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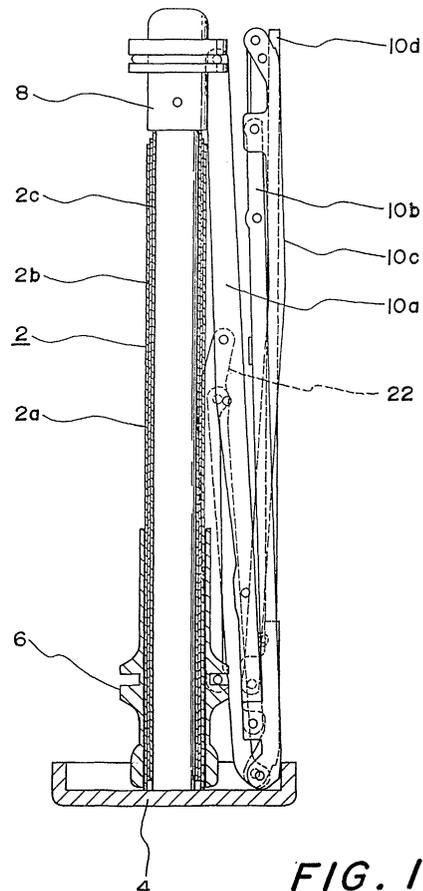
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(54) **Telescopic umbrella**

(57) A compact telescopic umbrella is provided, wherein an upper unit is provided at an end of a middle rod and a lower unit is slidably provided on the middle rod. An end of a main rib consisting of four pieces of mutually pivotally supported ribs is axially supported, and the main rib and the lower unit are connected by means of a receiving rib. Each rib of the main rib is folded in a straight line by interlocking with the vertical motion of the lower unit. Among the ribs of the main rib, a side curved portion and an inclined portion are formed on the third rib, and when the main rib is folded, a portion of the third rib opposite side of a pivotal portion with the second rib is not superposed on a portion of the second rib with the pivotal portion so that the portions are adjacent to each other. A four-side link mechanism is formed by the receiving rib and the second rib of the main. The first rib and the third rib are connected by means of the connecting rod, and the second rib and the fourth rib are connected by means of the connecting rod, whereby four-side link mechanisms and are respectively formed between the connecting rod and the main rib and the connecting rod and the main rib.



**FIG. 1**

**Description**

**[0001]** The present invention relates to a portable telescopic umbrella according to the preamble of claim 1 or 4.

**[0002]** In a portable telescopic umbrella of this kind, main ribs to be folded are normally composed of two pieces or three pieces of ribs.

**[0003]** When the number of constituting ribs of the main ribs is increased and the main ribs are arranged to be like a telescope so that the length of the main rib in the folded condition is arranged to be shorter, a miniaturization of an entire umbrella in its length direction is materialized. However, when the main ribs are folded, if the constituting ribs are in large number, the constituting ribs themselves are superposed which may result in a larger size of the entire umbrella in the folded condition, so that an actual or optimal miniaturization is not achieved.

**[0004]** An object of this invention is to settle with problem stated in the foregoing and to provide a compact telescopic umbrella.

**[0005]** The above object is achieved by a telescopic umbrella according to claim 1 or 4. Preferred embodiments are subject of the subclaims.

**[0006]** Preferably, the umbrella is constructed in such a way that an upper unit is provided on a tip of a middle rod, and a lower unit is provided slidably on the middle rod. In the upper unit, an end of the main rib consisting of four pieces of ribs that are mutually and axially supported, and the main rib and the lower unit are connected by means of a receiving rib. With the vertical sliding motion of the lower unit, each rib of the main rib is positioned in a straight line or is folded. Among the main ribs, a side curved portion and an inclined portion are formed on the third rib, and with this construction, when the main rib is folded, a portion at an opposite side of the third rib is not superposed on a portion at an opposite side of the axial support portion of the second rib and they are mutually adjacent to each other. Between the receiving rib and the second rib of the main rib, a four-side link mechanism is formed by means of a link rib. The first rib and the third rib are connected by a connecting rod, and the second rib and the fourth rib are connected by means of a connecting rod, whereby a four-side link mechanism is respectively formed between the connecting rod and the main rib and the connecting rod and the main rib.

