Feb. 23, 1965 O. M. SHATTUCK 3,171,128

EMERGENCY ANTENNA HAVING BALLOON MEANS TO ERECT ANTENNA AUTOMATICALLY IN RESPONSE TO IMPACT OR IMMERSION

Filed Nov. 8, 1962

3 Sheets-Sheet 1

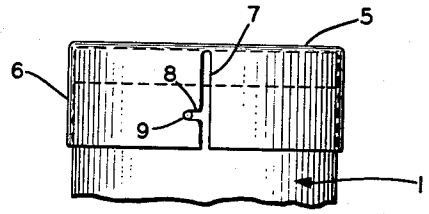


Fig. 1

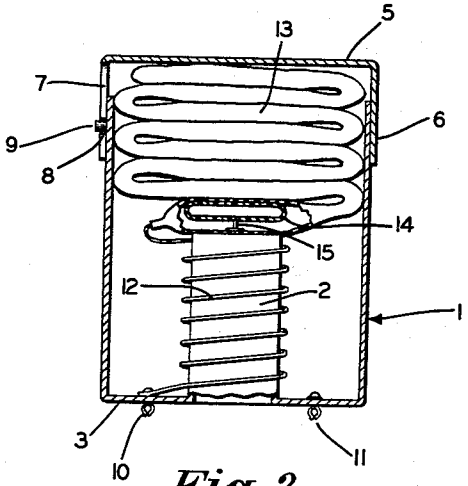


Fig. 2

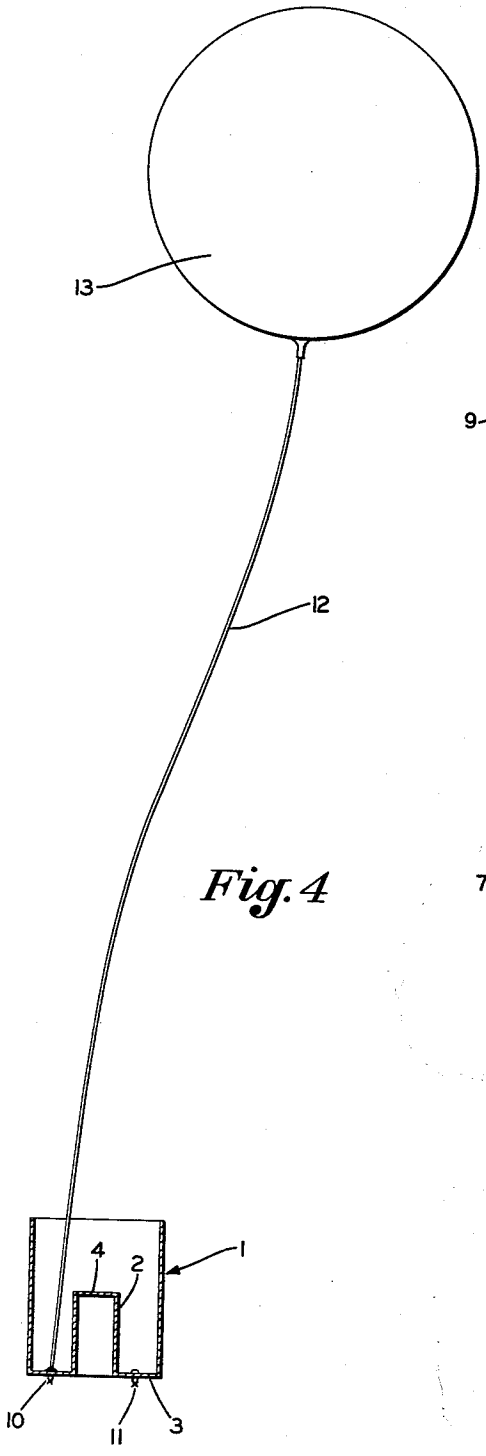


Fig. 4

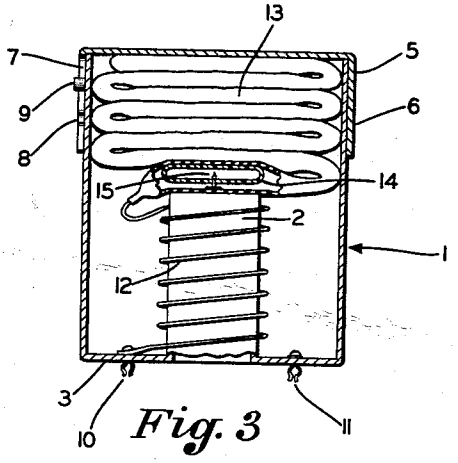


Fig. 3

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Filed Nov. 8, 1962 3 Sheets-Sheet 2

