

Oct. 5, 1948.

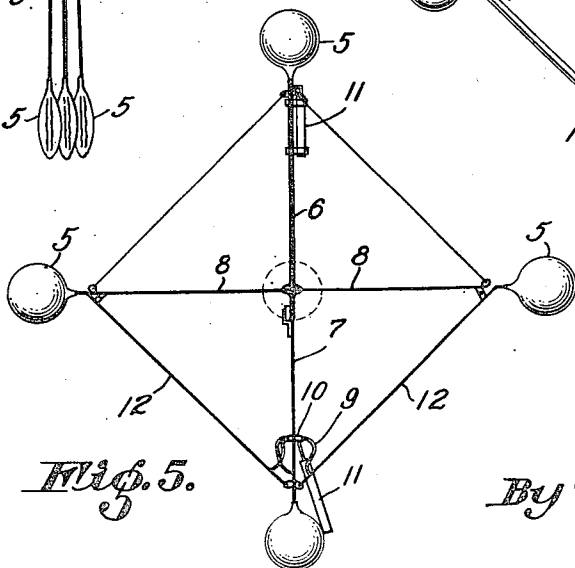
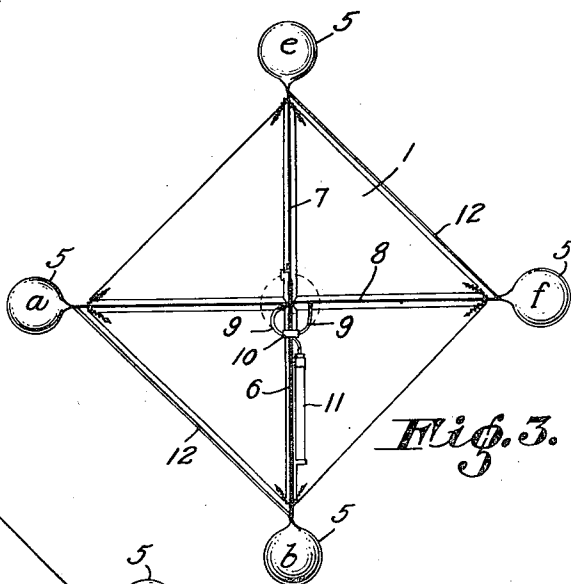
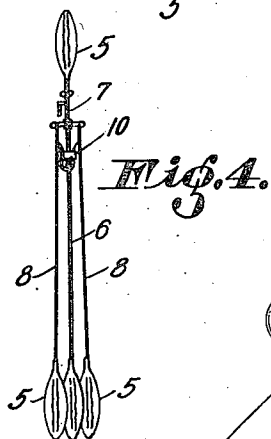
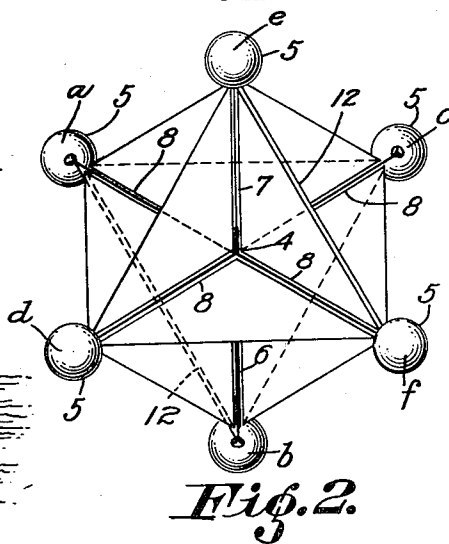
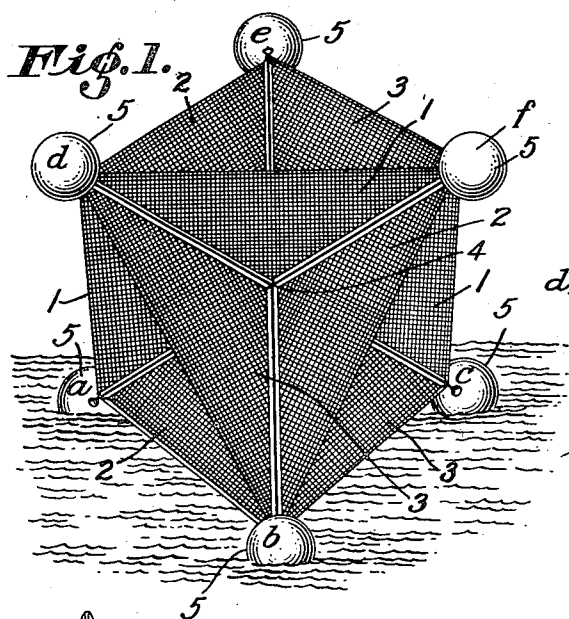
R. A. BOSSI

2,450,417

UNIVERSAL RAY OR BEAM REFLECTING DEVICE

Filed May 19, 1944

4 Sheets-Sheet 1



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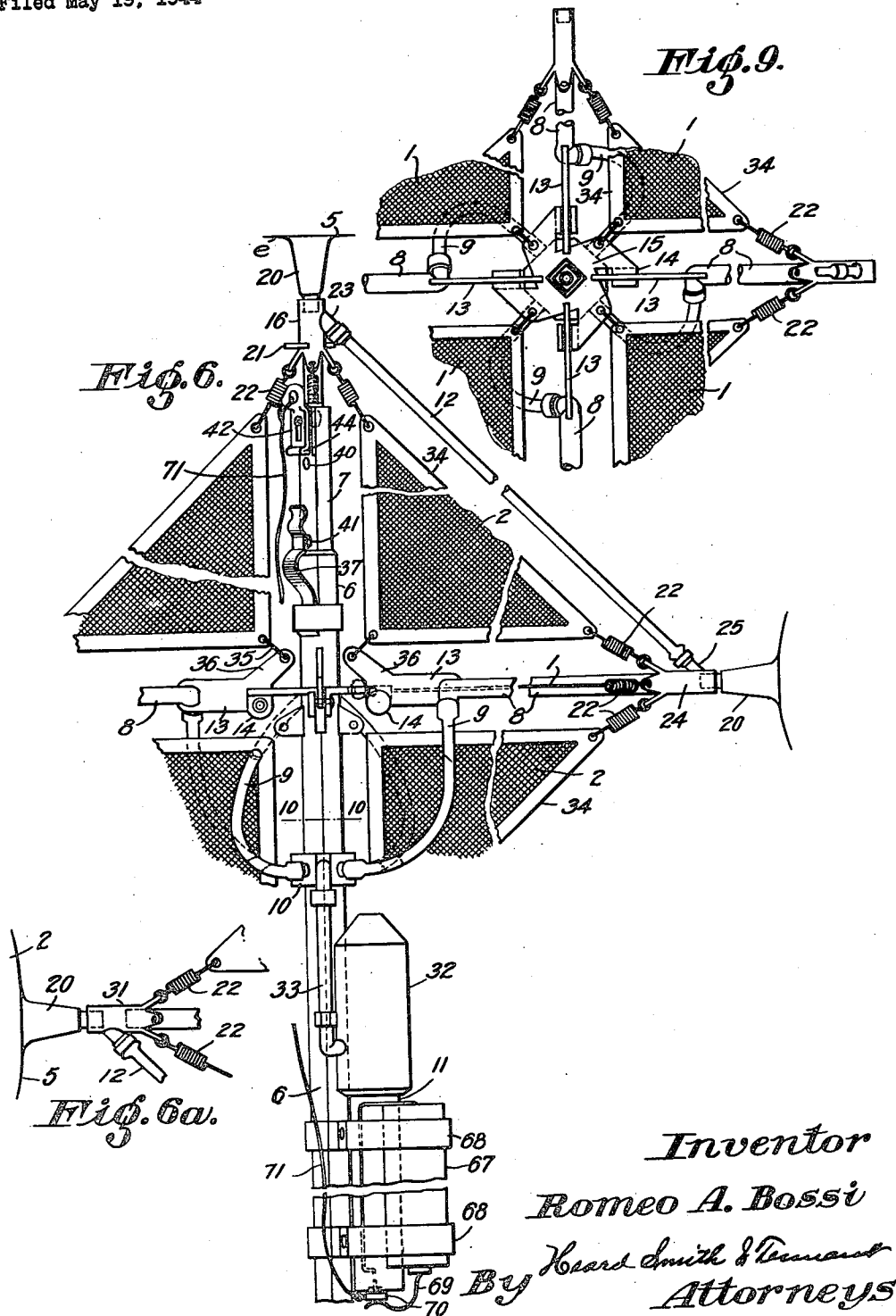
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UNIVERSAL RAY OR BEAM REFLECTING DEVICE