**[0007]** Further aspects, features, and advantages will become apparent from the following description referring to the drawings, which show:

Fig. 1 a cross section of the telescopic umbrella when it is folded according to this invention;

Fig. 2 an explanatory front elevation of the telescopic umbrella when a half part of the umbrella is in open condition according to this invention;

Fig. 3 an explanatory front elevation when a half part of the umbrella is in open condition according to this invention;

5 Fig. 4 a decomposed front elevation of a construction of an essential part of this invention; and

Fig. 5 an explanatory drawing of an essential portion of this invention;

10 **[0008]** This invention will be described in detail by referring to embodiments of this invention in the following.

**[0009]** Reference numeral 2a denotes a shaft, and a handle 4 is fixed to the lower end of the shaft. A slide shaft 2b is fitted and disposed in the shaft 2a, and in the slide shaft 2b, a slide shaft 2c is fitted and disposed.

**[0010]** On an upper end of the slide shaft 2c, an upper unit 8 formed with a projection is fixed. The shaft 2a and the slide shafts 2b, 2c constitute an extendable core type middle rod 2. Numeral 10a denotes a first rib, and its one end is pivotally and slidably supported on the upper unit 8.

**[0011]** The first rib 10a is disposed in a plural number around the upper unit 8 and is pivotally supported. In the drawing, in order to clarify the construction of this invention clearly, it shows only one piece, namely, the first rib and other first ribs are omitted in the illustration. One end of the second rib 10b is pivotally supported on the other end of the first rib 10a, and one end of the second rib 10b is pivotally supported 14 as per the illustration, and one end of the third rib 10c is pivotally supported 16 on the other end of the second rib 10b as shown in the illustration.

**[0012]** The other end of the third rib 10c is pivotally supported 20 on a connecting member 18, and the other end of the connecting member 18 is fixed with the fourth rib 10d. The ribs 10a, 10b, 10c, 10d constitute an extendable main rib 10. Numeral 22 denotes a receiving rib, and its one end is pivotally supported 24 on lower unit 5, and its other end is pivotally supported 26 on a middle portion of the first rib 10a.

**[0013]** Numeral 28 denotes a link rib, and its one end is pivotally supported 30 in the vicinity of the receiving rib 22, and the other end is pivotally supported 32 on the one end of the second rib 10b. The link rib 28 constitute a four-side link mechanism 34 between the link rib 28 and the receiving rib 22 and the ribs 10a and 10b. Numeral 36 denotes a first connecting rod made of a resilient wire, and its one end is pivotally supported 38 in the vicinity of the other end of the first rib 10a, and its other end is pivotally supported 40 on one end of the third rib 10c.

**[0014]** The first connecting rod 36 constitute a four-side link mechanism 44 between the ribs 10a and 10b. Numeral 46 denotes a second connecting rod made of a resilient wire, and its one end is pivotally supported 48 in the vicinity of the other end of the second rib 10b, and its other end is pivotally supported 50 of one end of

the connecting rod 18. The middle portion of the second connecting rod 46 is slidably engaged with an engaging member 42 formed in the middle portion of the third rib 10c.

**[0015]** The second connecting rod 46 constitutes a four-side link mechanism 52 between the ribs 10b and 10c and the connecting member 18. The third rib 10c is formed with a side curved portion 54 and an inclined portion 56, and the side curved portion 54 forms a clearance so that the other portion 19c' toward the connecting member 18 of the rib 10c is not superposed on the one portion 10b' of the rib 10b.

**[0016]** Furthermore, the inclined portion 56 is arranged to be adjacent so that the other portion 10c' of the rib 10c and the one portion 10b' of the rib 10b are in close contact. On the ribs 10a, 10b, 10c, and 10d, a canopy is spanned with an umbrella cloth or material (illustration is omitted).