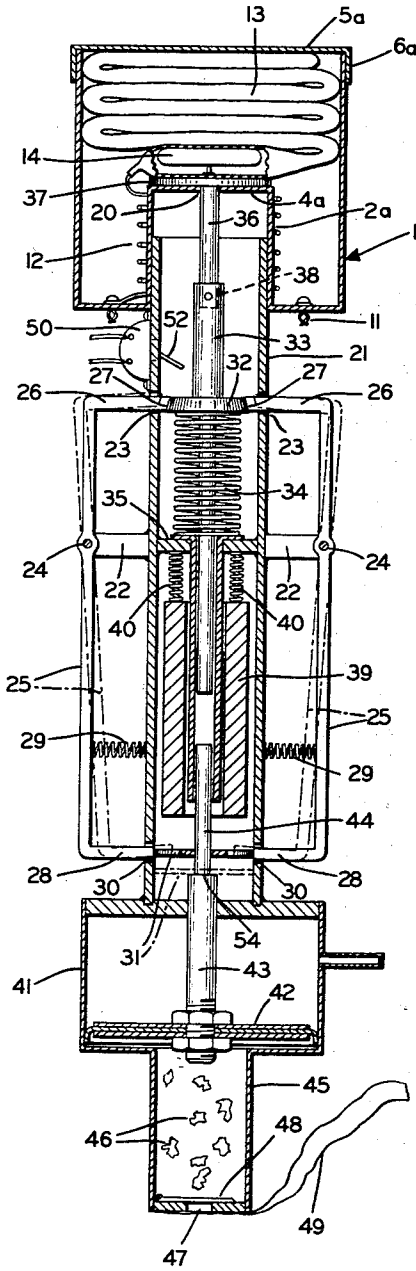


Fig. 5

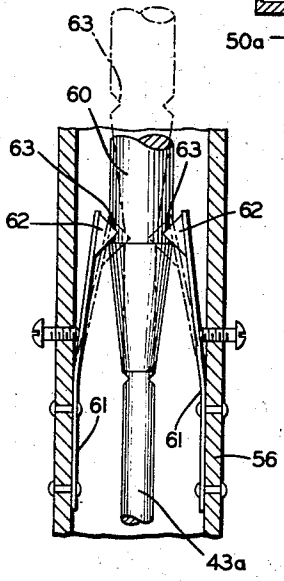


Fig. 7

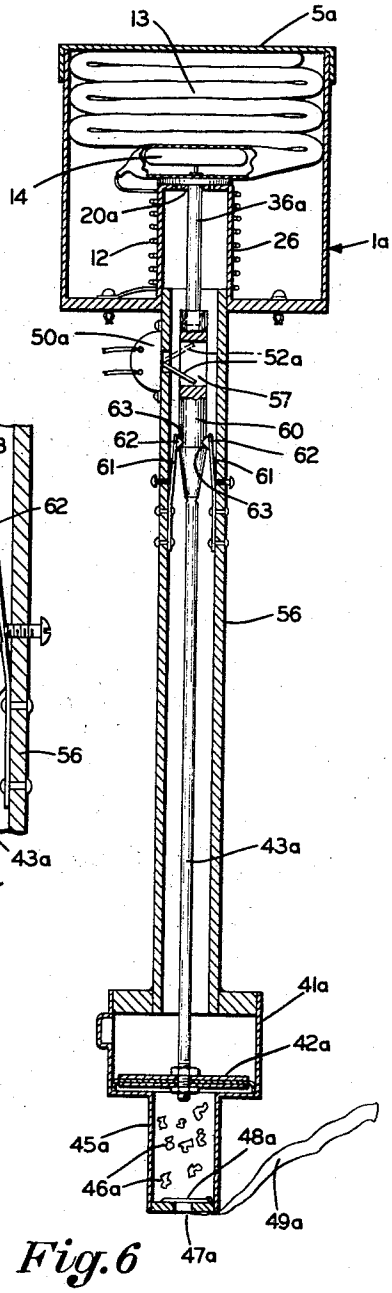


Fig. 6

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Filed Nov. 8, 1962 3 Sheets-Sheet 3

