Jan. 20, 1953 H. KASTON ET AL 2,625,946

INFLATABLE UMBRELLA

Filed Nov. 29, 1948

FIG. 1

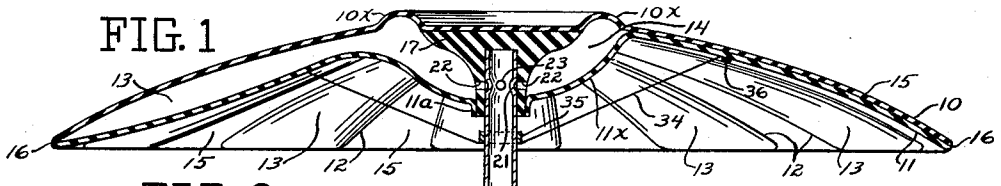


FIG. 2

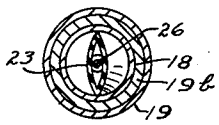
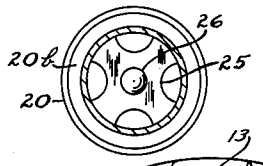


FIG. 3



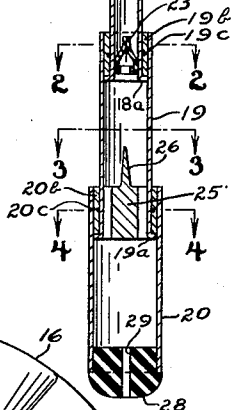


FIG. 4

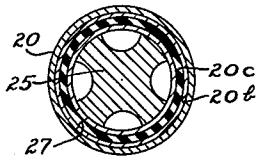


FIG. 5

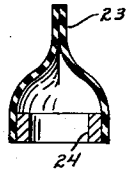


FIG. 6

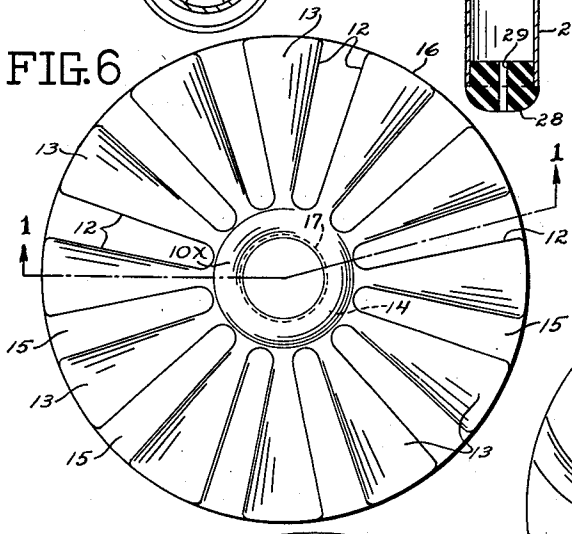


FIG. 8

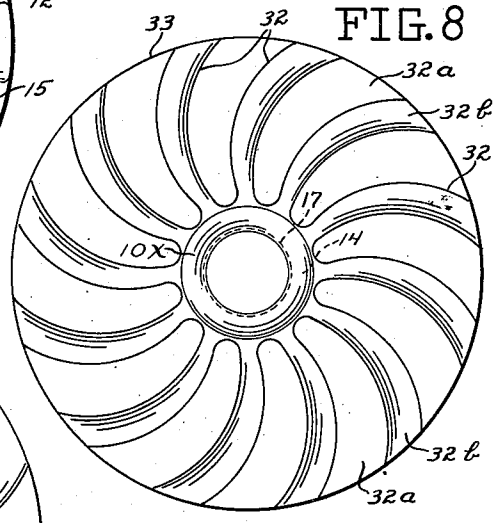
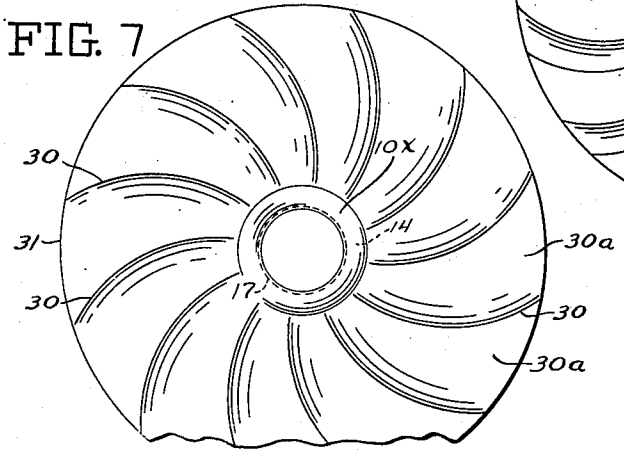


FIG. 7



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INFLATABLE UMBRELLA

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3 Claims. (Cl. 135—20)

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This invention relates to inflated umbrellas.

Its chief objects are economy of manufacture, attractiveness and durability of the product, and convenience in the matter of inflation and deflation of the umbrella.