**[0017]** In the following, an operation of the embodiment of this invention will be described.

**[0018]** When the middle rod 2 extends and the lower unit 6 slides upward with the middle rod 2 as an axis, the rib 10a lifts by the receiving rib 22, and the rib 10a swivels in a direction as shown in Fig. 2 where an angle  $\alpha$  formed with the middle rod 2 expands with the upper unit 8 as a pivot. According to the swiveling motion of the rib 10a, the rib 10b swivels in a direction where an angle  $\beta$  formed with the rib 10a expands by the operation of the four-side link mechanism 34 having the link rib 22 as a constituting element.

**[0019]** Furthermore, due to a change of the angle  $\beta$  of the rib 10b against the rib 10a, the rib 10c swivels in a direction where an angle  $\gamma$  formed with the rib 10b expands by the operation of the four-side link mechanism 44 having the first connecting rod 36 as a constituting element. Furthermore, according to a change of an angle  $\gamma$  formed with the rib 10b against the rib 10c, the connecting member 18 swivels in a direction where an angle  $\theta$  with the rib 10c expands by the operation of a four-side link mechanism 52 having the second connecting rod 46 as a constituting element.

**[0020]** When the lower unit 5 lifts to an upper end engaging position of the middle rod 2, each rib 10a, 10b, 10c, 10d, as shown in Fig. 3, form a straight line, and produces the umbrella in open condition. In this condition, the lower unit 5 is engaged with the middle rod 2 in releasable condition by a repulsion (illustration is omitted). When the engagement of the lower unit 5 is released, and the lower unit 5 slides in a lower direction along the middle rod 2, each rod 10a, 10b, 10c, 10d is folded as shown in Fig. 1 by the operation opposite the foregoing operation.

**[0021]** At this time, the other side 10c' of the rib 10c is disposed adjacent to the one side 10b' of the rib 10b by the presence of the side curved portion 54 and the inclined portion 56, and they are not superposed in the radial and/or vertical direction, and each rib 10a, 10b, 10c, 10d is folded in compact form. Furthermore, the mid-

dle rod 2 reduces its size and the folding of the umbrella completes.

**[0022]** As described in the foregoing, this invention is so constructed that the telescopic umbrella becomes a compact construction.

## Claims

1. Telescopic umbrella, wherein an upper unit (8) is provided on an upper end of an extendable slide type middle rod (2), and a lower unit (5) is slidably provided on the middle rod (2) and an end of a main rib (10) consisting of four pieces of mutually and axially supported ribs (10a), (10b), (10c), (10d) is pivotally supported (12) on the upper unit (8), and the main rib (10) and the lower unit (5) are connected by means of a receiving rib (22) and each rib (10a), (10b), (10c), (10d) of the main rib (10) forms a straight line by interlocking motion with the vertical sliding motion of the lower unit (5) whereby the ribs are folded,  
**characterized in that** among the ribs of the main rib (10), a side curved portion (54) is formed on the third rib (10c), and when the main rib (10) folds, a portion (10c') of the opposite side of a pivotal portion (16) of the third rib (10c) with the second rib (10b) is not superposed with a portion (10b') of opposite side of the pivotal portion (16) of the second rib (10b).
2. Telescopic umbrella according to claim 1, **characterized in that** an inclined portion (56) is formed on the third rib (10c), and when the main rib (10) folds, a portion (10c') of opposite side of the pivotal portion (16) of the second rib (10b) is positioned adjacent to a portion (10b') of opposite side of the pivotal portion (16) of the second rib (10b).
3. Telescopic umbrella according to claim 1 or 2, **characterized in that** a link rib (28) is mounted on a space formed between the receiving rib (22) and the second rib (10b) of the main rib (10), and a four-side link mechanism (34) is formed between the receiving rib (22) and the main rib (10), and the first rib (10a) and the third rib (10c) are connected by means of a first connecting rod (36), and the second rib (10b) and the fourth rib (10d) are connected by means of a second connecting rod (46), and a four-side link mechanism (44) and (52) are formed respectively between the first connecting rod (36) and the main rib (10) and between the second connecting rod (52) and the main rib (10).
4. Telescopic umbrella, preferably according to any one of the preceding claims, wherein the umbrella comprises foldable main ribs or arms (10) each having pivotably connected ribs (10a-d),

**characterized in**

**that** portions of the ribs (10b, 10c) are offset to the longitudinal extension of its respective main rib or arm (10) in unfolded condition so that these portions are located adjacent to each other and transversely offset to said longitudinal extension in the folded condition, of the respective main rib or arm (10).