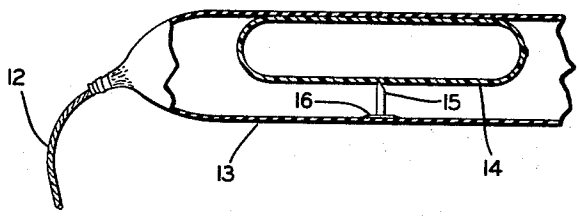


Fig. 8

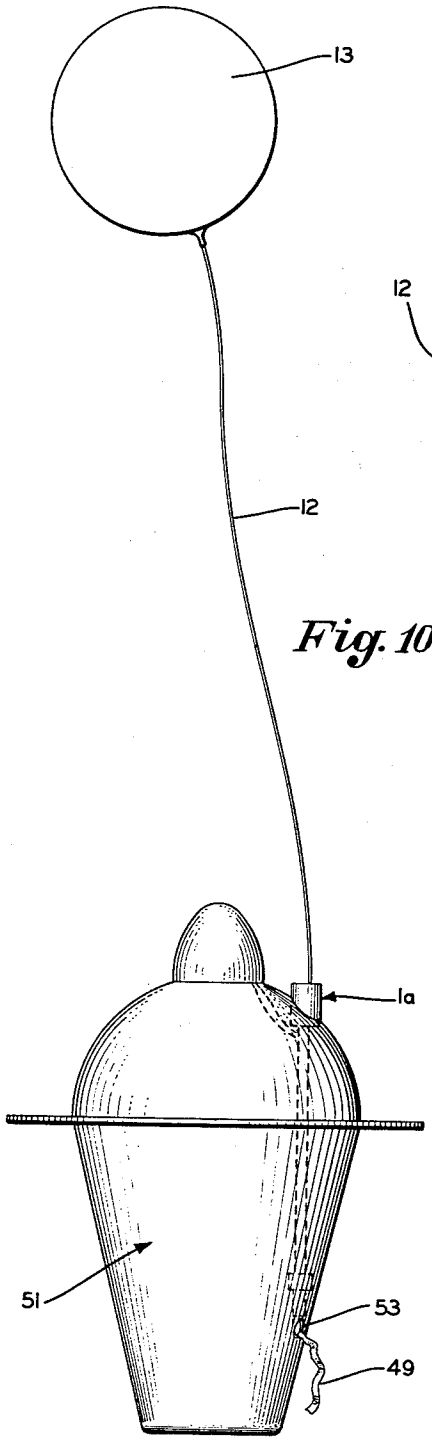


Fig. 10

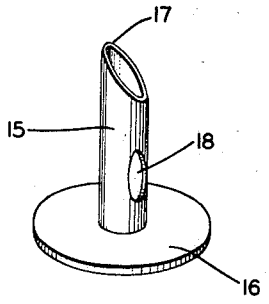


Fig. 9

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United States Patent Office 3,171,128 Patented Feb. 23, 1965

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EMERGENCY ANTENNA HAVING BALLOON MEANS TO ERECT ANTENNA AUTOMATICALLY IN RESPONSE TO IMPACT OR IMMERSION

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Filed Nov. 8, 1962, Ser. No. 236,253
6 Claims. (Cl. 343—706)

The invention relates to antennas and more particularly to an emergency antenna for use in connection with a radio sending set and/or receiving set.

The primary object of the invention is to provide a flexible antenna adapted to be normally coiled within an enclosure and having an inflatable balloon attached to one end thereof, with means for quickly inflating the balloon with helium or other lighter-than-air gas for the purpose of raising the antenna to a desired height necessary for transmitting and/or receiving radio signals to any required distance.

The emergency antenna to which the invention pertains may be used in conjunction with a buoy for electric circuit control mechanism for an emergency transmitting device such as disclosed in my copending application, Serial No. 77,415, filed December 21, 1960 (Patent No. 3,061,719, dated October 30, 1962).

Or, the emergency antenna may be used an an antenna for sending or receiving radio messages at a greater distance than that which can be obtained by the conventional antenna used on the ordinary type of equipment, such as the "walkie-talkie" used in the armed services, or in tanks that carry radios for both sending and receiving.

The device may be used as a marker in case of emergency, and even without a radio connection it may serve as a marker.

Another object of the invention is to provide such an emergency antenna comprising a flexible conductor coiled upon a spool in the manner of a fish line upon a spinner-type casting reel, an inflatable balloon being connected to the end of the conductor and collapsed within a container in which the spool is located.

A further object of the invention is to provide an emergency antenna of the character referred to, in which a capsule of condensed helium, or the like, is located within the balloon, with means for releasing gas from said capsule to quickly inflate the balloon so that it will rise out of the container and carry the antenna to the desired height.

A still further object of the invention is to provide an emergency antenna of this type in which means is provided for automatically puncturing the capsule and inflating the balloon in the case of a plane crash on land.

