

April 13, 1965

V. MILITANO
UNITARY UMBRELLA FRAMES
Filed Jan. 8, 1962

3,177,883

FIG. 1

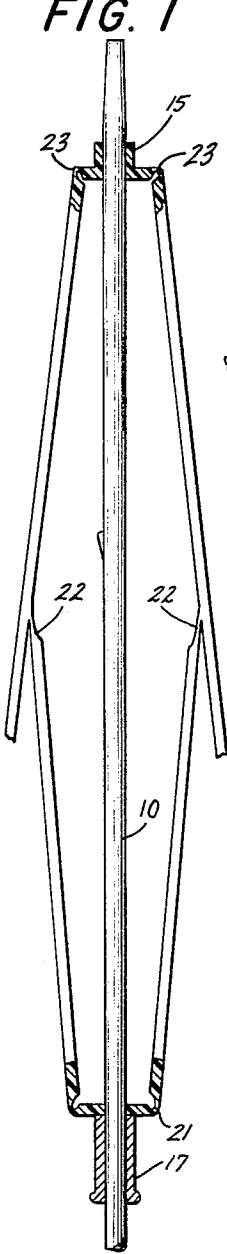


FIG. 2

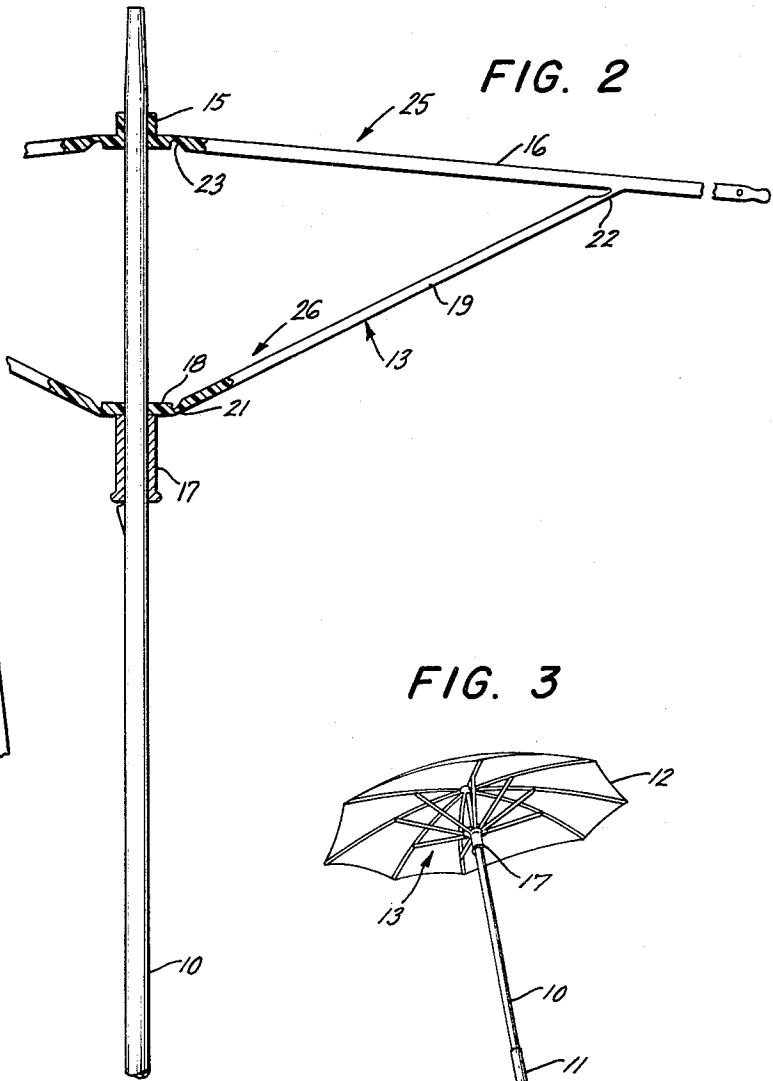
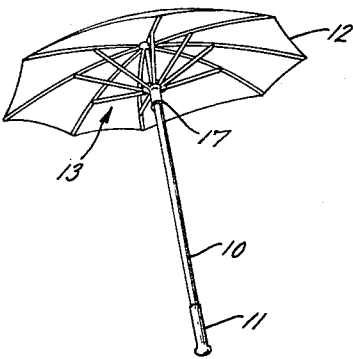


FIG. 3



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UNITARY UMBRELLA FRAMES

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Filed Jan. 8, 1962, Ser. No. 164,658

4 Claims. (Cl. 135—20)

This invention relates to umbrella frames and more particularly to umbrella frames of unitary or integral construction.

