

[54] ILLUMINATED PAVILION UMBRELLA

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[58] Field of Search 135/1 D, 2, 20 M, 20 R, 135/46 T, DIG. 10; 240/6.42; 52/63, 73

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[57] **ABSTRACT**

A decorative and portable pavilion umbrella is disclosed for use in outdoor open areas such as court-

yards and promenades to provide covering from sun and precipitation and having upper and lower cooperating membranes which obscure the unfurling mechanism and interior illuminating means to enhance its use as a decorative architectural member. The umbrella mast is formed in two tubular sections, the lower of which may be removably inserted in a receptacle fixed in the pavilion floor and the upper of which rides within the lower section for furling and unfurling the umbrella. The lower mast section has a collar fixed thereto for securing the inner edge of the lower membrane and its support cables and has a number of pivotable support arms mounted thereon. The upper mast section has a cup member on its upper end for securing the inner edge of the upper membrane and its support cables, and also mounts a number of upper and lower pivotable support arms, the lower of which are connected to the pivotable support arms on the lower mast section. The outer edges of the upper and lower membranes are connected with their support cables to the outer ends of a number of sleeve members which ride on the upper support arms of the upper mast section and which are connected to the support arms on the lower mast section. The unfurled umbrella may be readily furled by manually operating a screw jack mechanism which elevates the upper mast section causing the support arms to pivot inwardly toward the mast axis furling the upper and lower membranes.

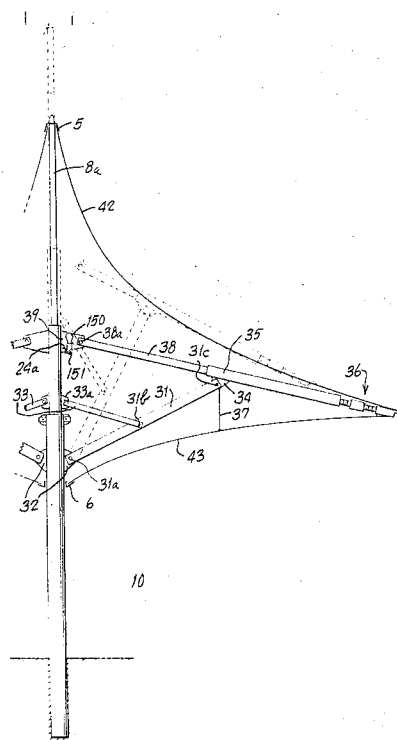
9 Claims, 18 Drawing Figures

Fig. 1.

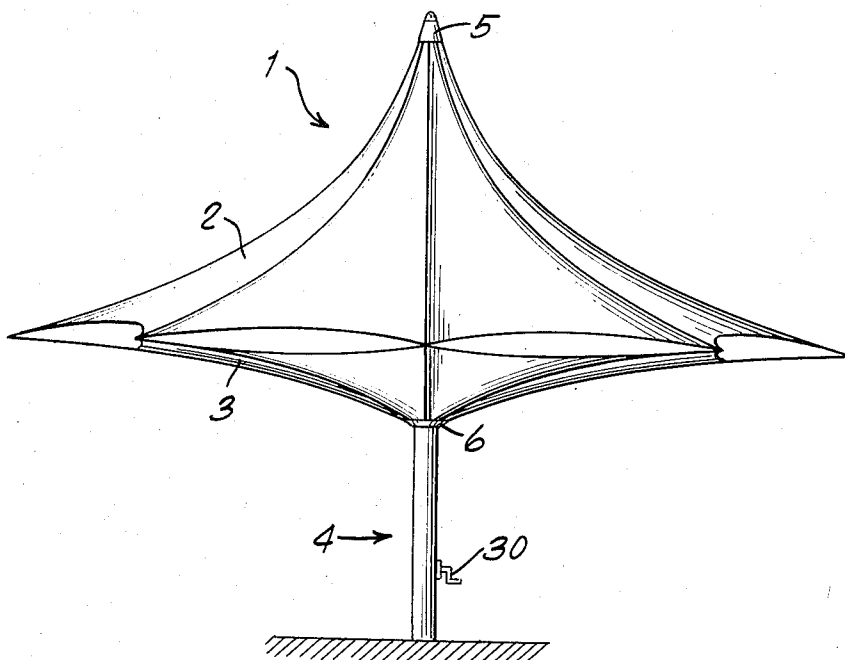


Fig. 2.

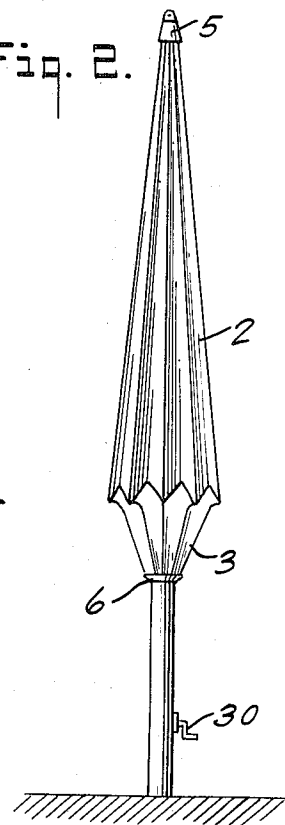


Fig. 7.

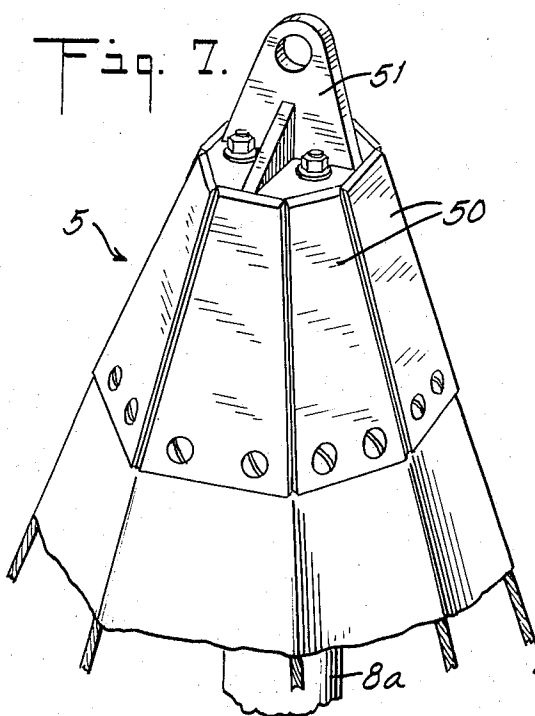
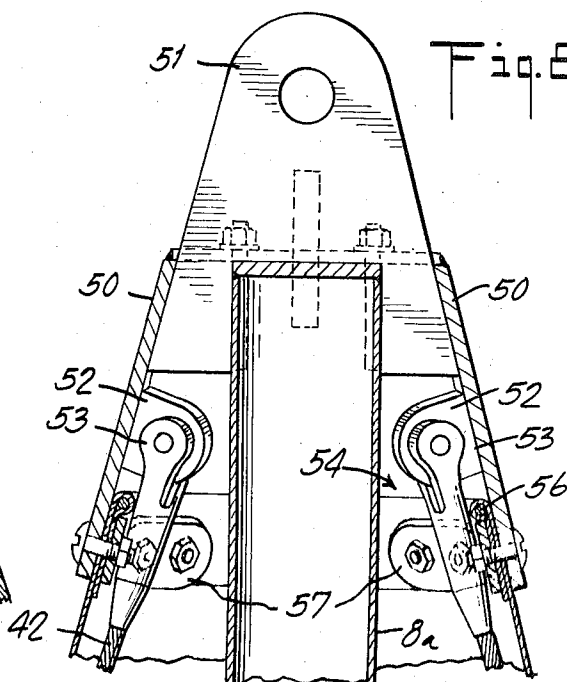