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4 Sheets-Sheet 2



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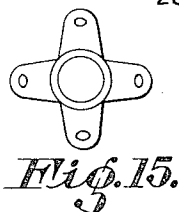
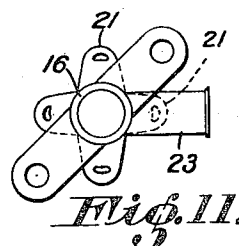
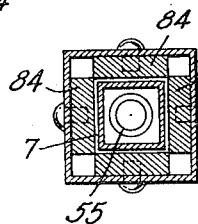
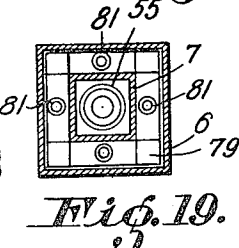
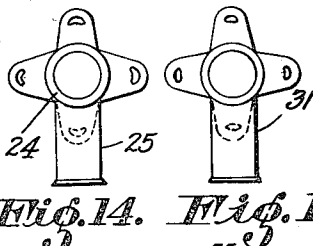
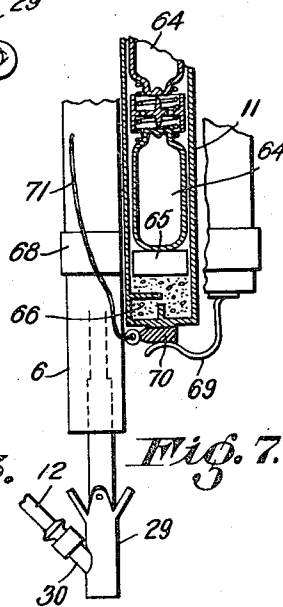
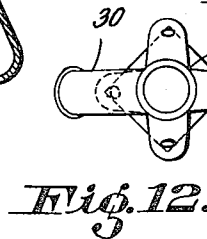
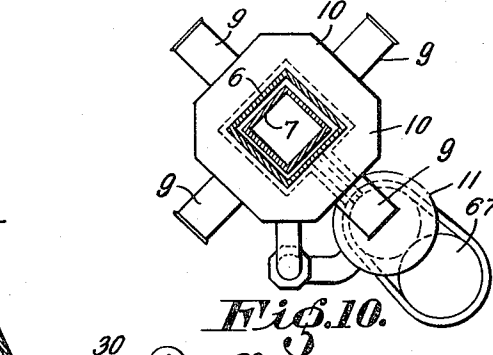
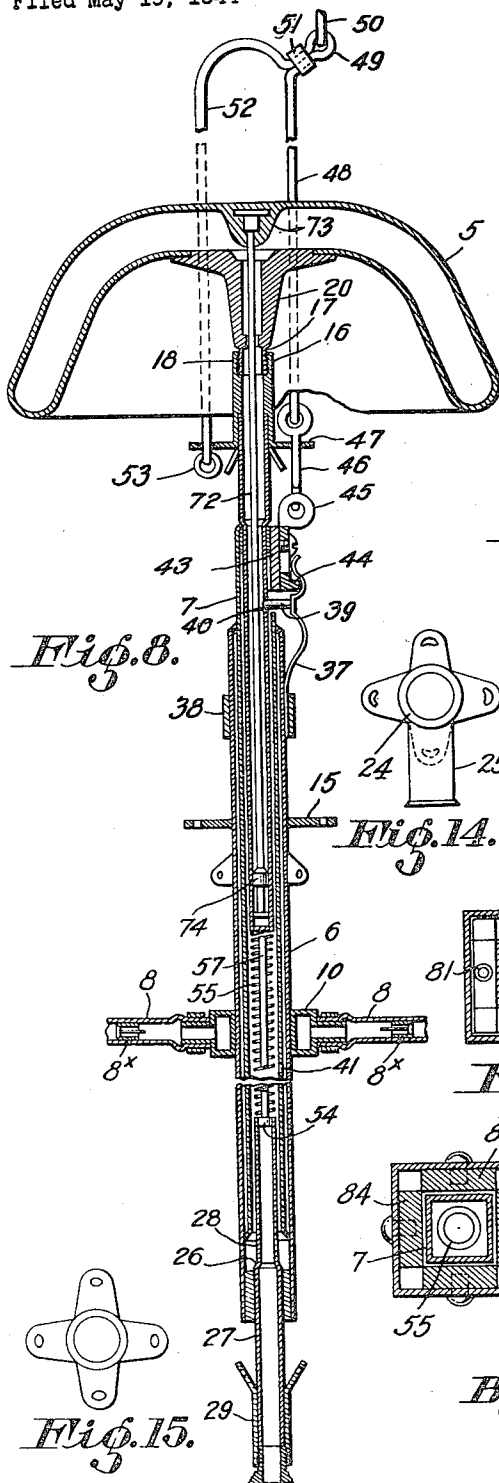
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UNIVERSAL RAY OR BEAM REFLECTING DEVICE