Umbrella frames, from the inception of the umbrella industry, have comprised a notch, runner, ribs and stretchers, formed as separate members and joined together with the inner ends of the ribs pivoted to the periphery of the notch and with one end of the stretchers pivoted to an intermediate point of the ribs and the other end pivotally secured to the runner. The latter slides up and down the umbrella pole and is held in its upper or umbrella open position by a spring catch and usually locked in its lower or umbrella closed position by a spring detent or catch. Universally, the ribs and stretchers are made of metal, usually steel. Customary practice is to stamp these parts from suitable stock. The notch and runner are also usually of metal, commonly steel. To produce the frame it is necessary to pivotally secure the ends of the ribs to the notch and the opposite ends of the stretchers to the laps on the ribs and the runner, respectively. Usually, the ribs are secured to the notches by wiring small eyes or openings on the ends of the ribs to the notch, with the ribs radially positioned relative to the notch. The ends of the stretchers are invariably pinned to the laps on the ribs and to the periphery of the runner, respectively, to provide pivoted joints at the points of jointure. The securing of the ribs to the notch and of the stretcher to the ribs and runner is a laborious and time-consuming operation, requiring considerable manual labor.

It is among the objects of the present invention to provide an umbrella frame which can be produced simply and relatively inexpensively, with the ribs and the stretchers so constructed in the localities where they join the notch and runner, respectively, and where the stretchers join the ribs also, as to provide hinges in these localities, permitting the opening and closing of the umbrella frame in a manner generally similar to conventional umbrella frames and yet not requiring the laborious and time-consuming assembly of the parts of the umbrella frame.

Another object of this invention is to provide a one-piece or integral umbrella frame in which the notch is joined to the ribs, the runner to one end of the stretchers, and the other end of the stretchers to the ribs, in each case by a self-hinge which is produced simply and inexpensively.

These and other objects and advantages of the present invention will be apparent from the following detailed description of a preferred embodiment of this invention taken in connection with the accompanying drawing, showing same for purposes of exemplification, and in which:

FIGURE 1 is a fragmentary side elevational view of an umbrella frame embodying this invention, showing the frame in partially closed condition;

FIGURE 2 is a fragmentary side elevational view of this frame in the open position of the umbrella; and

FIGURE 3 is a perspective view of an umbrella embodying the frame of this invention.

Referring to the drawings, as shown in FIGURE 3, the umbrella frame of this invention is particularly designed for use in producing umbrellas such as the so-called hand, rain or sun umbrellas, comprising a rod, pole or shank 10 having a handle 11 and a cover 12 of fabric, plastic or other suitable material which is maintained in the open

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or extended condition, shown in FIGURE 3, by a frame 13 to which the cover is secured. FIGURE 3 shows this frame in the open or extended position.

The umbrella frame 13 comprises a notch 15, ribs 16 radiating from the periphery of the notch 15, and a runner 17 having a collar 18 from which radiates the stretchers 19. These parts can be of any desired shape, that shown in the drawing representing one exemplification. The stretchers 19 are joined to the collar 18 by self-hinges 21 and to the ribs 16 at a point intermediate the length of the ribs by self-hinges 22. The ribs 16 are joined to the notch 15 by self-hinges 23. Each of these self-hinges is constituted of a flattened area of reduced thickness, as clearly shown in the drawings, and as more fully explained hereinafter. The number of ribs and stretchers will of course depend upon the size or style of the umbrella frame. For hand umbrellas, an umbrella frame having about 8 to 16 radiating ribs spaced approximately 45° to 22.5° apart, respectively, can be used, but the number can be varied as desired, since the invention is not limited to any particular number of ribs and cooperating stretchers.

As indicated, the ribs 16 and stretchers 19 may be shaped as desired. For example, they may be substantially polygonal in cross-section, rectangular, square, circular or other shape except in the area where the self-hinge is produced. The ribs 16 may be substantially straight, as shown in the drawings, or can have the free extremities arced or bent downwardly to produce any desired known shape of umbrella canopy, when the umbrella is open.

In forming the umbrella frame of this invention, the upper spider 25, consisting of the notch 15, having the ribs 16 radiating therefrom, can be molded in one mold, as one piece, and the lower spider 26, consisting of the runner 17 having the collar 18 integral therewith and the stretchers 19 radiating from collar 18 molded separately in a second mold. The two spiders 25 and 26 thus produced are joined at the self-hinges 22 which are located where the ribs and stretchers join. Employing thermoplastic material such as polypropylene, this joint can readily be made by heat and pressure or by heat alone to fuse the portion of the rib in contact with the self-hinge ends of the stretchers and then permit cooling to take place to form an integral joint contiguous to the self-hinges 22 where one end of each stretcher 19 is joined to a rib 16 intermediate the length of the rib. In so molding the parts, the self-hinges 23 between each rib 16 and the periphery of the notch 15 and the self-hinges 21 between each stretcher 19 and the periphery of the collar 18 are formed integrally, the mold being so designed to cause the formation of a thinner hinge area corresponding to self-hinges 21, 22 and 23 in these localities of these portions of the frame.