Another object of the invention is to provide such an emergency antenna in which means is provided for automatically puncturing the capsule and inflating the balloon in the case of a plane crash on water.

A further object of the invention is to provide an emergency antenna of the character referred to in which the capsule is punctured by means of a plunger actuated by gas pressure created by moisture entering the device.

A still further object of the invention is to provide an emergency antenna of this type in which the capsule is punctured by means of a spring-pressed plunger actuated by crashing of a plane carrying the device.

The above and other objects, apparent from the drawings and following description, may be attained, the above described difficulties overcome and the advantages and results obtained, by the apparatus, construction, arrangements and combinations, subcombinations and parts which comprise the present invention, a preferred embodiment

of which, illustrative of the best mode in which applicant has contemplated applying the principle, being set forth in detail in the following description and illustrated in the accompanying drawings; in which,

FIG. 1 is a fragmentary side elevation of the container for the emergency antenna showing the cover for the same in the normal closed position;

FIG. 2 is a vertical sectional view through the container, in the position of FIG. 1, showing the coiled antenna and the collapsed balloon therein;

FIG. 3 is a vertical sectional view showing the cover pressed down to puncture the capsule;

FIG. 4 is a vertical sectional elevation, showing the cover removed from the container and the inflated balloon with uncoiled antenna out of the container;

FIG. 5 is a vertical sectional view through a modification of the invention designed to be automatically operated to puncture the capsule in the event of a plane crash on land or in water;

FIG. 6 is a vertical sectional view of another modification of the invention adapted to be used in conjunction with a buoy;

FIG. 7 is an enlarged fragmentary sectional elevation showing a portion of the device shown in FIG. 6;

FIG. 8 is an enlarged fragmentary sectional view of the capsule and a portion of the balloon;

FIG. 9 is an enlarged perspective view of the pin which punctures the capsule; and

FIG. 10 is an elevation of a buoy with the device of FIG. 5 or FIG. 6 mounted therein, showing the balloon inflated and released and the antenna raised.

Reference is now made more particularly to the form of the invention shown in FIGS. 1 to 4, 8 and 9, in which similar reference characters indicate similar parts throughout the several views.

The antenna is adapted to be normally located within a container indicated generally at **1**. This container is preferably of cylindrical shape, as shown, with a centrally disposed spool **2** connected to the bottom wall **3** and extending to a point spaced from the open upper end of the container.

The container **1** may be made of any suitable material, preferably a plastic material from which it may be formed as by extrusion molding or the like. A head **4** closes the upper end of the spool **2**.

A removable cover **5** is provided for the container **1**. This cover has a depending peripheral flange **6** which slidably fits upon the open upper end of the container. A bayonet slot is provided in the flange **6** of the cover comprising the vertical slot **7** open through the lower edge of the flange **6** and the connecting horizontal slot **8** located at a point spaced above the lower edge of the flange **6**.

A stud **9** upon the exterior of the container **1**, near the open upper end thereof, is received in this bayonet slot. In the normal position shown in FIGS. 1 and 2, the stud **9** is received in the horizontal portion **8** of the bayonet slot.

Prongs **10** and **11** are provided upon the bottom of the container **1** for plugging into a radio or the like. The antenna comprises a flexible conductor **12**, one end of which is connected to the prong **10**. This flexible conductor is shown in FIGS. 2 and 3 as coiled upon the spool **2** in the same manner in which a fish line is coiled upon a spinner-type casting reel.

The inflatable balloon **13** is connected to the other end of the flexible conductor **12**. As best shown in FIG. 8, this inflatable balloon has a capsule **14**, of rubber or the like, located within the balloon, preferably adjacent the portion thereof which is connected to the flexible conductor **12**.

This capsule may contain compressed helium, or other lighter-than-air gas, in sufficient quantity to inflate the balloon **13** when the gas is expanded. The capsule **14** is

adapted to be punctured when desired by means of the tubular prong **15**, shown in detail in FIG. 9, having a flange **16** at its lower end for connection to the inner surface of the balloon **13**. The upper end of the prong **15** is sharpened as indicated at **17** and a slot **18** is formed in the tubular prong **15** intermediate its ends.

As best shown in FIG. 2, the deflated balloon **13**, upon the end of the coiled flexible conductor **12**, is folded upon itself within the upper end portion of the container **1** and extends up into the cover or cap **5**. The cover is retained upon the container by engagement of the stud **9** on the container in the horizontal portion **8** of the bayonet slot, as shown in FIG. 1.

In this position, it will be seen that the lower end portion of the collapsed balloon **13**, containing the capsule **14**, is located entirely above the head of the spool **2** in the container, as shown in FIG. 2.