Filed May 19, 1944

4 Sheets-Sheet 3



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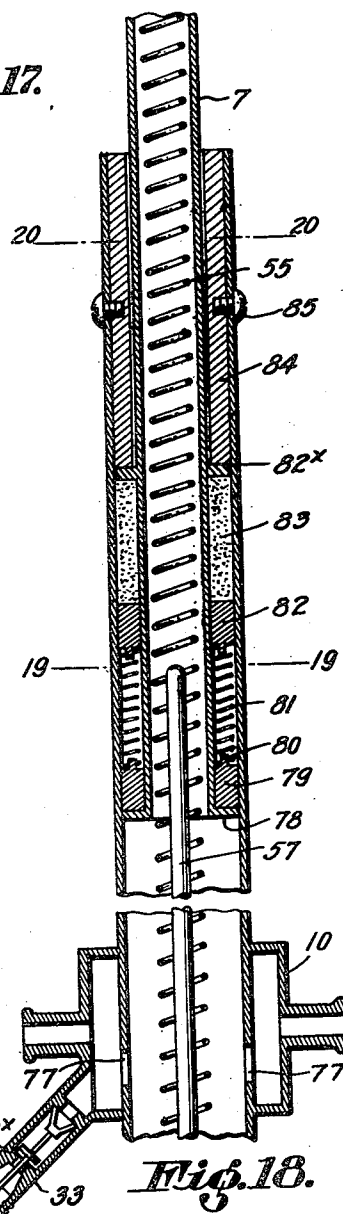
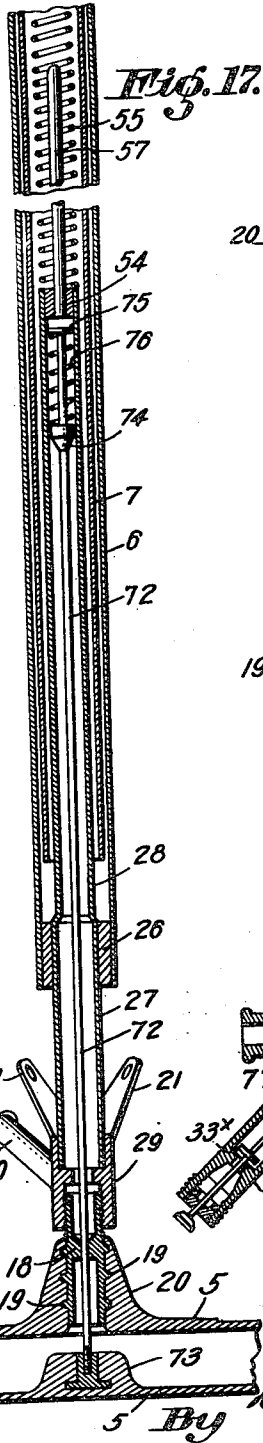
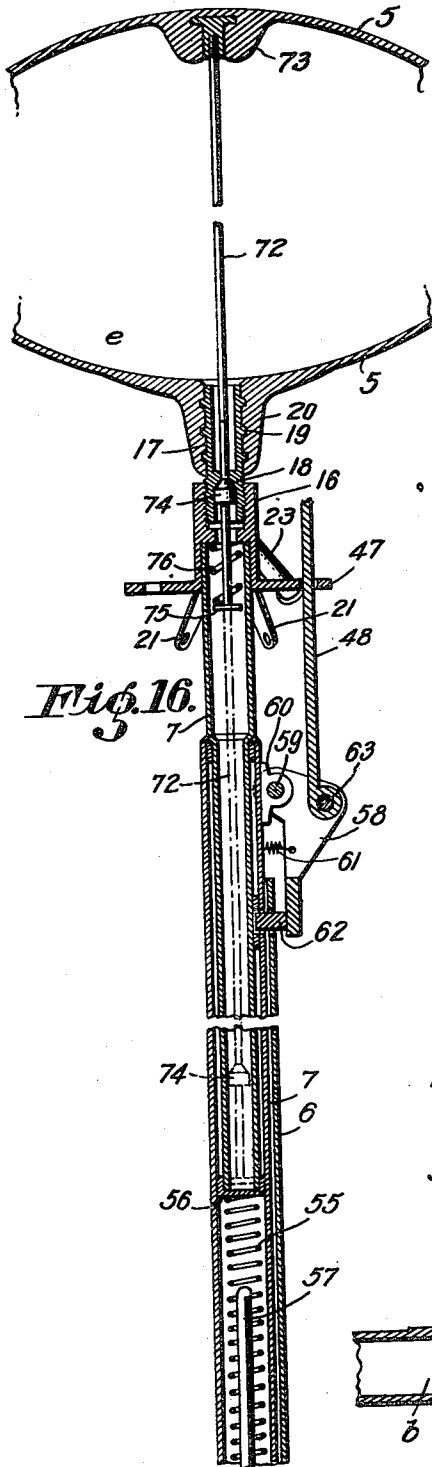
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UNIVERSAL RAY OR BEAM REFLECTING DEVICE

Filed May 19, 1944

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,450,417

UNIVERSAL RAY OR BEAM REFLECTING
DEVICE

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Application May 19, 1944, Serial No. 536,400

23 Claims. (Cl. 9-8)

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This invention relates to a device for marking a spot or locality to enable it to be found by a distant searcher from any position in space within his range of observation. It comprises essentially a group of reflector units symmetrically arranged about a common center and so constructed as to reflect rays or beams emanating from a suitable source or sources to the observer irrespective of the lateral or vertical positions of the searcher relatively thereto, or the rotative position of the reflector about its center.

The purpose of the invention is to provide a reflector of the character specified which may be utilized by a person or persons lost or in distress on sea or on land as a signal to identify his or their position, or approximate locality, so that it may be readily located by an airplane, ship, or from the ground, and relief promptly sent.

A further object of the invention is to provide a device of the character specified which can be dropped from an airplane to mark a spot or location of someone or something which it is desired to relocate, such, for example, as a ship in distress, a lost person or plane, or a place or object observed from an airplane passing over it with the reflecting surfaces always properly positioned to reflect rays or beams by means of which its position may be relocated.

While the invention is primarily designed to reflect radar beams, it may also be suitably constructed to reflect other beams, such as beams of light, within the scope of the invention.

Another important feature of the invention is to provide a collapsible reflector of the character specified which can be stored in a minimum space and readily erected to present universal reflecting surfaces of the character above described.

Another object of the invention is to provide a collapsible reflector of the character described adapted to be connected to a parachute and having means operable when the parachute is dropped from an airplane or the like automatically to cause erection of the reflector.

A further object of the invention is to provide a maritime buoy of the character described having means operable when the reflector is partially or wholly immersed in the water automatically to inflate pneumatically expansible floats so positioned as to provide a three-point support therefor irrespective of the rotative position of the reflector about its center.