Fig. 8.



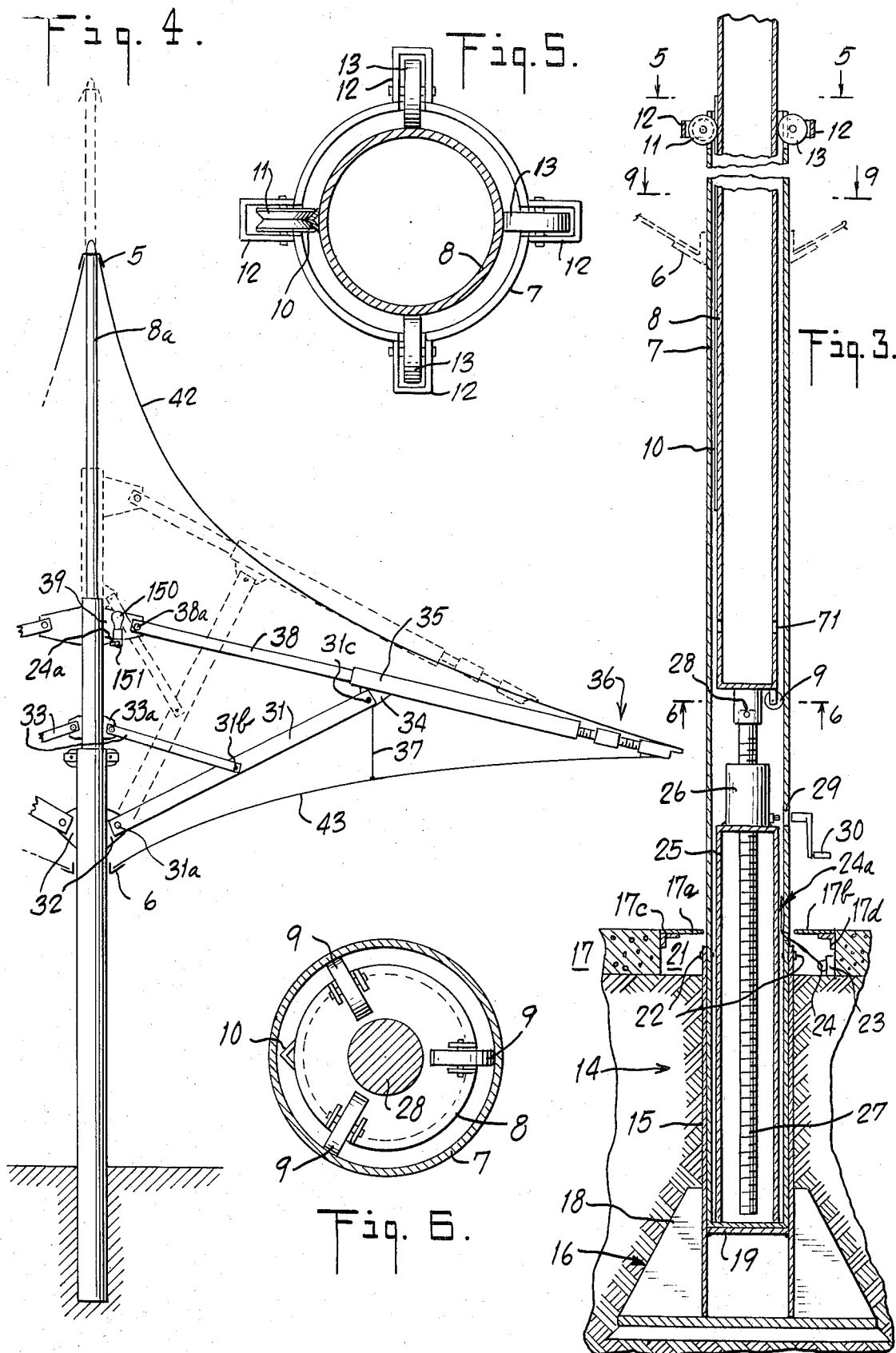


Fig. 9.