The sharpened prong **15** within the collapsed balloon thus rests upon the head **4** of the spool with the sharpened point thereof in contact with the capsule **14**. When it is desired to inflate the baloon **13** and release the antenna, the cover or cap **5** is rotated slightly so as to move the stud **9** out of the horizontal portion **8** and into the vertical portion **7** of the bayonet slot in the flange **6**.

The cap or cover **5** may then be compressed to the position shown in FIG. 3, compressing the deflated balloon **13** between the top of the cap and the head of the spool, whereby the sharpened prong **15** within the lower end of the balloon will puncture the capsule **14** releasing the compressed helium or other lighter-than-air gas therein within the interior of the balloon **13** inflating the same.

The cap or cover **5** may then be removed from the container **1** by pulling straight upward upon the same so that the bayonet slot therein will be disengaged from the stud **9**. The balloon will then be permitted to completely inflate, floating upward out of the container and carrying the flexible conductor **12** therewith, as shown in FIG. 4. The antenna may thus be raised to any desired height which may be governed by the length of the flexible conductor **12**.

It should be understood that instead of puncturing the capsule as illustrated and above described, the tubular prong **15** may be arranged to open a valve in the capsule, producing the same effect, by releasing lighter-than-air gas from the capsule to inflate the balloon.

In FIG. 5 is shown a modification of the invention adapted to be carried in an airplane and provided with means for automatically inflating and releasing the balloon to raise the antenna to desired height in the event the plane crashes either upon land or open water.

In this embodiment of the invention, the container **1***a* may be quite similar to the container **1** shown in FIGS. 1 to 4 and described above, having a spool **2***a* extending upward from the bottom thereof. The head **4***a* of the spool has a central aperture **20** therein for a purpose to be later described.

The cap or cover **5***a* has a peripheral flange **6***a* which may be relatively narrow as compared with the flange **6** shown in FIGS. 1 to 3. There is no stud or bayonet slot arrangement upon the container **1***a* and cover **5***a* for manipulating the cover in the manner above described. The cover **5***a* has merely a sliding fit upon the open upper end of the container **1***a*.

A tube **21** is connected to the lower end of the container **1***a* and depends downwardly therefrom. At a point spaced below the bottom of the container **1***a* a pair of oppositely disposed arms **22** are formed upon diametrically opposite sides of the tube **21**, and slots **23** are formed in the tube above these points.

Pivoted at **24** upon the arms **22** is a pair of levers **25**, each having a relatively short leg **26** at its upper end, the inner ends of which are bevelled as shown at **27**. The lower end of each lever **25** terminates in an inturned finger **28**.

Coil springs **29**, connected to the lower portions of the levers **25** and to the tube **21**, normally hold the levers in the position shown in FIG. 5, the fingers **28** extending through openings **30** in the tube **21** and contacting a disc **31** which holds the lower ends of the levers **25** outward against the pull of the springs **29**.

The bevelled inner ends **27** of the arms **26** of the levers **25** thus engage the bevelled periphery of flange **32** upon the plunger **33**. This plunger is spring-biased by spring **34** interposed between the underside of the bevelled flange **32** and the transverse partition wall **35** fixed within the tube **21**.

The reduced shaft or rod **36** is slidably located through the central opening **20** in the head **4***a* of the spool **2***a*, and a disc **37** is attached to the upper end thereof and normally rests on top of the head **4***a*, as shown in FIG. 5. The lower end of the rod or shaft **36** is received in a socket **38** in the upper end of the plunger **33**.

A hollow cylindrical weight **39** is suspended from the partition wall **35** within the tube **21** by coil springs **40**. The lower end of this weight is normally located spaced above the disc **31**.

A cylinder **41** is connected to the lower end of the tube **21** and a piston **42** is vertically slidably mounted within the cylinder, the piston rod **43** extending up through the top of the cylinder **41** into the tube **21**, the reduced upper end **44** of said piston rod being located within the hollow cylindrical weight **39** at a point spaced from the lower end of the plunger **33**. The disc **31** has a central opening which receives the reduced portion **44** of the piston rod.

The cylinder **41** has a reduced lower end portion **45** which contains carbide as indicated at **46**, or other material, which, coming into contact with either salt or fresh water, will produce a gas.

An opening **47** is formed in the lower end of the reduced portion **45** of the cylinder, a check valve **48** being provided therefor. The opening **47** may be normally sealed by a tape **49** of suitable material for sealing the same against moisture.