More specifically the object of the invention is to provide a maritime reflector buoy comprising a group of reentrant trihedral reflector units symmetrically arranged about a common center and having pneumatically expansible floats mounted upon the external apices of said units to provide a three-point support for the reflector irrespective of its position of rotation about said center, whereby upsetting of the buoy by waves

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of the water upon which it is deposited by blasts of wind, by unbalanced accumulation of snow or ice upon the reflector units, or otherwise, will result in cleansing of the surfaces and insure presentation of effectively exposed reflecting surfaces.

These and other objects and features of the invention will more fully appear from the following description and the accompanying drawings and will be particularly pointed out in the claims.

Preferred embodiments of the invention are illustrated in the accompanying drawings, in which,

Fig. 1 is a perspective view of a preferred embodiment of the invention fully erected and supported upon the surface of water by three inflated pneumatic supports with other floats so arranged as to provide a three-point support irrespective of the rotative position of the reflector about its center;

Fig. 2 is a diagrammatic plan view of the reflector;

Fig. 3 is a diagrammatic elevation of a fully erected collapsible reflector showing means for automatically inflating the floats upon full or partial submergence in the water;

Fig. 4 is a diagrammatic view illustrating the reflector in a collapsed position adapted to be suspended from a parachute;

Fig. 5 is a diagrammatic view of a collapsible erected reflector construction embodying an earlier conception of the invention;

Fig. 6 is a detail view partially broken away showing certain of the reflector units, the framework supporting the same in erected position and including means for automatically inflating pneumatic supports therefor;

Fig. 6-a is a view of the fitting at the left end of one of the horizontal arms showing the manner in which the float is mounted thereon and also illustrating means for connecting the fitting to members of reflector units;

Fig. 7 is a detail view of the lower end portion of the mast and including means operable upon submergence to activate means for generating gaseous fluid under pressure to inflate the floats;

Fig. 8 is a diagrammatic longitudinal sectional view of the mast of the frame formed in telescoping sections illustrating also means for permitting collapsing of the floats and for maintaining them fixedly in extended position together with means for supporting the reflector from a parachute;

Fig. 9 is a detail sectional view of a central portion of the reflector on line 9-9 Fig. 6 as viewed from above;

Fig. 10 is a diagrammatic sectional view on line 10-10 Fig. 6 viewed from above;

Fig. 11 is an end view of the fitting at the upper end of the upper section of the telescoping mast;

Fig. 12 is an end view of the fitting at the lower end of the lower and larger section of the telescoping mast;

Fig. 13 is a view of the fitting at the left end of one of the horizontal tubular arms of the frame;

Fig. 14 is a view of the fitting at the right end of one of the horizontal arms of the frame;

Fig. 15 is an end view of the fitting at the ends of other horizontal arms;

Fig. 16 is an enlarged vertical sectional view of portions of the telescopic mast illustrating the manner in which the floats are mounted upon the mast, the means for retaining the float when inflated rigidly upon the end of the mast, and also illustrating the spring mechanism for erecting the mast, and the means for releasably locking the sections of the mast in erected position operable when the reflector is dropped from a parachute to permit its erection and permit inflation of the floats;

Fig. 17 is an enlarged vertical sectional view of the lower end portion of the mast, the float thereon in collapsed position, and the means for retaining the float when inflated in axial alinement with the mast;

Fig. 18 is an enlarged vertical sectional view of a modified form of telescoping mast adapted to be pneumatically erected;

Fig. 19 is a horizontal sectional view on line 19—19 Fig. 18; and,

Fig. 20 is a horizontal sectional view on line 20—20 Fig. 18.

The invention is illustrated in the drawings as comprising a group of similar adjoining reentrant trihedral reflector units having their inner apices symmetrically positioned with respect to a common center and their outer apices provided with means forming a triangular supporting base irrespective of the rotative position of the reflector with respect to its center. The frame for supporting the trihedral units comprises a telescoping mast having arms hinged to the central portion of the extended mast and extending therefrom at right angles to the axis of the mast and at right angles to each other with pneumatic floats mounted upon the respective ends of the mast and arms with means for automatically erecting the mast and simultaneously moving the arms to erected position and also comprising means for automatically inflating the floats operable either by a jerk of the parachute when thrown overboard from an airplane or operable upon whole or partial submergence of the float in water upon which it is deposited.

A preferred form of reflector which is particularly adapted for reflecting radar beams is illustrated in Fig. 1 and comprises a group of four associated reentrant trihedral reflecting units each comprising triangular reflecting surfaces 1, 2, and 3, each positioned at right angles to the other, with their inner apices 4 symmetrically disposed with respect to a common center, and having suitable supporting means, preferably in the form of pneumatically expansible floats 5, mounted upon the adjoining outer apices of said units. The triangular reflector units desirably are made of flexible metallic fabric and the opposite surfaces thereof constitute reflecting surfaces for adjacent trihedral units. The frame for supporting the trihedral units in the manner above described comprises a main member, which is hereinafter designated as a mast, extending diametrically across the reflector, and four arms

extending from the central portion of the mast at right angles to the mast and to each other, the floats being mounted respectively upon the ends of the mast and the outer ends of the arms radiating therefrom. By reason of this construction the reflector will be supported by a three-point support upon three of its outer apices irrespective of the rotative position of the reflector with respect to its center of rotation.

Any suitable floats may be provided for thus supporting it upon the surface of water. Preferably however pneumatically inflatable supports are provided as illustrated herein. Suitable means are provided for simultaneously inflating the floats. Preferably the frame of the reflector is collapsible and as illustrated in Figs. 3 and 5 comprises a mast formed in telescoping tubular sections 6 and 7 of rectangular cross section, a portion of the section 7 which telescopes into the outer section preferably being of reduced cross sectional area, with radial arms 8 pivotally mounted upon the larger section 6 of the mast at the center of the length of the mast when in extended or erected position.

In order to provide for simultaneously inflating the floats the horizontal arms 8, four in number, may be of tubular form and connected by branches 9 to a manifold 10 which is mounted upon the larger section 6 of the mast and gaseous fluid under pressure may be supplied to the manifold, from a suitable generator 11 which is secured to the mast. Suitable flexible tubes 12 may be provided for conducting the gaseous fluid under pressure from the ends of two of the horizontal arms to the floats which are mounted upon the respective ends of the mast as illustrated graphically in Fig. 3 and by the heavier lines in Fig. 5.

The details of construction of the reflector above described are more clearly illustrated in Figs. 6—17 inclusive.