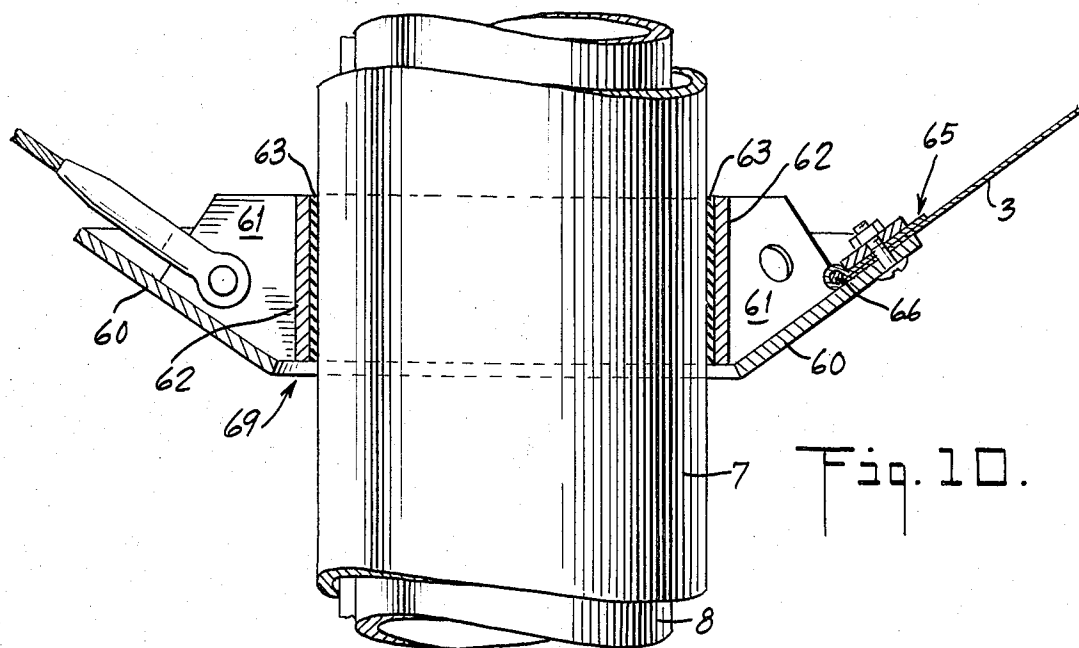
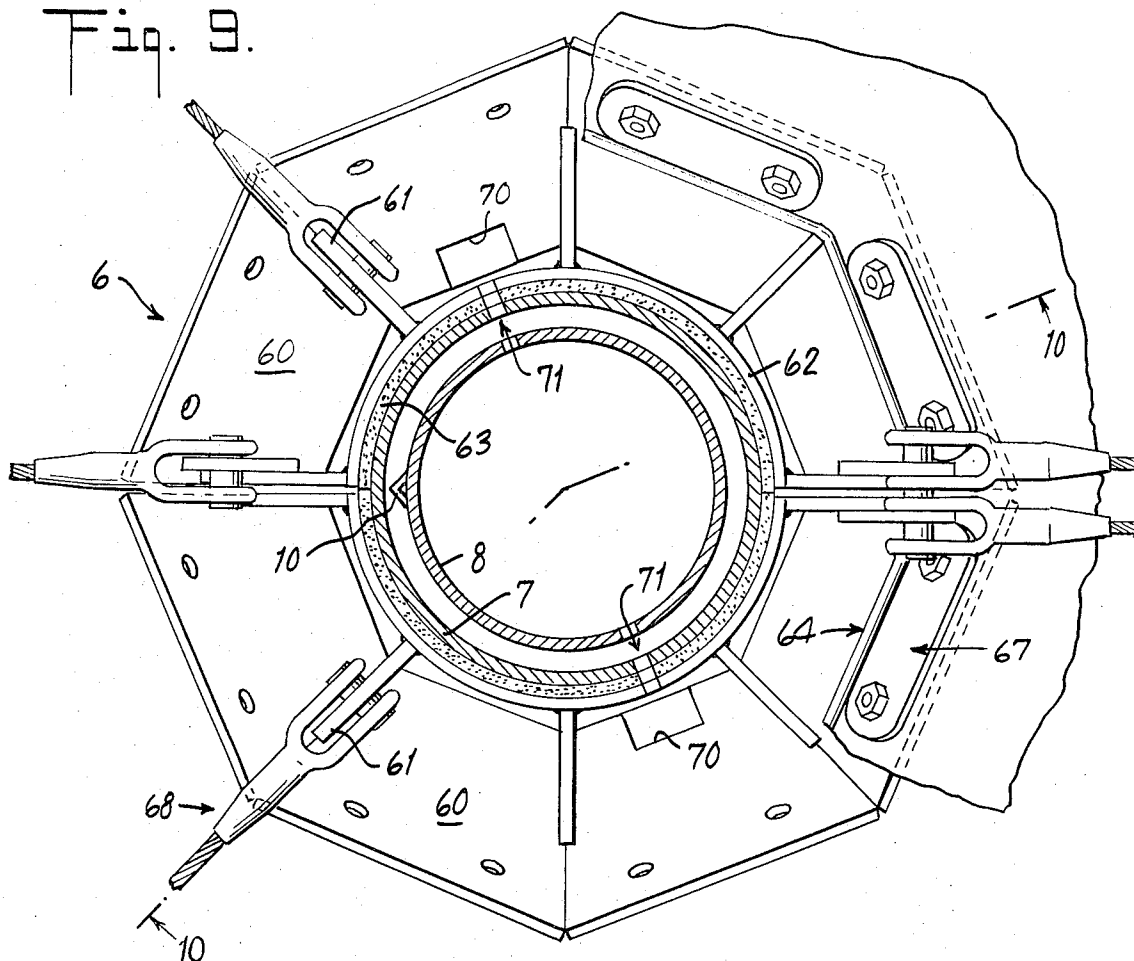
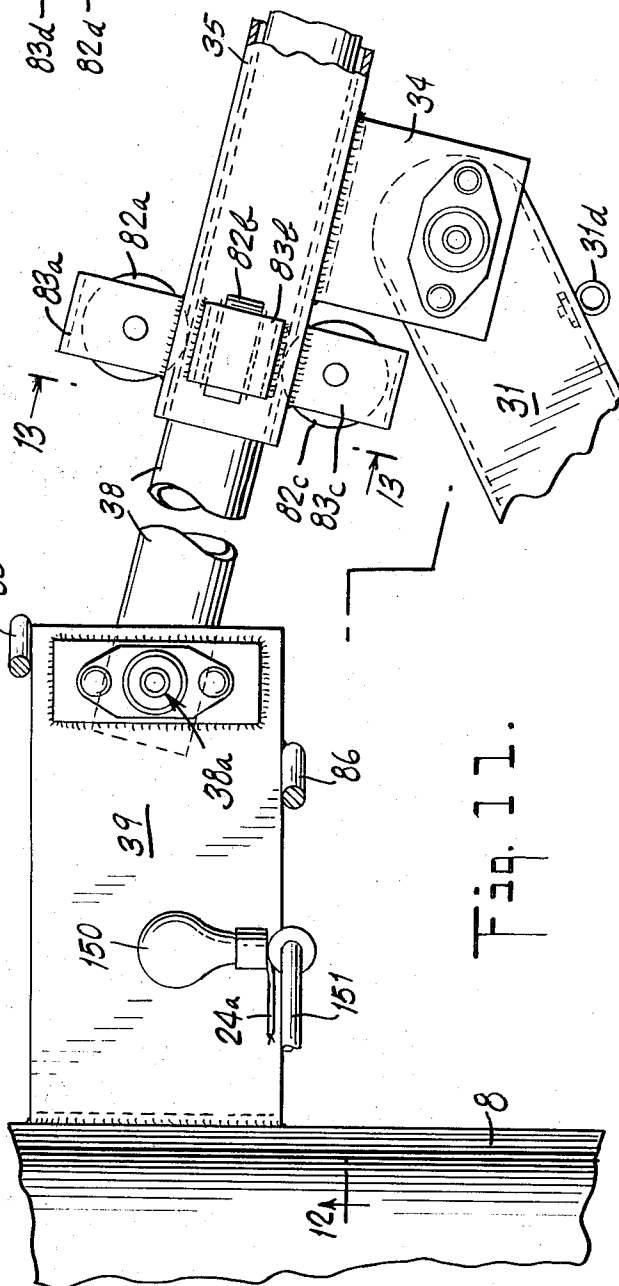