A switch **50** is shown mounted upon the exterior of the tube **21** entirely below the container **1***a*. In the event the device shown in FIG. 5 is located within a buoy, as indicated generally at **51** in FIG. 10, containing a radio sending set, flasher light, etc., as disclosed in my above-mentioned application, Serial No. 77,415 now Patent No. 3,061,719, the switch **50** may control the circuit to these devices.

The switch arm **52** is normally held in the off position shown in FIG. 5. In the event the device is carried in an airplane, it may be mounted within a buoy **51** as shown in FIG. 10, the container **1***a* for the antenna and collapsed balloon being located through the top of the buoy as shown in FIG. 10, while the tape **49** may be located through a suitable opening **53** in the lower end of the buoy and connected to a stationary part of the plane.

The buoy would be preferably carried in the tail portion of the plane. The antenna **12** would be coiled upon the spool **2***a*, within the container **1***a*, and the collapsed balloon **13** would be folded within the container in the same manner as shown in FIGS. 2 and 3 and above described.

Assuming that the plane carrying the buoy so equipped crashes in water, when the buoy is immersed in water it will be floated out of its position by the water removing the sealing tape **49** from the opening **47** and permitting water to enter the reduced lower end **45** of the cylinder **41**. Gas will be formed when the water comes into contact with the carbide, or other gas-forming material **46**, creating a pressure which will move the piston **42** upward in the cylinder.

As the shoulder **54** on the piston rod **43** contacts the disc **31** it will raise the same from between the fingers **28** of the levers **25**, the springs **29** pulling the lower ends of the levers **25** together, thus tilting the substantially horizontal legs **26** of the levers upward, releasing the

spring-loaded bevelled disc 32, whereupon the plunger 33 will rapidly move the disc 37 upward puncturing the capsule 14 in the balloon, whereby the balloon 13 will become inflated raising the cover or cap 5a from the container 1a and raising the antenna 12, as shown in FIG. 10.

Assuming that a plane carrying the device shown in FIG. 5 would crash upon the ground, the weight 39 suspended upon the coil springs 40 would be thrown downward by gravity, striking the disc 31 and moving it to the broken line position shown in FIG. 5, permitting the springs 29 to pull the levers 25 inward to the broken line position, thus withdrawing the legs 26 from engagement with the bevelled periphery of the disc 32, whereupon the spring 34 will thrust the plunger 33 upward, thrusting the reduced rod 36 upward through the opening 20 in the head 4a of the spool, puncturing the capsule 14 so that the balloon 13 will be inflated, rising up and removing the cover or cap 5a from the container 1a and uncoiling the flexible conductor 12 from the spool 2a in the manner above described.

In FIG. 6 is shown another modification in which the container 1a and cap 5a may be the same as in FIG. 5. A spool 2b is formed within the container, the flexible conductor 12 being coiled thereon in the manner above described, one end thereof being connected to the deflated balloon 13 which is folded within the container in the manner above described.

A gas capsule 14, as shown and described with reference to the previously described forms of the invention, is provided within the balloon and adapted to be punctured in the manner above described.

A tube 56 is connected at its upper end to the bottom of the container 1a, and a cylinder 41a is connected to the lower end of the tube. A piston 42a is mounted within the cylinder 41a and the piston rod 43a extends upward through the tube and has the reduced rod 36a at its upper end slidable through the aperture 20a in the top of the spool 2b.

A reduced portion 45a is formed at the bottom of the cylinder 41a and may contain carbide or the like as shown at 46a. An opening 47a in the bottom of the reduced portion 45a is provided with a check valve 48a and is normally closed by a tape 49a, similar to the tape 49 above described, normally closes the opening 47a.

The switch 50a is mounted upon the tube 56 and may be connected to a radio or other equipment as above described. The switch arm 52a is normally in open position, as shown in full lines in FIG. 6, and is located within the slot 57 in the enlarged portion 60 of the piston rod 43a.

The piston rod is normally held in the position shown in FIG. 6 by means of the leaf springs 61 mounted within the tube 56 and having the projections 62 at their upper ends for engaging in notches 63 in the enlarged portion 60 of the piston rod.

This form of the invention is especially adapted to be mounted within a buoy 51 as shown in FIG. 10. Such a buoy may be mounted in a plane, as above described, or carried upon a boat, and may be automatically released from the plane in the manner above described with reference to the embodiment of the invention shown in FIG. 5 or may be manually placed in the water from a boat in distress, or the like.

The action will be the same as above described with reference to FIG. 5, water entering the opening 47a in the reduced end 45a of the cylinder 41a, when the tape 49a is torn away, will create a gas when contacting the carbide or the like, therein, the gas pressure thrusting the piston 42a upward.