In order to provide a collapsible frame construction the mast comprises a lower tubular metallic section 6, preferably of rectangular cross section, and an upper tubular metallic section 7 also of rectangular cross section, the lower portion of which desirably is of lesser cross sectional area, which telescopically slides into the lower section, with means for locking the sections together either in collapsed or erected position. The horizontal arms 8 are desirably cylindrical metal tubes having L-shaped inner ends which are welded to bell-crank members 13 which are pivotally mounted in ears 14 extending vertically downwardly from a general rectangular plate 15 which is welded to the upper portion of the lower mast section 6, thereby enabling the horizontal arms to be folded into parallelism with the axis of the lower mast section. The respective ends of the upper and lower masts are provided with tubular fittings upon which are mounted the pneumatically expansible floats 5. The fitting for the upper end of the inner mast section 7 is illustrated in detail in Fig. 11 and in vertical section in Fig. 16 and comprises a cylindrical tubular section 16 which tightly fits upon and preferably is welded to the upper end of the mast section 7. The tubular section 16 is internally screw threaded and a nipple 17 having external screw threads is mounted therein. The nipple 17 is provided preferably midway of its length with an internal valve seat 18 and desirably is provided with external ribs 19 which are embedded in a rubber boss or extension 20 of the wall of the float 5. The fitting 17 is provided with four

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downwardly and outwardly extending arms 21 to which the upper apices of the reflector members 2 are secured preferably by spiral springs 22.

The fitting 16 at the upper end of the upper mast section 7 is provided with an angularly and downwardly extending tubular branch 23 which is secured by a suitable union to the upper end of the flexible pipe 12 which leads to a suitable fitting upon the end of one of the horizontal arms 8. The end of this horizontal arm is provided with a fitting 24, shown in detail in Fig. 14, which is similar to the fitting 16, and a like pneumatic float 5 is similarly secured to the end of this arm and communicates therewith. The fitting 24 is provided with inwardly inclined arms which are similarly connected by springs 22 with the outer apex of the reflector member 2. The fitting 24 is likewise provided with an upwardly inclined tubular section 25 which is similarly secured to the lower end of the flexible tube 12.

The lower end of the rectangular mast section 6 is provided with an internal collar 26 at its lower end and a tubular section 27 which extends through the collar 26 and is hermetically secured thereto, preferably by welding, is provided with a tubular section 28 of smaller cross sectional area than that of the upper tubular section 7 and extends well into the inner section when the sections of the mast are in collapsed position, as illustrated in Figs. 8 and 17. The lower end portion of the tubular member 17 is provided with a fitting 29, as illustrated in Fig. 12, similar to the fitting 16 at the upper end of the mast and has an upwardly extending tube 30 which is connected to a flexible pipe 12 the upper end of which is similarly connected to a like fitting 31 upon the end of the horizontal arm 8 which is diametrically opposite to that previously described, as illustrated in detail in Figs. 6—a and 13. The fitting 29 is likewise provided with four upwardly extending diverging arms which likewise are connected by spiral springs 22 with the apices of the reflector members 2.

The horizontal arms 8 which extend at right angles to those previously described are provided with fittings similar to the fittings which are illustrated in detail in Fig. 15 and which are similar to those previously described except that they are not provided with angularly disposed tubes for connection to the flexible pipes like those which establish communication with the flexible members 12 which serve to carry fluid under pressure to the pneumatic floats at the upper and lower ends of the mast, as fluid under pressure can be transmitted to each of the floats upon the ends of these arms directly through the horizontal arms themselves.

The fittings for the horizontal tubular arms 8 are each provided with inwardly extending inclined arms which are similarly secured by spiral springs 22 to the outer apices of the respective flexible reflector members 1 as will be readily understood.

Suitable means are provided for simultaneously inflating all of the floats 5. In the preferred construction illustrated a suitable generator 11, for gaseous fluid under pressure, as heretofore described, is fixedly secured to the lower mast section 6 and is provided with a chamber 32 as shown in Fig. 6 which is connected by a pipe 33 to the rectangular manifold 10 from which the pipes 9 heretofore described lead to and are connected by a suitable union to each of the horizontal arms 8. When therefore fluid under pressure is generated it passes from the reservoir 32

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through the pipe 33, the manifold 10, and each of the flexible branch pipes 9 to the horizontal arms from which the gaseous fluid under pressure passes directly to each of the floats 5 upon the ends of the horizontal arms which are identified respectively in Figs. 1 and 2 as a, c, d and f. The floats 5 and the base and top of the mast are identified as b and e. In the constructions shown in Figs. 1-17 respectively the telescoping mast sections 6 and 7 do not form conduits for the gaseous fluid under pressure and the floats b and e are supplied with fluids under pressure from the flexible pipes 12 which connect the fittings of these valves with fittings upon the ends of the horizontal arms.

As illustrated in Figs. 2 and 6 a flexible conduit 12 extends from the fitting for the float f to the fitting for the float e at the top of the machine and a similar flexible pipe 12 extends from the fitting of the float a to the float b upon the lower end of the machine. Desirably a check valve 8* is provided adjacent the manifold 10 for each of said branches 9 and a check valve 33* is also provided adjacent to the manifold in the pipe 33 leading from the reservoir 32 to the manifold as shown in Fig. 18. Such check valves prevent reverse flow of the gaseous fluid under pressure from the respective floats when the floats are inflated to the desired uniform dimensions.

Suitable means desirably are provided for automatically causing the actuation of the generator for gaseous fluid under pressure either when the reflector is dropped from a parachute or partially or wholly submerged in the water or which can be manually operated as will hereinafter be more fully described.

The reflector units 1, 2, and 3, desirably are of flexible wire mesh of triangular form and in order to insure their maintenance in taut condition desirably are secured at their edges to tapes 34 of substantially inextensible fabric the outer apices of which are secured to the spiral springs 22 and the inner apices of which are secured by links 35 to the upwardly and inwardly extending inclined arms 36 of the bell crank members 13 of the horizontal arms.

When therefore the upper section 7 of the tubular mast is telescoped into the lower section 6 the horizontal arms 7 will fold downwardly into parallelism with the lower section as illustrated in Fig. 4 and upon deflation of the floats will enable the reflector to be collapsed into such a minimum space that it can be readily housed in a tubular container thereby enabling it to occupy a minimum amount of space for convenience in storage and transportation.