Of the accompanying drawings:

Fig. 1 is a vertical section, on line 1—1 of Fig. 6, showing an umbrella embodying our invention in its preferred form, in condition for use.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a section on line 3—3 of Fig. 1.

Fig. 4 is a section on line 4—4 of Fig. 1.

Fig. 5 is a vertical middle section, on a larger scale, of a check valve shown in Fig. 1.

Fig. 6 is a top plan view of the umbrella shown in Fig. 1.

Fig. 7 is a top plan view of a modification.

Fig. 8 is a top plan view of another modification.

In making the umbrella shown in Figs. 1 to 6, two initially flat pieces 10 and 11 of flexible and preferably slightly elastic sheet material, cut to circular shape, and with a central hole cut in the sheet 11, are seamed to each other, while they are in generally flat condition, preferably by means of a die, along the continuous line 12 having the configuration that is clearly shown in Fig. 6, so that they define a set of radially extending air-pockets 13, 13 each opening at its inner end into space 14 between the central portions of the two sheets.

Preferably the sheets 10 and 11 are of a heat-plastic material, adapted to be inexpensively heat-seamed to each other. Examples of desirable materials are polymerized and plasticized vinyl chloride or vinyl acetate or copolymers of the two; polyvinyl butyrol; cyclized chlorinated rubber (Pliofilm); plasticized polyethylene; and polyvinylidene. Water-proofed and air-impervious woven fabric, preferably having a coating adapting it to be seamed by simple application of heat and pressure, can be employed.

Both sheets preferably are left intact in the areas 15, 15 between the air pockets and preferably the sheets are heat-seamed to each other throughout the circle of their outer peripheries, along the line 16, Figs. 1 and 6, so that a failure of any part of the seam 12 will not result in escape of air to the atmosphere, the air escaping only into one of the inter-pocket areas.

The two sheets are associated with a molded rubber mushroom-shaped member 17 having a head portion and a socketed neck portion, as shown in Fig. 1. The central area of the upper sheet 10 is secured, as by means of an adhesive, to the entire area of the upper face of the head

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of the member 17. The lower sheet 11, has the neck portion of the member 17 occupying its central hole and air-tightly bonded, as by means of an adhesive, to an annular flange portion 11*a* of the sheet, preferably formed by heat-shaping of the sheet around the hole.

The head member 17 preferably is mounted between the sheets 10 and 11 before they are seamed to each other, so that the central opening in the lower sheet does not have to be temporarily enlarged to admit it.

The umbrella preferably is provided with a telescoping handle or shaft comprising a plurality of sections of thin-walled metal tubing such as the sections 18, 19 and 20.

The upper section 18, has its upper end fitting tightly in and gripped by, and preferably adhered to, the wall of the socketed neck of the member 17, and for passage of inflating air the metal tube section is formed, as by spinning, with an annular groove 21 in its outer face. This groove is in communication with a pair of holes 22, 22 extending through the wall of the neck of the member 17, and a hole 23 through the wall of the metal tube, at the position of the groove 21, completes the communication between the interior of the tube section 18 and the central space 14, which is in communication with the air pockets 13 defined by the seamed sheets 10 and 11.

Mounted in the lower end portion of the metal tube 18 is a suitable check-valve 23, which can be a rubber flutter-valve as shown, cemented in place and preferably provided with a metal reinforcing ring 24 in its base.

For automatically opening the valve 23 when the telescopic handle is collapsed, a spider 25 is secured, as by a press fit, in the lower end of the middle tube section 19, and is formed with a central, upwardly projecting, valve-opening pin 26 adapted to open the valve 23 as shown in Fig. 2 as the tube section 19 approaches the limit of its upward movement on the section 18.

The tube sections 18 and 19 are formed at their lower ends with respective outwardly bent flanges 18*a* and 19*a*, adapted to act as stops, in the extending of the handle, by abutting respective bushings 19*b* and 20*b* press-fitted in the upper ends of the tube sections 19 and 20.

To provide against excessive escape of air in the inflation of the umbrella respective rubber rings 19*c* and 20*c* can be set in annular grooves formed in the inner faces of the respective bushings 19*b* and 20*b*, the rings sealing against the respective tube sections that they surround and also providing sufficient friction against them to provide adequate resistance against unintended

collapsing of the telescopic handle. Each ring can be formed of an initially straight length of a circular section strip of rubber, which is bent to ring shape and mounted in the groove in the bushing, with its ends abutting each other as shown at 27 in Fig. 4.

The lower end of the lowest tube section 20, has stuck into it a rubber plug 28 having an ornamental head and formed with a through aperture 29 for passage of air.

The canopy portion of the umbrella, comprising the sheets 10, 11, is shown in Fig. 1 as being downwardly curved toward its outer periphery. It takes this shape, upon being inflated, by reason of the fact that the air pockets 13, 13, as shown clearly in Fig. 6, progressively from their inner ends toward their outer ends, occupy a progressively increasing percentage of the successive circles of the assembly, so that their upward and downward bulging in being inflated causes a progressively increasing shortening of the circles. Thus the canopy, instead of having flat or merely conical form, is held to the downwardly curved shape.