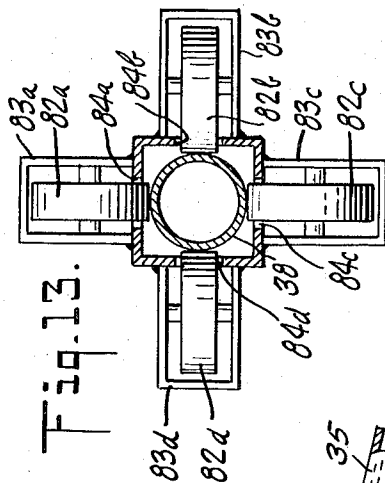
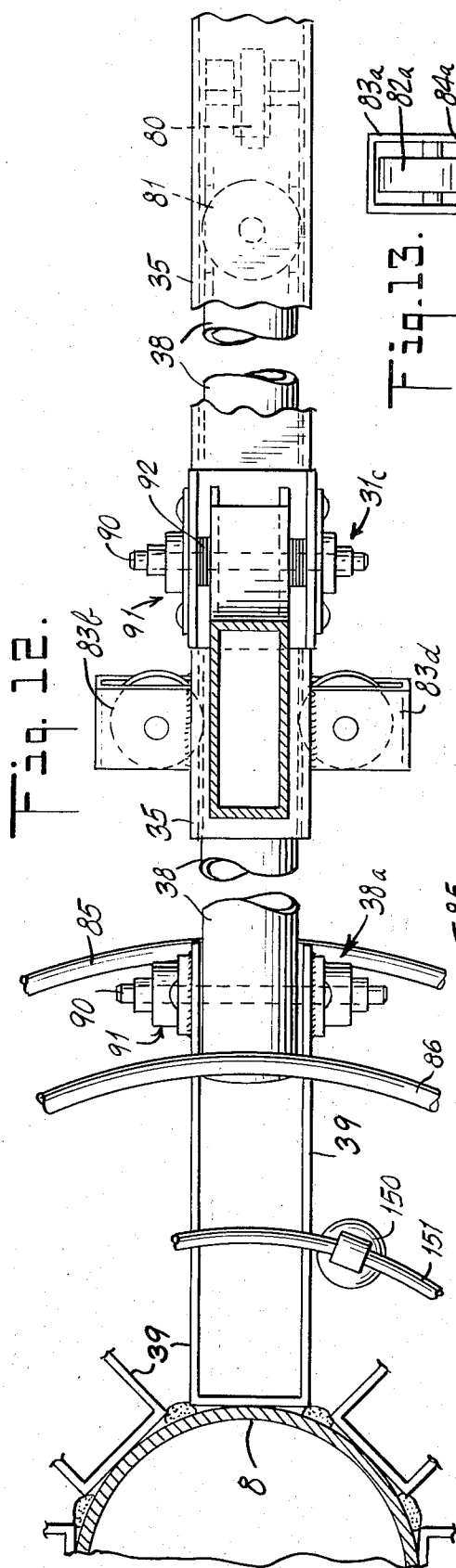