Suitable locking means are provided for holding the telescopic sections of the mast in collapsed and extended positions. In the construction illustrated in Figs. 7 and 8 a sinuously bent leaf spring 37 is fixedly secured to the upper end portion of the lower section 6 of the mast by a strap or collar 38 and a detent 39, which is fixedly secured to the inwardly bent central section of the spring, is adapted selectively to engage suitable holes 40 and 41 in the upper section 7 of the mast to hold the mast respectively in extended or collapsed positions. The locking means may be manually released but preferably means are provided for releasing the locking means when the mast is in telescoped position adapted to be actuated when the reflector is dropped from a parachute. As illustrated in Figs. 6 and 7 such means comprises a slide 42 which is secured by screw and slot connection to a bracket 43 which

is fixedly mounted upon the upper end portion of the mast. The lower end portion of the slide 42 is provided with a laterally extending rib 44 adapted to enter a concaved portion of the reversely bent end portion of the spring 37, as shown in Fig. 8, when the masts are in collapsed position. The upper end of the slide 42 is provided with a loop 45 which is engaged by one eye of a double-eye link 46 the shank of which is slidably mounted in a horizontal plate 47 which is secured to the upper fitting 16 of the mast section 7. The cable 48, which is secured to the upper eye of the link 46, is provided with a loop 49 which in turn is connected to a cable or cord 50 which is secured to the parachute. The loop 49 is formed by a constricting band 51 which embraces and holds together two adjacent portions of the cable 48. The section 52 of the cable which extends from the loop 50 is of considerably greater length and at its lower end passes through a hole in the plate 47 and is anchored therein in any suitable manner as by a ring 53. When the reflector and parachute are thrown overboard from an airplane or the like the filling of the parachute will produce a jerk upon the cables 50 and 48 which will raise the link 46 and slide 42 so that the rib 44 of the slide will force the spring outwardly and thereby disengage the detent 39 from the hole or recess in the mast thus permitting the mast to be extended. When the mast is fully extended the spring 37 will force the detent into the lower hole or recess 41 in the mast and lock it in erected position.

Suitable means are provided for automatically erecting the mast upon release of the detent 39 from the lower hole or recess 40 in the upper section 7 of the mast. This is accomplished in the construction illustrated in Figs. 6-16 by a spring but pneumatically operated mechanism may also be provided for erecting the mast, as will hereinafter be described. In the construction illustrated in these figures the upper end of the reduced portion 28 of the extension 27 of the lower mast is provided with a collar 54 and a coiled spring 55, which is seated upon the collar 54, engages the head 56 upon the lower end of the inner telescoping section 7 of the mast. Desirably a rod 57 which is fixedly connected to the collar 54 extends axially through the spring to prevent it from buckling when collapsed and may be of any suitable length for this purpose. When therefore the upper section 7 of the mast is telescoped into the lower section, the spring 55 will be collapsed but upon release of the detent 39 of the locking device from the upper recess 40 of the mast the spring will expand and force the member 7 of the mast longitudinally until the detent 39 engages the lower recess 41 and thereby lock the mast in erected position.

In the construction illustrated in Fig. 16 an alternate form of locking mechanism is shown which comprises an L-shaped lever 58 the shorter arm of which is fulcrumed on a pivot 59 in the ears of a bracket 60 which is mounted upon the upper end portion of the lower section of the mast and the longer arm of which is yieldably connected to the mast by a spiral spring 61. The end of the longer arm is provided with a detent 62 adapted to engage the holes or recesses 40 or 41 of the mast. In this construction the cable 48 is suitably connected to the elbow of the L-shaped latch 58 in any suitable manner as by passing through a hole in said elbow or secured to a stud 63 mounted therein. In this construction as in that previously described the jerk pro-

duced by the parachute upon the cable 48 will release the detent from the hole or recess in the upper mast section and permit it to be automatically extended to erected position, as above described.

Any suitable means may be provided for generating fluid under pressure to inflate the floats. One construction which is contemplated comprises one or more capsules 64, containing gaseous fluid such as carbon dioxide, which are slidably mounted in the casing of the generator 11 and provided with a closure adapted to be punctured by a needle fixedly positioned above the closure or by double needles between two companion capsules. The lower end of the capsule desirably is supported upon a plate 65 which is slidably mounted in the generator casing and a small charge 66 of an explosive mixture is contained in the casing beneath the plate 65. An electric battery 67 is mounted upon the casing of the generator 11 and both are secured to the mast by suitable straps 68. The generator casing desirably is grounded to the mast and an electric spring conductor 69 leading from the battery is adapted to engage a suitable insulated terminal within the explosive mixture which when contact is made will cause a spark to pass through the explosive mixture to a companion grounded terminal therein.

The spring conductor 69 normally is held out of contact with the terminal by a suitably protected insulated piece 70 which is adapted to be withdrawn by the jerk upon the cable 48 when the reflector is dropped from a parachute.

Any suitable means may be provided for accomplishing this purpose, such, for example, as a cord 71 connecting the insulator 70 to the eye 46 of the slide 42 as illustrated in Fig. 8, or to the connection 63 of the cord 48 to the latch 58 as shown in Fig. 16.

When therefore the insulator 70 is withdrawn electric current is established from the battery through the terminal in the explosive mixture and produces a spark causing the explosion of the mixture thereby forcing the plate 65 upwardly so that the closure of the capsule will be punctured and the compressed gas released thereby to enter the reservoir 32 and from it through the pipes 33 to the branches 9 and thence to the floats 5 in the manner above described. The generator for the gaseous fluid under pressure may also be activated by the construction above described upon submergence or partial submergence of the reflector in the water as the submergence of the lower end of the battery and generator will permit the current of electricity to flow through the water from the spring conductor 65 to the terminal which is within the explosive mixture thereby producing a spark which will ignite the explosive mixture and cause the release of the fluid under pressure into the reservoir 32 in the manner above described. Thus it will be seen that when the reflector is dropped from a parachute the locking mechanism which retains the mast sections in telescoped positions will be released, the mast then fully erected by the spring 55 during the dropping of the parachute and simultaneously the generator will be activated to deliver gaseous fluid under pressure simultaneously to the several floats which are to support the reflector. When therefore the reflector lands upon the water it will, by reason of its construction, rest upon a three-point support irrespective of the rotative position about its center as above described.

Furthermore by reason of the fact that the

explosive mixture may be ignited upon submergence of the mechanism for producing the gas as above described the reflector may be erected manually by merely releasing the mast locking mechanism and dropping it into the water, or by manually removing the insulator which is between the spring 69 and the terminal which is within the explosive mixture, so that by virtue of the present construction the reflector can be automatically erected and the floats inflated when dropped from a parachute, or may be manually erected and the floats inflated either manually on land or on shipboard or inflated by tossing the reflector upon the water.

A further object of the invention is to provide means for holding the floats in axial alignment respectively with the mast and with the horizontal arms. This is accomplished by providing a rigid rod 72 the outer end of which is embedded and anchored in a boss 73 extending inwardly from the wall of the inflatable member in axial alignment with the boss 20 and nipple 17 by which it is secured to the end of the upper or lower section of the telescoping mast, or similarly to the horizontal arms 8 of the reflector. The rod 72 is provided intermediate of its length with an enlargement 74 forming a valve adapted to engage the valve seat 18 in the nipple 17. The rod 72 extends beyond the valve 74 and desirably is provided with a head 75 and a light spring 76 is interposed between the head 75 and an internal shoulder upon the fitting 16 as shown in Fig. 16.