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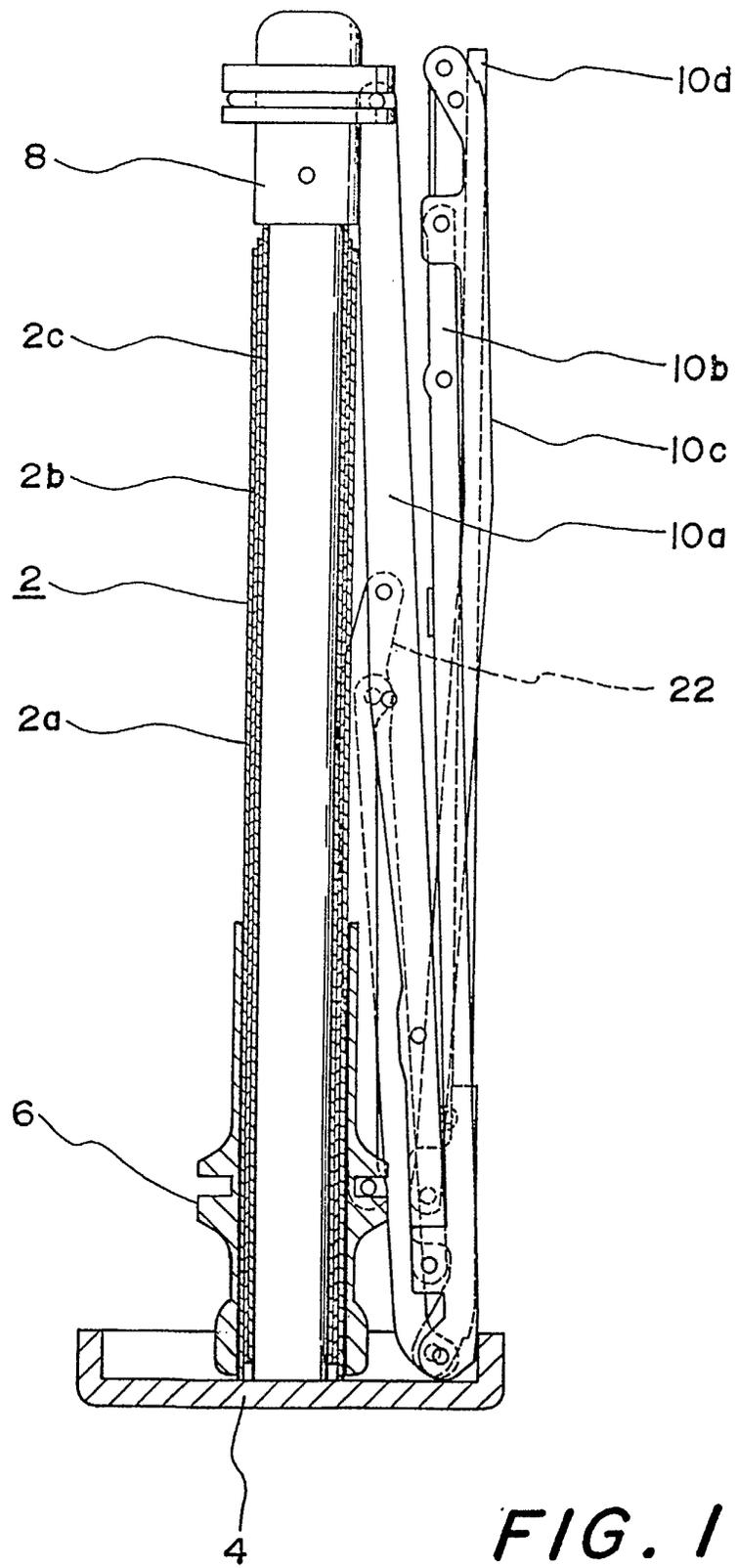