As the piston rod 43a is thus moved upward, the switch arm 52a will be moved to closed position as shown in broken lines. The reduced rod 36a will be thrust upward through the opening 20a, causing the capsule 14 to be punctured, so as to inflate the balloon 13 in the manner above described, so that it will remove the cap 5a from the container 1a and uncoil the conductor 12 from the spool, assuming the position shown in FIG. 10.

From the above it will be obvious that an emergency antenna is provided which may be operated either manually or automatically to cause a balloon to be inflated with lighter-than-air gas so that the same will ascend, uncoiling a flexible conductor or the like carrying it to any desired height depending upon the length of said conductor.

It will also be evident that the invention provides an antenna for sending and/or receiving emergency radio messages or signals at a greater distance than that which can be obtained by the conventional antenna used on the ordinary type of equipment, such as the "walkie-talkie" used in the armed services, or in tanks that carry radios for both sending and receiving.

The device may also be used as a marker only in case of emergency, without any radio connection, by attaching an ordinary line or string to a balloon which may be inflated in the manner disclosed above.

In the foregoing description certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiments of the improved construction illustrated and described herein are by way of example, and the scope of the present invention is not limited to the exact details of construction.

Having now described the invention or discovery, the construction, the operation, and use of preferred embodiments thereof, and the advantageous new and useful results obtained thereby; the new and useful construction, and reasonable mechanical equivalents thereof obvious to those skilled in the art, are set forth in the appended claims.

I claim:

1. An emergency antenna construction comprising a container having an open upper end, a removable cap for said open upper end of the container, a spool extending upward from the bottom of the container to a point spaced from said cap, a flexible conductor coiled upon said spool, one end of said conductor being fixed to the container, a collapsed balloon attached to the other end of said conductor, a rubber-like capsule of compressed lighter-than-air gas in said balloon, said balloon being located within the container between the cap and the top of the spool, a spring-biased plunger located longitudinally relative to said spool, means operated by said plunger for releasing gas from said capsule to inflate the balloon whereby the inflated balloon will remove the cap from the container and will rise therefrom uncoiling said conductor from said spool, spring-loaded lever means normally holding said spring-biased plunger inoperative, a spring-suspended weight for tripping said spring-loaded lever means under certain conditions, and a gas-pressure-operated piston for tripping said spring-loaded lever means under certain other conditions.

2. An emergency antenna construction comprising a container having an open upper end, a removable cap for said open upper end of the container, a spool extending upward from the bottom of the container to a point spaced from said cap, a flexible conductor coiled upon said spool, one end of said conductor being fixed to the container, a collapsed balloon attached to the other end of said conductor, a rubber-like capsule of compressed lighter-than-air gas in said balloon, said balloon being located within the container between the cap and the top of the spool, a spring-biased plunger located longitudinally relative to said spool, means operated by said plunger for releasing gas from said capsule to inflate the balloon whereby the inflated balloon will remove the cap from the container and will rise therefrom uncoiling

said conductor from said spool, a flange upon said spring-biased plunger, spring-loaded levers having means at one end for engaging said flange, a movable member normally engaged between the opposite ends of said levers for holding said means at said one end of the lever in engagement with said flange for normally holding said spring-biased plunger inoperative, a spring-suspended weight for displacing said movable member under certain conditions, and a gas-pressure-operated piston for displacing said movable member under certain other conditions.

3. An emergency antenna construction comprising a container having an open upper end, a removable cap for said open upper end of the container, a spool extending upward from the bottom of the container to a point spaced from said cap, a flexible conductor coiled upon said spool, one end of said conductor being fixed to the container, a collapsed balloon attached to the other end of said conductor, a rubber-like capsule of compressed lighter-than-air gas in said balloon, said balloon being located within the container between the cap and the top of the spool, a spring-biased plunger located longitudinally relative to said spool, means operated by said plunger for releasing gas from said capsule to inflate the balloon whereby the inflated balloon will remove the cap from the container and will rise therefrom uncoiling said conductor from said spool, a tube connected to the lower end of the container and depending therefrom, said spring-biased plunger being located within said tube, a flange upon said spring-biased plunger, spring-loaded levers fulcrumed outside of said tube, angular fingers upon each end of said levers, there being openings in said tube through which said angular fingers project, a movable disc-like member within the tube normally engaged between the fingers at one end of said levers for holding the fingers at the other end of the levers in engagement with said flange for normally holding said spring-biased plunger inoperative, a gas-pressure-operated piston at the lower end of said tube for displacing said disc-like member under certain conditions, and a spring-suspended weight within said tube for displacing said disc-like member under certain other conditions.