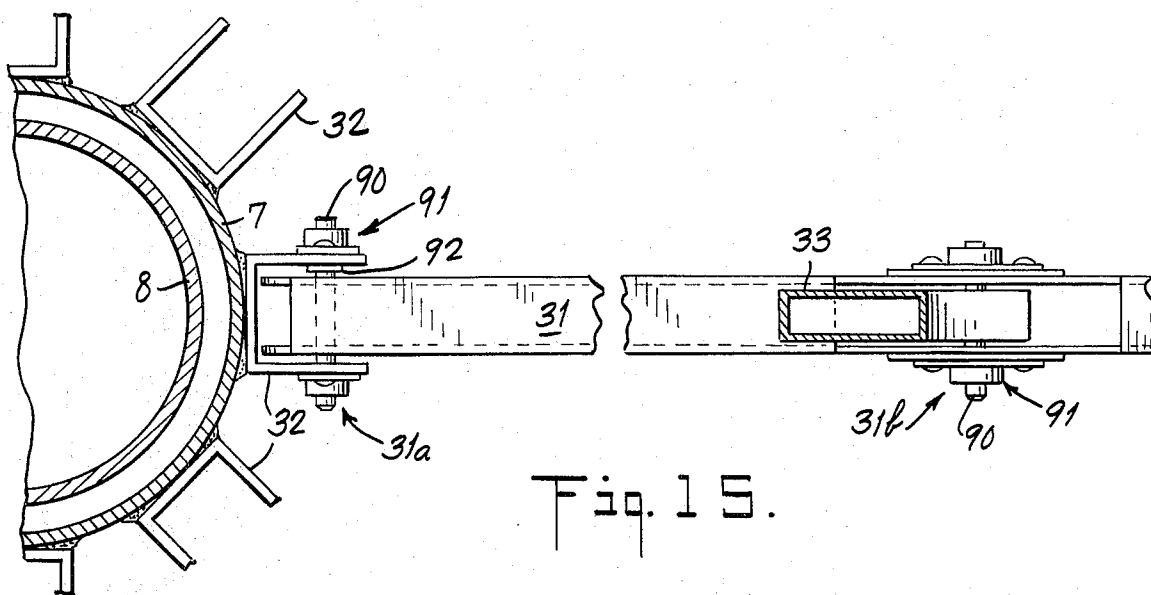
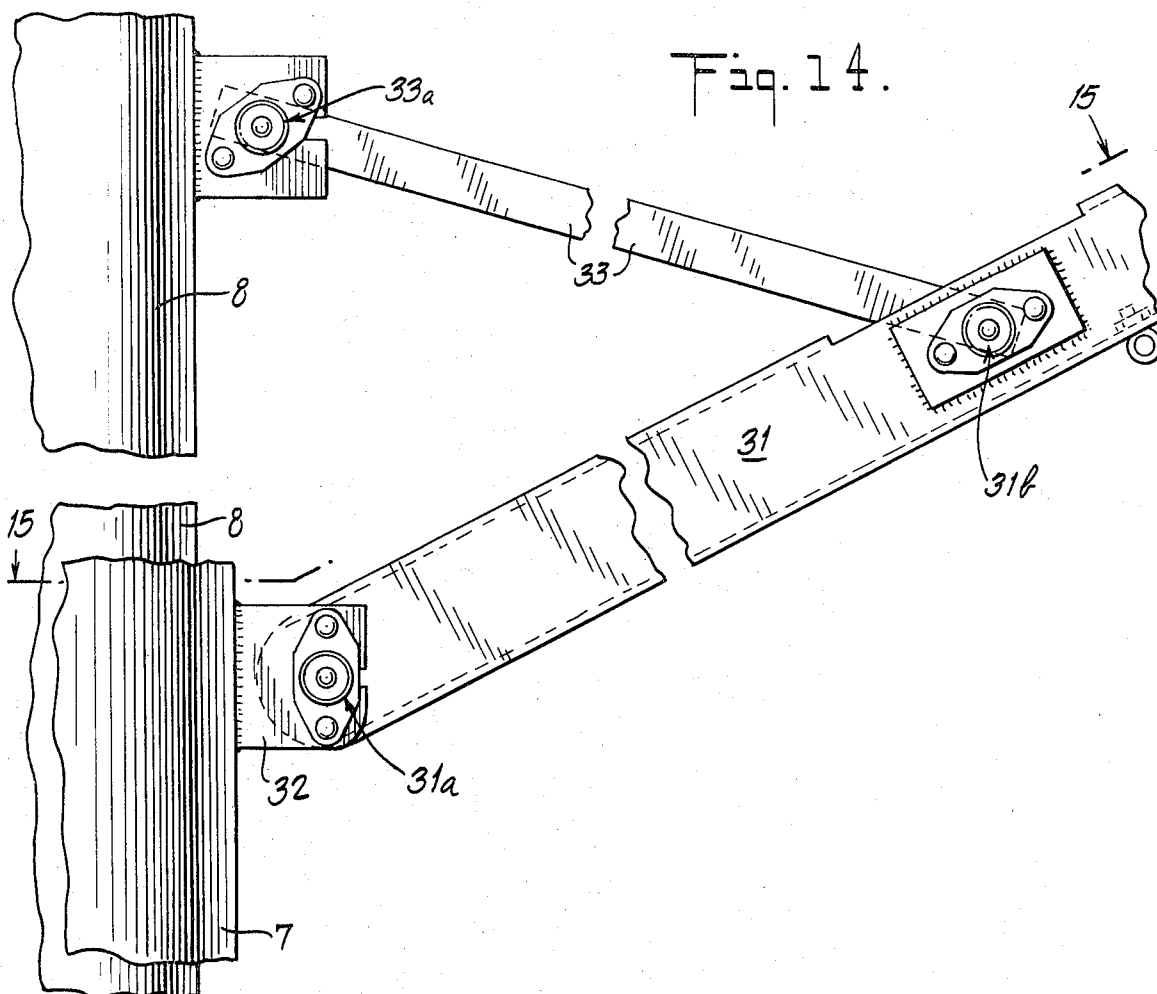
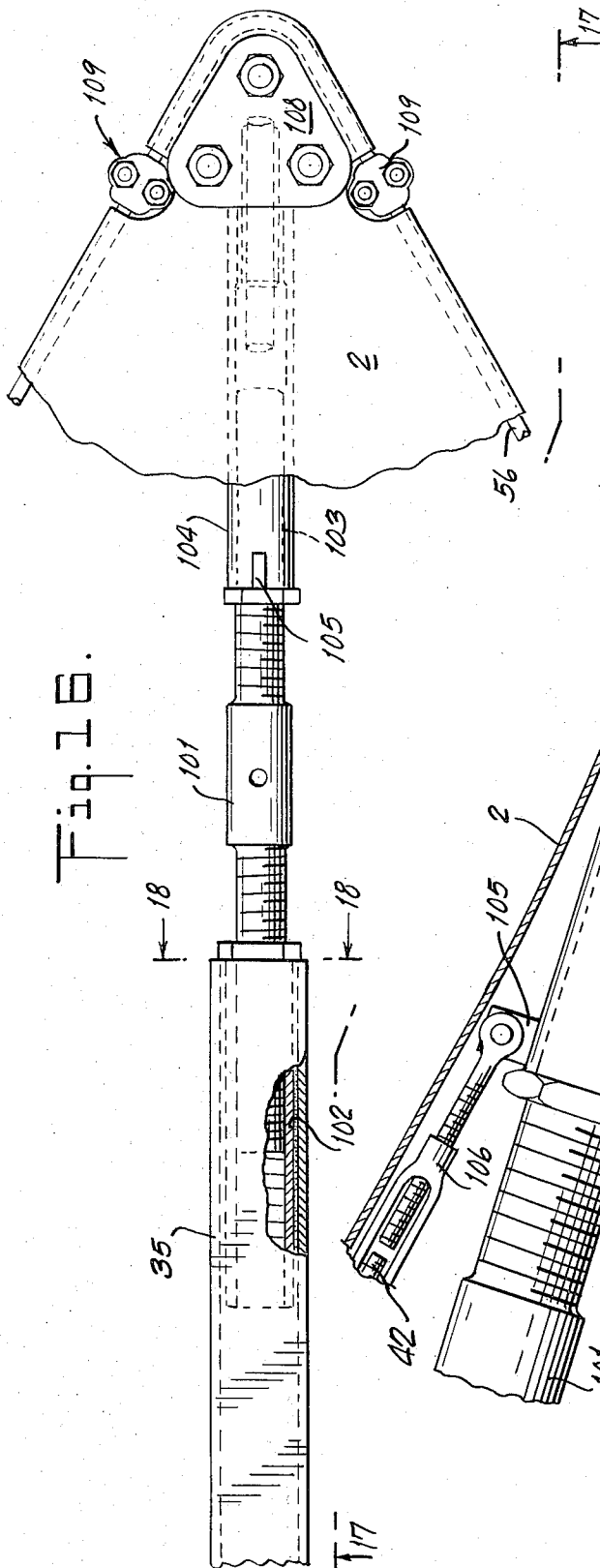