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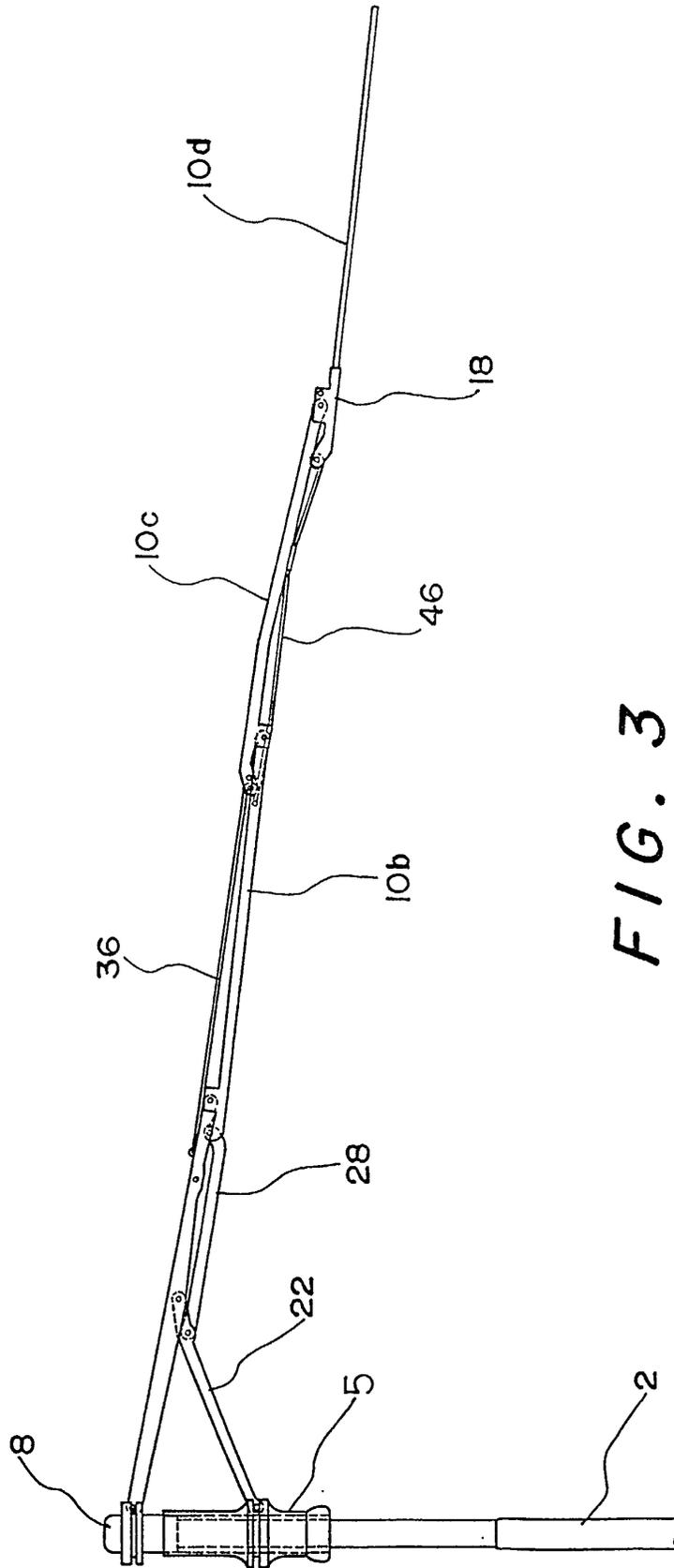