By reason of this construction the rod 72 will be withdrawn inwardly when fluid under pressure within the float is relieved and the valve 74 will be retained open during the introduction of fluid under pressure into the float until the desired fluid pressure within the float is obtained at which time the expansion of the float will cause the valve 74 to engage the valve seat 18. Thereupon the rigid rod 72 will retain the float in substantial axial alignment with the mast or similarly with the horizontal axis of each of the horizontal arms instead of permitting the float as a whole to flex with respect to the ends of the mast and arms respectively.

A modified form of the invention is illustrated in Figs. 18, 19, and 20, in which the telescoping mast is so constructed as to permit the gaseous fluid under pressure to be directly delivered to the floats at the ends of the mast instead of from the horizontal arms to the floats at the respective ends of the mast. In this construction the manifold 10 is provided with ports 77 which communicate directly with the chamber of the lower rectangular mast section 6. The upper rectangular mast section 7 is of relatively smaller cross sectional area than the lower section and suitable means are provided for making an hermetic seal between the mast sections. As illustrated herein the lower end of the upper mast section 7 is provided with an outwardly extending flange 78 upon which is seated a washer 79 having preferably four upwardly extending studs 80 each of which engage the lower end of a spiral spring 81 the upper end of which surrounds similar studs upon a reversely arranged washer 82. A suitable annular packing 83 of considerable length is interposed between the washer 79 and the complementary washer 82 which surrounds and is fixedly secured to the upper section 7 of the telescoping mast. Suitable spacers 84 are interposed between the walls of the lower section of the mast and the telescoping upper section thereof and are secured

thereto by screws 85 which extend through the walls of the outer section.

By reason of this construction the springs 80 normally force the washer 82* against the packing 83 with sufficient force to compress it against the spacers 84 which are fixedly secured to the inner mast section 7, to maintain an hermetic seal. By removing the screws 85 the entire assemblage can be readily withdrawn from the lower tubular section of the mast for purpose of replacement of the packing if necessary.

While in this construction an erecting spring such as the spring 55 may be employed the erecting spring may be omitted and the force of the fluid under pressure employed to erect the mast as well as to inflate all of the floats of the reflector as the fluid under pressure will pass directly to the floats until they are fully inflated, whereupon the valve 74 will engage the valve seat 18 thereby preventing further expansion of the floats which might distort or rupture them and the fluid pressure then acting upon the sealed end of the upper telescoping section 7 of the mast will force it lengthwise until it is locked in erected position by the detent of the locking mechanism entering the recess in the mast. In this case obviously the recesses of the mast must be in the form of a socket indented in the wall of the mast or suitable locking mechanism provided which will not permit the escape of fluid under pressure from the mast.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A reflector comprising a frame having a plurality of rigid members assembled to provide a multiplicity of outwardly projecting apices equidistant from a common center and equally spaced from each other in triangular relation, outwardly facing reflector members mounted on said frame within the respective spaces defined by said apices and supporting means upon each of said apices providing a three-point support for the reflector irrespective of the rotative position of the reflector about said common center.

2. A reflector comprising a frame having rigid members extending radially equal distances from a common center and at right angles to each other thereby positioning their outer ends in equally spaced triangular relation to each other and providing a three-point support for said frame irrespective of the rotative position thereof about said center, and reflector units mounted on said frame within the respective triangular spaces defined by the outer ends of said members.

3. A reflector comprising a frame having a rigid vertical mast, rigid horizontal arms pivotally connected to said mast having their outer ends equidistant from a common center centrally of the length of said mast, and at right angles to each other providing a three-point support for the reflector irrespective of the rotation of the frame about said center and vertical and horizontal triangular reflector members mounted on said frame within the respective triangular spaces defined by said mast and arms.

4. A reflector comprising a frame having its members extending radially equal distances from a common center and right angles to each other thereby positioning their outer ends in equally spaced triangular relation to each other and providing a three-point support for said frame irrespective of the rotative position thereof about said center, and trihedral reflecting units

mounted on said frame within the respective triangular spaces defined by said outer ends with their inner apices symmetrically positioned with respect to said center, and supporting means upon the ends of each of said members thereby providing a three-point support for the reflector irrespective of its rotative position relatively to said center.

5. A universal self-positioning reflector comprising a frame having a rigid vertical mast, rigid horizontal arms of equal length extending radially from the longitudinal center of said mast at right angles to each other, upper and lower triangular reflectors connected respectively to said frame with their inner apices symmetrically positioned in proximity to said center and their outer apices respectively connected to the ends of said mast and to the ends of said horizontal arms, triangular reflectors connected to said frame with their inner apices positioned symmetrically with respect to said center and their outer apices connected to the ends of adjacent arms, and means upon the respective ends of said mast and said horizontal arms forming a three-point support for said reflector irrespective of the rotative position thereof with respect to said center.

6. A self-positioning reflector comprising a symmetrical group of adjoining similar trihedral units presenting reflecting surfaces with the inner apices symmetrically positioned with respect to a common center, and means at their respective external apices forming a triangular supporting base irrespective of the rotative position of the reflector with respect to said center.

7. A self-positioning reflector comprising a group of eight similar adjoining reentrant trihedral reflecting units having their inner apices symmetrically positioned with respect to a common center and their external apices equidistant from said common center forming a triangular supporting base irrespective of the rotative position of the reflector with respect to said center.

8. A maritime self-positioning reflecting buoy comprising a group of similar reentrant trihedral reflecting units with their inner apices symmetrically positioned with respect to a common center and having floats at all of their remote apices forming a triangular base support irrespective of the rotative position of the reflector with respect to said center.

9. A maritime self-positioning reflecting buoy comprising a group of similar reentrant trihedral reflecting units with their inner apices symmetrically positioned with respect to a common center and having at all their remote apices pneumatically inflatable members forming when inflated a triangular base support irrespective of the rotative position of said reflector with respect to said center.

10. A maritime self-positioning reflecting buoy comprising a group of similar triangular reflecting surfaces pivotally connected together to form reentrant trihedral reflecting adjoining units with their inner apices symmetrically positioned with respect to a common center, pneumatically inflatable floats at the external apices of said units, and means operable upon partial submergence of the reflector simultaneously to inflate said floats thereby providing a three-point support for the reflector irrespective of the rotary position thereof with respect to said center.

11. A collapsible reflector comprising a frame having a mast formed of telescoping sections, resilient means tending to force the mast sections into erected position, arms pivotally mounted on

said mast foldable into parallelism with said mast and having their outer ends when erected in a plane perpendicular to the axis of the mast at said center, means for locking said mast and arms in collapsed or erected position, and flexible reflector units connected respectively to the outer ends of the mast and to the outer ends of adjacent arms.