Fig. 10.

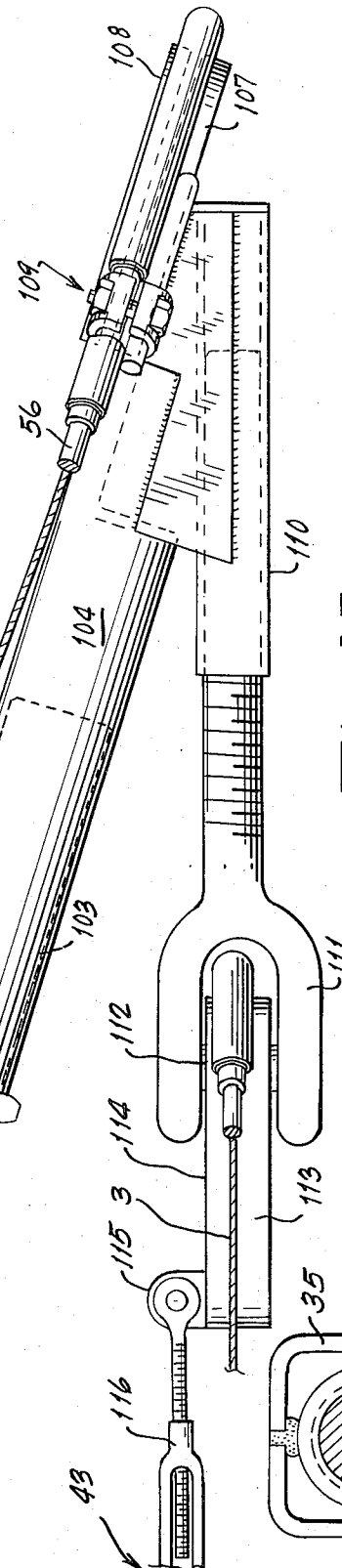


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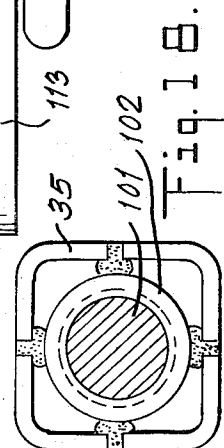




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ILLUMINATED PAVILION UMBRELLA

BACKGROUND OF THE INVENTION

The present invention relates to a decorative retractable roofing structure, or more particularly a portable protective umbrella for pavilions and the like, including illuminating means in its interior.

Recent architectural innovations have included large furlable umbrella structures which serve as retractable roofing over plazas, terraces and similar open areas to provide protection against the weather when necessary, and yet offering the versatility of being furlable or removable when not required. These structures have taken many forms and have generally been rather complex in construction involving multi-element towers and masts, networks of cables and, in some instances, inflatable membrane members.

The present invention is intended to provide a roofing or pavilion-forming umbrella of simplified construction which is both decorative and functional and offering the advantages of prior retractable roofing structures while obviating many of the disadvantages.

SUMMARY OF THE INVENTION

The present invention embodies a portable pavilion umbrella having upper and lower membranes whose inner edges are respectively attached to upper and lower tubular mast members. The upper mast member rides within the lower one and is extendable therefrom to furl the umbrella. The two membranes are supported by respective sets of cables connected at one end to the mast members, and both membranes have their outer edges attached, along with the other ends of the cables, to suitable fittings mounted on the outer ends of a number of sleeve-like members. The sleeve-like members are slidably mounted on respective support arms pivoted to the upper mast member and are fixedly connected to respective support arms pivoted to the lower mast member. The lower mast member may be removably inserted in a suitable receptacle which is permanently installed in the pavilion floor and the umbrella may be readily furled or unfurled by means of a screw-jack mechanism which respectively extends or retracts the upper mast member within the lower one. Illuminating means may be mounted on the mid-part of the upper mast member, obscured from direct view within the cooperating membranes while providing exterior lighting through the membranes.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view in elevation of an unfurled umbrella in accordance with the present invention.

FIG. 2 is a view as in FIG. 1 showing the umbrella in the furled position.

FIG. 3 is a sectional view of the lower portion of the umbrella mast showing the details of the furling and unfurling mechanism and of the mast mounting socket in the floor of a pavilion.

FIG. 4 is a view in elevation of the membrane support structure and illustrating its movement during the furling operation.

FIG. 5 is a sectional view taken along the lines 5—5 in FIG. 3.

FIG. 6 is a sectional view taken along the lines 6—6 in FIG. 3.

FIG. 7 is a view in perspective of the cap member on the top of the upper mast member.

FIG. 8 is a sectional view of the cap member showing the membrane and cable connections for supporting the inner edge of the upper membrane.

FIG. 9 is a sectional view taken along the lines 9—9 in FIG. 3 illustrating the mounting collar for the inner edge of the lower membrane and its supporting cables.

FIG. 10 is a sectional view taken along the lines 10—10 of FIG. 9.

FIG. 11 is a fragmented side view illustrating the structural details of the support arm furling mechanism.

FIG. 12 is a sectional view taken along the lines 12—12 in FIG. 11.

FIG. 13 is a sectional view taken along the lines 13—13 in FIG. 11.

FIG. 14 is a fragmented side view showing the structural details of the lower support arm mechanism.

FIG. 15 is a sectional view taken along the lines 15—15 in FIG. 14.

FIG. 16 is a top view showing the structural details of the mechanism for connecting the outer edges of the upper and lower membranes and their support cables.

FIG. 17 is a side view taken along the lines 17—17 in FIG. 16.

FIG. 18 is a sectional view taken along the lines 18—18 in FIG. 16.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIG. 1, the unfurled umbrella 1, in accordance with the present invention, is seen externally to comprise an upper membrane 2 and a lower membrane 3 disposed on a tubular support mast 4 with the inner edge of the upper membrane 2 held in a cap member 5 and the inner edge of the lower membrane 3 held in a collar member 6. The membranes, 2 and 3, are prestressed when fully unfurled and are of a weather-resistant material such as a polyester coated on both sides with vinyl. A particularly suitable fabric is Shelterlite style 7126, manufactured by Domestic Film Products Corporation, Detroit, Mich., having a weight of 26 ounces per square yard with a grab tensile strength of 500 × 550 pounds per inch. Such a fabric is available in various colors so that the membranes on a particular umbrella or on an array of umbrellas can be color coordinated to produce a pleasing decorative effect.

The umbrella 1 may be furled into the configuration shown in FIG. 2 by extending an upper part of the supporting mast 4 causing the outer portion of the lower membrane 3 to be folded up within the outer portion of the upper membrane 2. The interior mechanism for accomplishing the furling operation is shown more particularly in FIGS. 3 and 4. It will be seen that the supporting mast 4 comprises a lower tubular member 7, an upper tubular member 8 which rides within the lower member 7, and a staff member 8a mounted on member 8, having the cap member 5 at its upper end. As seen in FIGS. 3 and 6, the upper mast member 8 is provided at its base with three spacer wheels 9 to prevent it from tilting off axis with respect to the lower mast member 7 within which it rides. A keying strip 10 is also provided on the surface of the upper mast member 8 to prevent the rotation thereof about its axis with respect to the lower mast member 7. The keying strip 10 cooperates with a grooved wheel 11 disposed in a suitable bracket 12 at the top of the lower mast member 7.