Alternatively, however, for pleasing appearance, the sheets 10 and 11 can be seamed to each other as shown in Fig. 7, in which they are joined only by generally radial but whorl-like seams 30, 30 and a peripheral seam 31, or they can be seamed to each other as shown in Fig. 8, where they are joined by a set of generally V-shaped, whorl-like seams 32, 32 and a peripheral seam 33.

In Fig. 7 there are no flats between the air pockets 30*a*, 30*a*, other than the seams themselves, whereas in Fig. 8 there are flats 32*a*, 32*a*, between the air pockets 32*b*, 32*b*. In the structures of both of those figures, straightening of the curved pockets by inflation is prevented by chordal zones or reaches of the sheets, in somewhat the way that the string of an archer's bow holds the bow to curved shape.

When the canopy is formed by seaming the sheets as in Fig. 7 or Fig. 8, the umbrella takes, upon being inflated, a somewhat dished or conical shape by reason of a balancing of forces in the central regions of the two sheets, which is a factor also in the shaping of the Fig. 1 embodiment by the inflation.

Referring to Fig. 1, the upper sheet 10, being adhered to the upper face of the member 17 throughout its extent, and the seam 12, like the seams 30, 30 in Fig. 7 or 32, 32 in Fig. 8, coming close but not quite to the member 17, inflation of the canopy can produce an upward annular bulge 10*x*, of the sheet 10, of only short radius of curvature.

In contrast to this, there is a much greater reach of the lower sheet 11, from the low and near-center position of its central flange 11*a* to the nearest parts of the radial seams, because of which the inflation produces an annular downward bulge 11*x*, of the sheet 11, of relatively long radius of curvature.

As the strains in the bulges 10*x* and 11*x* are of course proportional to their radii of curvature, a downward dishing of the canopy is an incident of the balancing of all of the strains resulting from the inflation, inclusive of those in the bulges 10*x* and 11*x* and those in the walls of the air pockets. Where the downwardly bulged wall 11*x* merges with the downwardly bulged wall of each air pocket the balancing of strains apparently involves a downward and inward pull on the last mentioned wall at positions farther out than the inner limits of the seams and this apparently is a factor in the assuming of cone shape by the canopy.

If desired, the sheets 10 and 11 can be given either conical or curved-canopy form, either by seaming or heat-shaping or both, before or after they are seamed to each other as described.

An advantage of the umbrella as described is that it can be turned inside out by wind without damage to it, and can readily be turned right-side out again by simply holding it against the wind.

If desired, the umbrella can readily be provided with flexible stay cords 34, 34 to resist its being blown inside out, by mounting the cords as connections between a metal ring 35, press fitted on the tube section 18, and respective tabs such as the tab 36, of suitable material heat-welded to the lower face of the sheet 11 at the positions of the radial seams.

As the check-valve 23 is in the uppermost tube section 18 of the handle, it is not essential that the telescopic joints be perfectly air tight.

As the peripheral portion of the canopy consists only of thin and highly flexible sheets, the umbrella has a high degree of safety against the eye injuries that sometimes occur in the use of ordinary umbrellas.

The manner of assembling, inflating, using, collapsing, and storing of the umbrella will be manifest from the foregoing description.

In the foregoing description and in the appended claims the expression "heat-plastic material" is intended to mean a material that becomes plastic upon merely being heated, to less than a destructive temperature, as distinguished from vulcanized rubber, for example, the heat-plastic character of the material adapting it to be seamed to itself by the simple application of heat and pressure.

In the appended claims the word "dished" is intended to be inclusive of both curved and conical canopies.

Further modifications are possible within the scope of the appended claims.

We claim:

1. An inflatable umbrella comprising an inflatable, flexible canopy, a telescoping handle having one of its sections hollow and in direct sealed communication with the canopy, a check-valve in that section, and means on an adjacent telescopic handle section for automatically opening the check-valve as an incident of the collapsing relative movement of the two sections.

2. An inflatable umbrella comprising as its canopy two thin and flexible pieces of sheet material so seamed to each other, with pronouncedly non-radial seam-margins, as to define a set of outwardly flared air pockets spaced apart and connected, circumferentially of the assembly, by non-inflating tie reaches of at least one of the said pieces of sheet material, the set of seams being so disposed and so spaced apart, circumferentially of the assembly, that, in circular zones of the assembly succeeding one another at progressively greater distances from the center of the assembly, there is a progressively increasing ratio of the part of the circle represented by the pockets to the part of the circle represented by the tie reaches, such that upon inflation the canopy is urged, by the inflation, toward a pronouncedly dished shape, by reason of baying out of the walls of the pockets by the inflation.

3. An inflatable umbrella comprising as its canopy two thin and flexible pieces of sheet ma-

terial so joined to each other as to define a set of air pockets extending outwardly from the central region of the assembly, and central rigid means which with the central portions of the said pieces defines a central air chamber having an upper flexible wall attached to said means at such position and of such radial extent, and a lower flexible wall attached to said means at such position and of such radial extent, that, in inflated condition, the said lower wall constitutes tie means holding the canopy to dished shape.

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