12. A collapsible maritime self-supporting reflector comprising a frame having a mast formed of telescoping sections, resilient means tending to force the mast sections into erected position, arms pivotally mounted on said mast foldable into parallelism with said mast and having their outer ends when erected in a plane perpendicular to the axis of the mast at said center, means for locking said mast and arms in collapsed or erected position, flexible reflector units connected respectively to the outer ends of the mast and to the outer ends of adjacent arms, and floats mounted upon the outer ends of said mast and arms.

13. A collapsible maritime self-supporting reflector buoy comprising a frame having a rigid vertical mast formed of telescoping sections, means for releasably locking said sections in extended position, horizontal arms of equal length pivotally connected to and extending radially from the longitudinal center of the extended mast and at right angles to each other, upper and lower vertical triangular reflectors of highly flexible material connected respectively to said frame with their inner apices symmetrically positioned in proximity to said center and their outer ends respectively connected to the ends of said mast and to the ends of said horizontal arms, similar horizontal triangular reflectors connected to said frame with their inner apices positioned symmetrically in proximity to said center and their outer apices connected to the ends of adjacent horizontal arms, and floats upon the respective ends of said mast and said horizontal arms providing a three-point support for said buoy irrespective of the rotative position thereof relatively to said center.

14. A collapsible maritime self-supporting reflector buoy comprising a frame having a rigid vertical mast formed of telescoping sections, means for releasably locking said sections in extended position, horizontal arms of equal length pivotally connected to and extending radially from the longitudinal center of the extended mast and at right angles to each other, upper and lower vertical triangular reflectors of highly flexible material connected respectively to said frame with their inner apices symmetrically positioned in proximity to said center and their outer ends respectively connected to the ends of said mast and to the ends of said horizontal arms, similar horizontal triangular reflectors connected to said frame with their inner apices positioned symmetrically in proximity to said center and their outer apices connected to the ends of adjacent horizontal arms, and flexible pneumatically expandable floats upon the respective ends of said mast and said horizontal arms and means for simultaneously supplying fluid under pressure to said floats to inflate the same and thereby cause said floats to provide a three-point support for said buoy irrespective of the rotative position thereof relative to said center.

15. A collapsible reflector comprising a frame having a mast formed of outer and inner telescoping sections, arms of equal length pivotally mounted upon the outer mast section and extending radially from the longitudinal center of the

erected mast and foldable into substantial parallelism with the mast, means having reflector units of flexible material mounted on said mast sections and arms, means tending to force said mast sections to erected position, means for selectively locking said mast in collapsed or in extended position, and means for connecting said locking means to a parachute operable upon inflation of the parachute when dropped to release said locking means thereby to erect said reflector and permit relocking of the erected mast in extended position, whereby the reflector will be fully erected during its descent.

16. A collapsible reflector comprising a frame having a mast formed of outer and inner telescoping sections, arms of equal length pivotally mounted upon the outer mast section and extending radially from the longitudinal center of the erected mast and foldable into substantial parallelism with the mast, pneumatically expandable floats on the ends of the mast and the ends of the respective arms, means having reflector units of flexible material mounted on said mast sections and arms, means tending to force said mast sections to erected position, means for selectively locking said mast in collapsed or in extended position, means for connecting said locking means to a parachute operable upon inflation of the parachute when dropped to release said locking means thereby to erect said reflector and permit relocking of the erected mast, a source of gaseous fluid under pressure mounted on said frame, means for conducting said fluid under pressure to the respective floats, and means operable upon release of said locking means to cause fluid under pressure to be supplied from said source to the respective floats whereby the reflector and its floats will be fully erected during its descent.

17. A maritime reflector comprising a frame having outwardly extending tubular members, pneumatically expandable floats mounted upon and communicating with the outer ends of the respective tubular members, means for supplying gaseous fluid under pressure to the respective floats, and rigid means for retaining the floats substantially in axial alignment with the respective frame members.

18. A maritime reflector comprising a frame having outwardly extending tubular members, pneumatically expandable floats mounted upon and communicating with the outer ends of the respective tubular members, means for supplying gaseous fluid under pressure to the respective floats, and rigid rods slidably mounted in the respective tubular members extending diametrically through the float thereon and fixedly secured to the inner remote portions of the wall of the float acting to retain the floats substantially in axial alignment with the frame member.

19. A maritime reflector comprising a frame having outwardly extending tubular members, pneumatically expandable floats mounted upon and communicating with the outer ends of the respective tubular members, means for supplying gaseous fluid under pressure to the respective floats, and rigid rods slidably mounted in the respective tubular members extending diametrically through the float thereon and fixedly secured to the inner remote portions of the wall of the float acting to retain the floats substantially in axial alignment with the frame member, and means operable by the outward movement of the respective rods to limit the inflation of the float to which it is attached.

20. A maritime reflector comprising a frame having tubular members extending radially from a common center each provided adjacent its outer end with an internal valve seat, a pneumatically expandable float mounted upon and communicating with the outer end of each tubular member, means for supplying gaseous fluid under pressure to the respective floats, a rigid rod slidably guided in each of the respective arms and extending freely through the valve seat thereof and fixedly secured to the inner remote portions of the wall of its float, and a valve on said rod so positioned as to engage the valve seat when the float is inflated to a predetermined size.

21. A maritime reflector comprising a frame having tubular members extending radially from a common center each provided adjacent its outer end with an internal valve seat, a pneumatically expandable float mounted upon and communicating with the outer end of each tubular member, a rigid rod slidably guided in each of the respective arms and extending freely through the valve seat thereof and fixedly secured to the inner remote portions of the wall of its float, a valve on said rod so positioned as to engage the valve seat when the float is inflated to a predetermined size, and means for supplying fluid under pressure simultaneously to all the floats, whereby the operation of said valve rods will cause uniform expansion of all the floats and also retain the floats in substantial axial alignment with the respective arms when supporting the reflector.

22. A collapsible reflector comprising a frame having a vertical mast formed of telescoping sections, horizontal arms pivotally mounted on the outer section of said mast adjacent to the end thereof through which the inner section extends and normally extending at right angles to said mast and in similar angular relation to each other, trihedral reflecting units of flexible material having their inner apices symmetrically positioned with respect to a common center and their outer apices respectively connected to the ends of said mast and arms and adapted to be erected upon extension of said mast, and releasable means for locking said mast when in extended position.

23. A collapsible reflector comprising a frame having a vertical mast formed of telescoping sections, horizontal arms pivotally mounted on the outer section of said mast adjacent to the end thereof through which the inner section extends and normally extending at right angles to said mast and in similar angular relation to each other, a group of four trihedral reflecting units of flexible material having their inner apices connected to the respective arms symmetrically with respect to a common center and their outer apices respectively connected to the ends of said mast and arms and adapted to be erected upon extension of said mast, and releasable means for locking said mast when in extended position.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,384,014	Fessenden	July 5, 1921
1,635,915	White	July 12, 1927
1,754,899	Miller et al.	Apr. 15, 1930