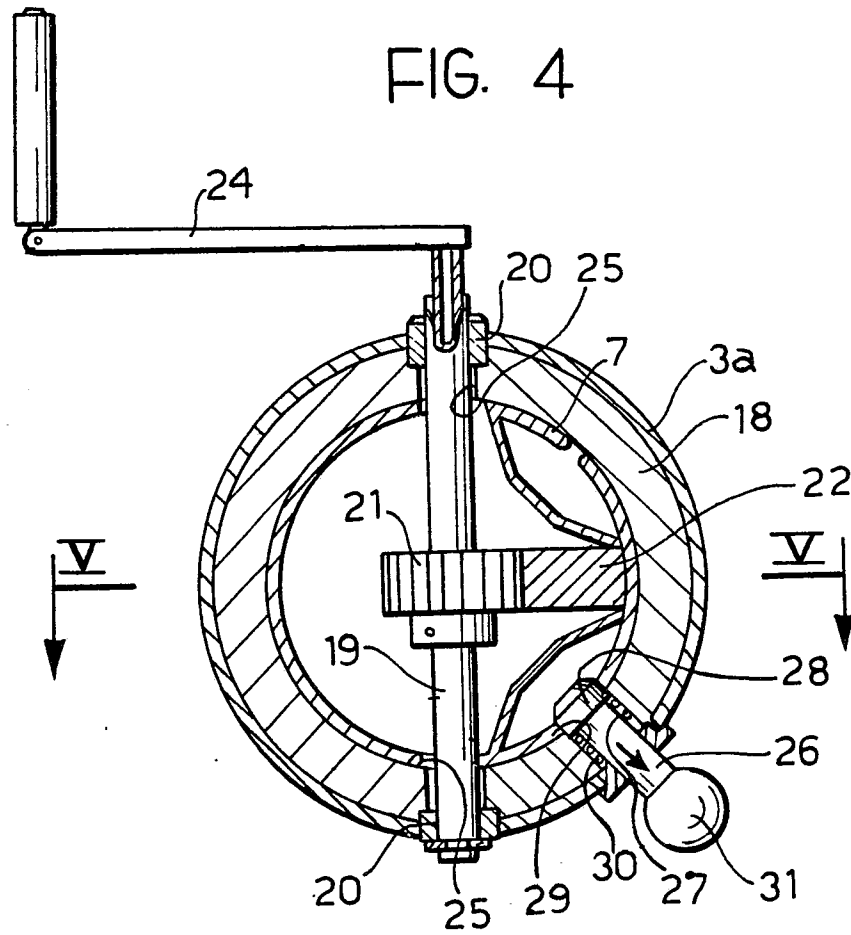


FIG. 6

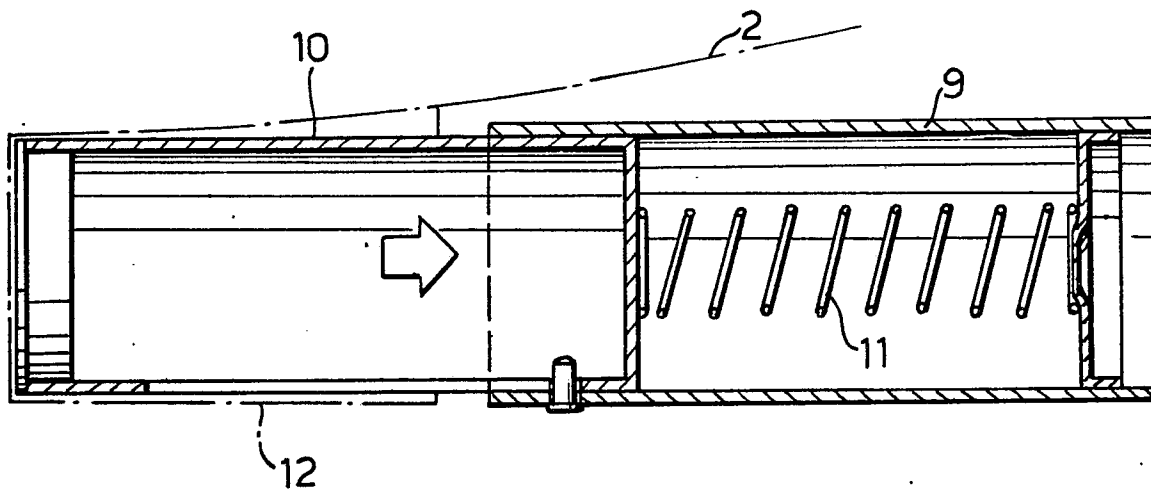


FIG. 5