Three more spacer wheels 13 are mounted on similar brackets 12 at the top of the lower mast member 7 to facilitate the smooth riding of the upper mast member 8 therein.

The lower mast member 7 is removably mounted in a socket 14 which is permanently installed in the floor of the pavilion. As seen in FIG. 3, the socket 14 comprises a tubular casing 15 which rests on or is attached to a footing or pedestal, which may be in the form, for example, of a structural slab 16 buried in the ground beneath the layer of concrete 17 forming the pavilion floor. The tubular casing 15 may be secured against movement and rotation by the welding thereto of flange members 18 also buried beneath the pavilion platform. A shim member 19 may be welded inside the tubular casing 15 at a level which will insure that each of the umbrellas on the platform extend the same distance below floor level. For an umbrella having a lower mast member of about 11 feet in length, about 3½ feet of the lower end should extend below the floor level. The upper end of the socket casing 15 does not extend to the floor level, but rather extends into a generally circular opening 20 in the pavilion platform. The space 21 within the opening 20 provides access to the upper portion of the socket casing 15 so that when the lower mast member 7 is inserted in the socket, lock pins 22 may be inserted or screwed into cooperating openings in the two members. This space 21 also leaves room available for the provision of an electrical outlet 23 into which a plug 24 at the end of an electrical supply line 24a disposed in the interior of the lower mast member 7 may be inserted. Two semicircular cover plates or liftout caps 17a and 17b, having cutouts to accommodate the mast, may be disposed on mounting rails 17c and 17d fixed to the wall of the space 21. These plates 17a, 17b may be put in place after the umbrella has been installed to close off the opening 20 and after the umbrella has been removed, a solid circular plate may be inserted to cover the opening.

The mechanism for extending and retracting the upper mast member 8 may comprise any suitable form of power transmission means, but preferably is in the form of a manually operated screwjack mechanism. As shown in FIG. 3, a tubular support member 25 is mounted in the lower end of the lower mast member 7 with the screwjack operator 26 mounted on its upper end. The operating screw member 27 extends into the support interior and is attached at its upper end by a pin means 28 to the lower end of the upper mast member 8. An access hole 29 is provided in the side of the lower mast member 7 to permit a removable operator handle 30 to extend into the interior of the mast to drive the operator 26. Rotation of the handle 30 will raise or lower the screw member 27 within the operator 26 accordingly extending or retracting the upper mast member 8 within the lower mast member 7 to respectively furl and unfurl the umbrella 1.

The interior support mechanism for the umbrella is shown in FIG. 4. The two membranes 2 and 3 are each supported by a series of cables 42 and 43 attached at their inner ends respectively to cap member 5 and collar number 6 and at their outer ends to membrane edge securing means 36. Further, a series of lower support struts 31 are rotatably attached by pin means 31a to brackets 32 fixed to the lower mast member 7 above the collar member 6. These support struts 31 are also rotatably pinned, at about their midpoints, by pins 31b

to respective bracing members 33 which are pivoted at 33a to the upper mast member 8. The upper ends of the support struts 31 are pivoted at 31c on brackets 34 connected to respective sleeve members 35 which accommodate at their outer ends, the means 36 for securing the outer edges of both membranes 2 and 3. The upper ends of the support struts also have connected to their undersides respective tie cords 37 which are attached to the lower membrane support cables 43 to maintain the contour of the lower membrane 3 in the unfurled condition and which facilitate the furling of the lower membrane 3. The sleeve members 35 are mounted on and ride along respective upper support struts 38 whose inner ends are rotatably pinned at 38a to brackets 39 on the upper end of the upper mast member 8.

In operation, when the umbrella is in the unfurled condition, as indicated in solid lines in FIG. 4, the screwjack is operated to extend the upper mast member 8 from within the lower mast member 7. As the upper mast member 8 rises, the sleeve members 35, which are connected through the lower support struts 31 to the stationary lowermast member 7, will tend to ride inwardly along the upper support struts 38 by virtue of the pivoting of the support braces 33 and upper support struts 38 fixed to the upwardly moving upper mast member 8. Movement of the series of sleeve members 35 toward the axis of the support mast 4 will draw the outer edges of both membranes along with them toward the mast axis. The tie cords 37 connected to the underside of support struts 31 will draw the lower membrane 3 upwardly within the upper membrane 2 until the upper mast member 8 reaches its uppermost position at which point the umbrella will be furled as shown in FIG. 2. Conversely, to unfurl the umbrella 1 the upper mast member 8 is drawn into the lower mast member 7 causing the sleeve members 35 to move away from the mast axis outwardly along the upper support struts 38, thus extending the upper and lower membranes, 2 and 3, outwardly until they reach their fully extended unfurled position, as seen in FIG. 1.

Although the dimensions of the structural elements making up the umbrella may be varied, a preferred embodiment will be about 23 feet high from the floor level to the top when unfurled and be extendable to about 27 to 27.5 feet when furled. The radius of the unfurled umbrella will be about 15.5 feet and the height of the inner edge of the lower membrane above the floor will be about 7.5 feet to permit adequate clearance underneath. The series of cooperating supporting struts and sleeve-like members will comprise eight sets spaced symmetrically and extending radially outward from the mast axis.

The various preferred structural details of the essential components of the umbrella are shown in the remaining figures. Firstly, the cap member 5, which is mounted atop the mast staff member 8a for supporting the inner ends of the upper membrane 2 and its support cables 42, is shown in FIGS. 7 and 8. The cap member 5 comprises a series of welded plates 50 forming a truncated prism, with a fitting 51 on top to permit the attachment of a hoisting cable for inserting and removing the umbrella 1 from the socket 14 by means of a crane or other lifting device. The interior of the plate members 50 have tabs 52 welded thereon for pinning the connectors 53, swaged on the ends of the membrane support cables 42, thereto. The reinforced inner edge 54 of the upper membrane 2, provided with an extra

layer of fabric 55 and a monocord rope 56, is fastened to the interior of cap member 5 by a series of clamp plates 57 which are bolted to the cap plates 50 and hold the membrane edge 54 between them. The rope 56 may be of one-fourth inch diam. soft PVC monocord and cotton webbing.