4. An emergency antenna construction comprising a container having an open upper end, a removable cap for said open upper end of the container, a spool extending upward from the bottom of the container to a point spaced from said cap, a flexible conductor coiled upon said spool, one end of said conductor being fixed to the container, a collapsed balloon attached to the other end of said conductor, a rubber-like capsule of compressed lighter-than-air gas in said balloon, said balloon being located within the container between the cap and the top of the spool, a spring-biased plunger located longitudinally relative to said spool, means operated by said plunger for releasing gas from said capsule to inflate the balloon whereby the inflated balloon will remove the cap from the container and will rise therefrom uncoiling said conductor from said spool, a tube connected to the lower end of the container and depending therefrom, said spring-biased plunger being located within said tube, a flange upon said spring-biased plunger, spring-loaded levers fulcrumed outside of said tube, angular fingers upon each end of said levers, there being openings in said tube through which said angular fingers project, a movable disc-like member within the tube normally engaged between the fingers at one end of said levers for holding the fingers at the other end of the levers in engagement with said flange for normally holding said spring-biased plunger inoperative, a spring-suspended weight within the tube for displacing said disc-like member under certain conditions, a cylinder connected to the lower end of the tube, a gas-pressure-operated piston in said cylinder, a piston rod connected to said piston and extending into said tube for displacing said disc-like member under certain other conditions, a reduced lower portion of the cylinder containing material which will produce gas on contact with water, and means permitting water to enter said reduced lower portion of the cylinder when the same is immersed in water.

5. An emergency antenna construction comprising a container having an open upper end, a removable cap for said open upper end of the container, a spool extending upward from the bottom of the contained to a point spaced from said cap, a flexible conductor coiled upon said spool, one end of said conductor being fixed to the container, a collapsed balloon attached to the other end of said conductor, a rubber-like capsule of compressed lighter-than-air gas in said balloon, said balloon being located within the container between the cap and the top of the spool, a spring-biased plunger located longitudinally relative to said spool, means operated by said plunger for releasing gas from said capsule to inflate the balloon whereby the inflated balloon will remove the cap from the container and will rise therefrom uncoiling said conductor from said spool, a tube connected to the lower end of the container and depending therefrom, said spring-biased plunger being located within said tube, a flange upon said spring-biased plunger, spring-loaded levers fulcrumed outside of said tube, angular fingers upon each end of said levers, there being openings in said tube throught which said angular fingers project, a movable disc-like member within the tube normally engaged between the fingers at one end of said levers for holding the fingers at the other end of the levers in engagement with said flange for normally holding said spring-biased plunger inoperative, a spring-suspended weight within the tube for displacing said disc-like member under certain conditions, said weight having an axial opening which receives the lower end of said plunger, a cylinder connected to the lower end of the tube, a gas-pressure-operated piston in said cylinder, a piston rod connected to said piston and extending into said tube for displaceing said disc-like member under certain other conditions, there being an opening in said disc-like member, and a reduced portion of said piston rod located through said opening and into said axial opening in the weight.

6. An emergency antenna construction comprising a container having an open upper end, a removable cap for said open upper end of the container, a spool extending upward from the bottom of the container to a point spaced from said cap, a flexible conductor being fixed to the container, a collapsed balloon attached to the other end of said conductor, a rubber-like capsule of compressed lighter-than-air gas in said balloon, said balloon being located within the container between the cap and the top of the spool, a spring-biased plunger located longitudinally relative to said spool, means operated by said plunger for releasing gas from said capsule to inflate the balloon whereby the inflated balloon will remove the cap from the container and will rise therefrom uncoiling said conductor from said spool, a tube connected to the lower end of the container and depending therefrom, said spring-biased plunger being located within said tube, a flange upon said spring-biased plunger, spring-loaded levers fulcrumed outside of said tube, angular fingers upon each end of said levers, there being openings in said tube through which said angular fingers project, a movable disc-like member within the tube normally engaged between the fingers at one end of said levers for holding the fingers at the other end of the levers in engagement with said flange for normally holding said spring-biased plunger inoperative, a spring-suspended weight within the tube for displacing said disc-like member under certain conditions, a cylinder connected to the lower end of the tube, a gas-pressure-operated piston in said cylinder, a piston rod connected to said piston and extending into said tube for displacing said disc-like member under certain other conditions, a reduced lower portion of the cylinder containing material which will produce gas on contact with water, there be-

ing an opening in said reduced lower portion of the cylinder, and sealing material closing said opening, said sealing material being removed from said opening by immersion in water.

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