Alternatively, instead of molding the upper spider 25 and the lower spider 26 and then joining these two spiders to form the one-piece or integral frame, the frame constituted of these parts can be molded in one piece, employing a special mold which can be assembled to provide a mold cavity conforming to the shape of the frame and after the frame has set and hardened, can be disassembled to permit removal of the one-piece umbrella frame.

Polypropylene is the preferred material of construction for frame 13. Polypropylene, of all the plastic materials now available, has the desired properties of rigidity when formed in suitable thickness, for example about 1/4", to produce the ribs 16 and stretchers 19 and the desired flexibility and resistance to fatigue upon repeated flexing when formed of reduced thickness, for example about 1/16" or less, to produce the self-hinges 21, 22 and

23. Particularly outstanding is the property of polypropylene when formed in thickness of about $\frac{1}{16}$ " to $\frac{1}{32}$ " or even less to produce the self-hinges 21, 22 and 23, having remarkable fatigue characteristics upon flexing. The umbrella frame can be opened and closed many thousands of times without weakening the hinges 21, 22 and 23 to the point where they lose their effectiveness. Polypropylene is also preferred because it is light in weight, resistant to microorganisms, has exceptionally good tensile properties, is water repellant, is readily available and is comparatively inexpensive.

Polypropylene, commercially available, having molecular weights in range of about 150,000 to 500,000 and melt indices of from about 1 to 5, can be used but the invention is not limited to such polypropylenes but includes umbrella frames made of plastic or other material in which the plastic can be other grades of polypropylene or other plastics which can be molded, or materials which can be formed to produce the umbrella frame, having the desired rigidity when made of suitable thickness and flexibility to provide the self-hinges 21, 22 and 23 of reduced thickness.

It will be noted the present invention provides an umbrella frame, preferably of polypropylene, in which the notch is integral with the ribs having self-hinges at the ends thereof adjacent the notch, the runner is integral with the stretchers having self-hinges at the ends thereof adjacent the runner and the stretchers are also integral with an intermediate area of the ribs and have self-hinges at the opposite ends thereof adjacent the ribs. These one-piece frames can be molded or otherwise formed readily of plastic material, preferably polypropylene, as hereinabove described.

While a rain umbrella is shown in FIGURE 3, the umbrella frame of this invention can be used in producing garden, beach, and other umbrellas, with or without handles.

Since different embodiments of the one-piece or integral umbrella frames hereinabove described can be made without departing from the scope of this invention, it is intended that all matter contained in the above description or shown in the accompanying drawing be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A one-piece umbrella frame comprising a notch, a runner, ribs joined to the notch and radiating therefrom and stretchers joined to the ribs and to said runner, the notch and runner each being molded of plastic material which when set is rigid, each of the ribs being molded of plastic material and being relatively rigid except for the portion thereof where the rib is joined to the notch, which portion is thinner than the remainder of the rib and constitutes a self-hinge where the rib joins the notch,

each of said stretchers being molded of plastic material and being relatively rigid except for the terminal ends thereof which are thinner than the thickness of the remainder of the stretcher and form self-hinges with a rib and the runner, respectively.

2. A one-piece umbrella frame comprising a rigid notch, a rigid runner, ribs joined to the notch and radiating therefrom and stretchers joined to the ribs and to said runner, the notch and runner each being molded of polypropylene, each of the ribs being of polypropylene and being relatively rigid except for the portion thereof where the rib joins the notch, which portion is markedly thinner than the remainder of the rib and constitutes a self-hinge where the rib joins the notch, each of said stretchers being of polypropylene and being relatively rigid except for the terminal ends thereof which are markedly thinner than the thickness of the remainder of the stretchers and form self-hinges where the stretcher joins a rib and the runner, respectively.

3. A one-piece umbrella frame molded from plastic material, said frame comprising a notch, ribs radiating from said notch molded integrally with said notch to produce said ribs each having a relatively rigid intermediate portion and a flexible end joined to the notch thus forming a self-hinge of plastic material capable of repeated flexing without fatigue at the joint between said rib and the notch; a runner; stretchers radiating from said runner molded integrally with said runner to produce said stretchers, each having a relatively rigid intermediate portion and a flexible end joined to the runner, thus forming a self-hinge of plastic material capable of repeated flexing without fatigue at the joint between said stretcher and the runner; and each stretcher having its opposite end flexible and joined to a rib at a point intermediate the length of the rib by a self-hinge joint of plastic material capable of repeated flexing without fatigue.

4. An umbrella frame as defined in claim 3, in which the notch, runner, ribs and stretchers are molded of polypropylene.

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