FIG. 3

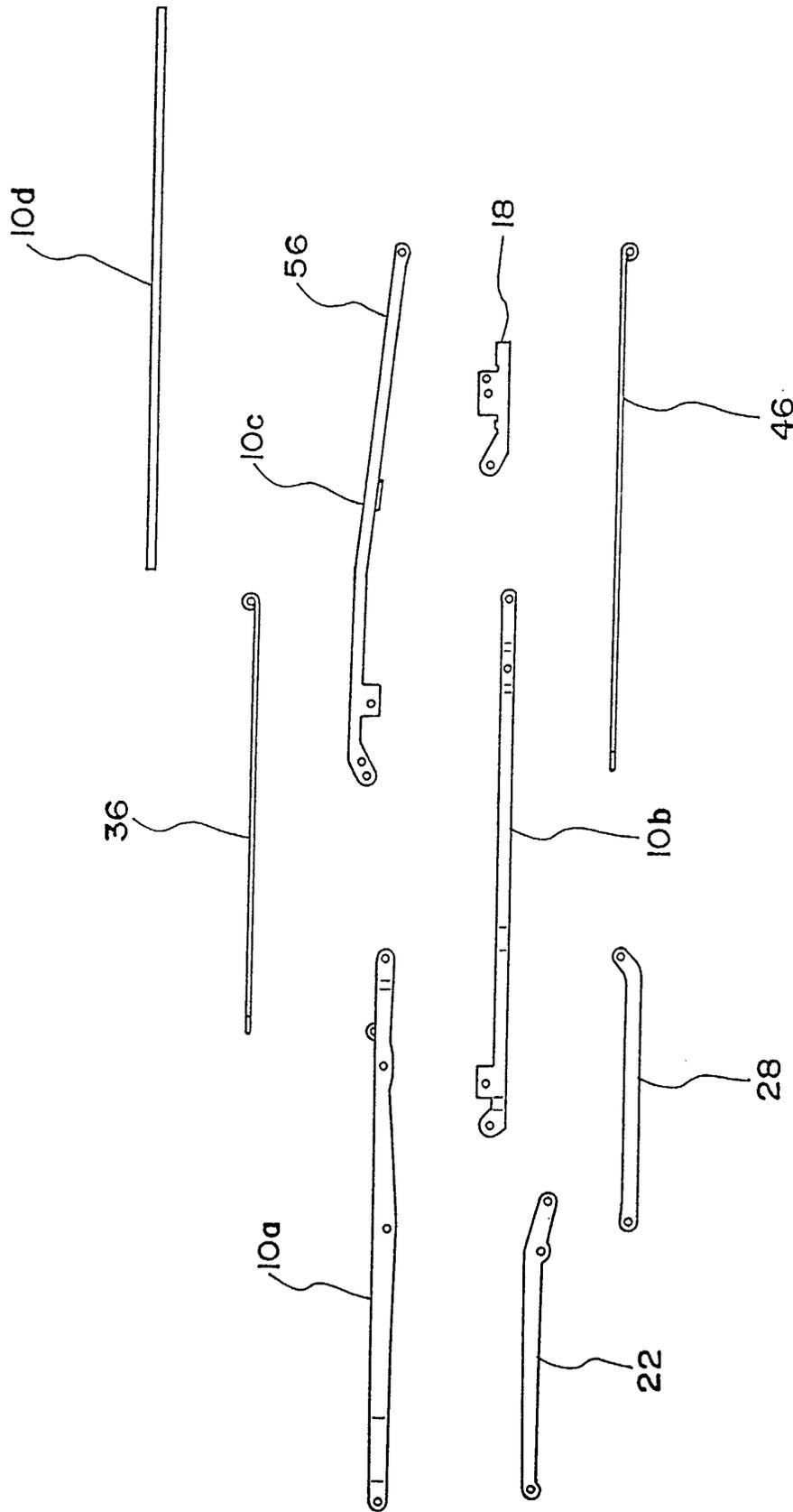


FIG. 4

(A) **FIG. 5** (B)