The inner edge 64 of the lower membrane 3 is fastened to the collar member 6 fixed on the lower mast member 7 and shown in detail in FIGS. 9 and 10. The collar member 6 is fabricated from steel plates 60, welded to upstanding tabs 61 which are welded in turn to an annular ring member 62. A neoprene layer 63 is disposed between the annular ring 62 and the outer surface of the lower mast member 7. The reinforced inner edge 64 of the lower membrane 3, provided with an extra layer 65 of fabric and a monocord rope 66 disposed within its edge, in the manner of the upper membrane edge 54, is also bolted to the plates 60, in the same manner as the inner edge of the upper membrane, by plates 67 and the support cable connectors 68 are pinned to the upright tabs 61. The lower edges of the plates 60 are spaced from the lower edge of the ring member 62 and the outer surface of the lower mast member 7 allowing for openings 69 in the lower part of the collar member 6 about the lower edge of the ring member 62. Cutouts 70 are provided in two diametrically opposed plates 60 and cooperating holes 71 are provided through the ring member 62, the neoprene collar 63, and the upper and lower mast members 8 and 7 to permit a locking pin to be inserted through the assemblage to lock the mast members in the furled condition.

FIGS. 11-13 show the details of the supporting strut furling mechanism. Each of the upper supporting struts 38 is pinned at 38a for rotation within a respective bifurcated bracket 39 which is welded to the upper mast member 8. The outward end of each supporting strut 38 is fitted with a roller 80 and rides within a sleeve member 35 which may be rectangular in section. Another roller 81 is also provided near the end of the supporting strut 38 with its axis disposed at right angles to the first roller 80 and the sleeve-like member 35 has four orthogonally disposed spacer wheels 82a-d, mounted in external brackets 83a-d, for guiding the relative movement of the support strut 38 and the sleeve-like member 35. The four spacer wheels 82a-d extend inwardly through openings 84a-d in the sleeve-like member 35 and ride on the surface of the supporting strut 38 as shown in FIG. 13. All of the wheels are preferably pressed steel truck wheels with ball bearing mountings.

The upper ends of the lower support struts 31 are each pinned by pin means 31c for rotation within a respective bifurcated bracket 34 welded on the underside of the cooperating sleeve-member 35 and each has a suitable eye bolt 31d for attaching a tie-cord 37 for furling the lower membrane 3. A ring member 85 for protecting the membrane when furled is welded to the tops of the bifurcated brackets 39 attached to the upper mast member 8 and a similar ring 86 of smaller diameter is welded to their undersides.

The pivot connections for the lower ends of the supporting struts 31 to the lower mast member 7 at 31a, and for both ends of the supporting braces 33 to the upper mast member 8 at 33a and the lower supporting struts 31 at 31b are shown in FIG. 14. These connections and all of the pin connections may comprise cot-

ter pins 90 disposed in radial bearings 91, such as NICE No. 6908, and with nylon washers and spacers 92.

The means 36 on the outer ends of the sleeve members 35 for securing the outer edges of membranes 2 and 3, as well as their respective supporting cables 42 and 43, are shown in detail in FIGS. 16-18. More particularly, each comprises an adjustment member 101 having threaded ends, one end of which is screwed into an internally threaded receptacle 102 welded inside the outer end of the sleeve member 35. The other threaded end of the member 101 is screwed into an internally threaded opening 103 in a tubular member 104 which has the fittings for holding the cables and membrane edges mounted thereon. The inner end of the tubular member 104 has a tab 105 for attaching a turnbuckle 106 thereto for securing the outer end of an upper membrane support cable 42. At the other end of tubular member 104 there is welded a triangular plate member 107 which cooperates with a similar plate member 108 to hold the outer edge of membrane 2 under the clamping action of clamping means 109. The lower outer end of tubular member 104 has an internally threaded member 110 for receiving the threaded end of a bifurcated rod member 111. The bifurcated end of rod member 111 contains a crosspin 112 which holds another set of plate members 113, 114 for clamping the outer edge of lower membrane 3. The upper one of these plates 114 has tab 115 thereon to which a turnbuckle 116 is connected which holds the outer end of a lower membrane support cable 43.

The illumination means for the portable umbrella are located internally and may be suitable incandescent lamps 150 mounted on a ring member 151 welded to the undersides of the bifurcated brackets 39 attached to the upper mast member as shown in FIGS. 4, 11, and 12.

It will be seen then that the present invention provides a roofing or a pavilion-forming umbrella of simplified construction which is both decorative and functional and offering the advantages of prior retractable roofing structures while obviating many of their disadvantages.

I claim:

1. A roofing umbrella apparatus comprising:

an upper membrane having an inner edge and an outer edge;

a lower membrane having an inner edge and an outer edge;

a mast means for supporting said upper and lower membranes and including:

a lower base member having an elongated chamber therein;

an upper member riding within said chamber in said lower base member and extendable upward therefrom;

means on said lower base member for holding the inner edge of said lower membrane;

means on said upper member for holding the inner edge of said upper membrane;

a plurality of means for holding the outer edges of said upper and lower membranes adjacent to one another and each having an elongated chamber therein;

a plurality of lower supporting arms, each pivotably connected at its opposite ends to said lower base member and to a respective one of said outer edge holding means;

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a plurality of upper supporting arms, each pivotably connected at its inner end to said upper member and having its outer end riding within the elongated chamber in a respective one of said outer edge holding means;

a plurality of brace members, each pivotably connected at its opposite ends to said upper member and to a respective one of said lower supporting arms; and

means for extending said upper member from within said lower base member whereby said upper and lower supporting arms pivot inwardly toward said mast means to furl the upper and lower membranes.

2. Apparatus as in claim 1 further comprising:

a plurality of cables for supporting said upper membrane, each having its inner end connected to said upper member and its outer end connected to a respective one of said outer edge holding means.

3. Apparatus as in claim 1 further comprising:

a plurality of cables for supporting said lower membrane, each having its inner end connected to said

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lower base member and its other end connected to a respective one of said outer edge holding means.

4. Apparatus as in claim 3 further comprising a plurality of tie cords, each having an upper end connected to a respective one of said lower supporting arms and a lower end connected to a respective one of said lower membrane supporting cables.

5. Apparatus as in claim 1 wherein said means for holding the inner edge of said lower membrane comprises a collar member on said lower base member.

6. Apparatus as in claim 1 wherein said means for holding the inner edge of said upper membrane comprises a cap member on said upper member.

7. Apparatus as in claim 1 wherein said means for extending said upper member comprises a screwjack mechanism.

8. Apparatus as in claim 1 further comprising illuminating means mounted on the mid-part of said upper mast member.

9. Apparatus as in claim 1 further comprising illuminating means mounted on said mast means.

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