

Jan. 6, 1970

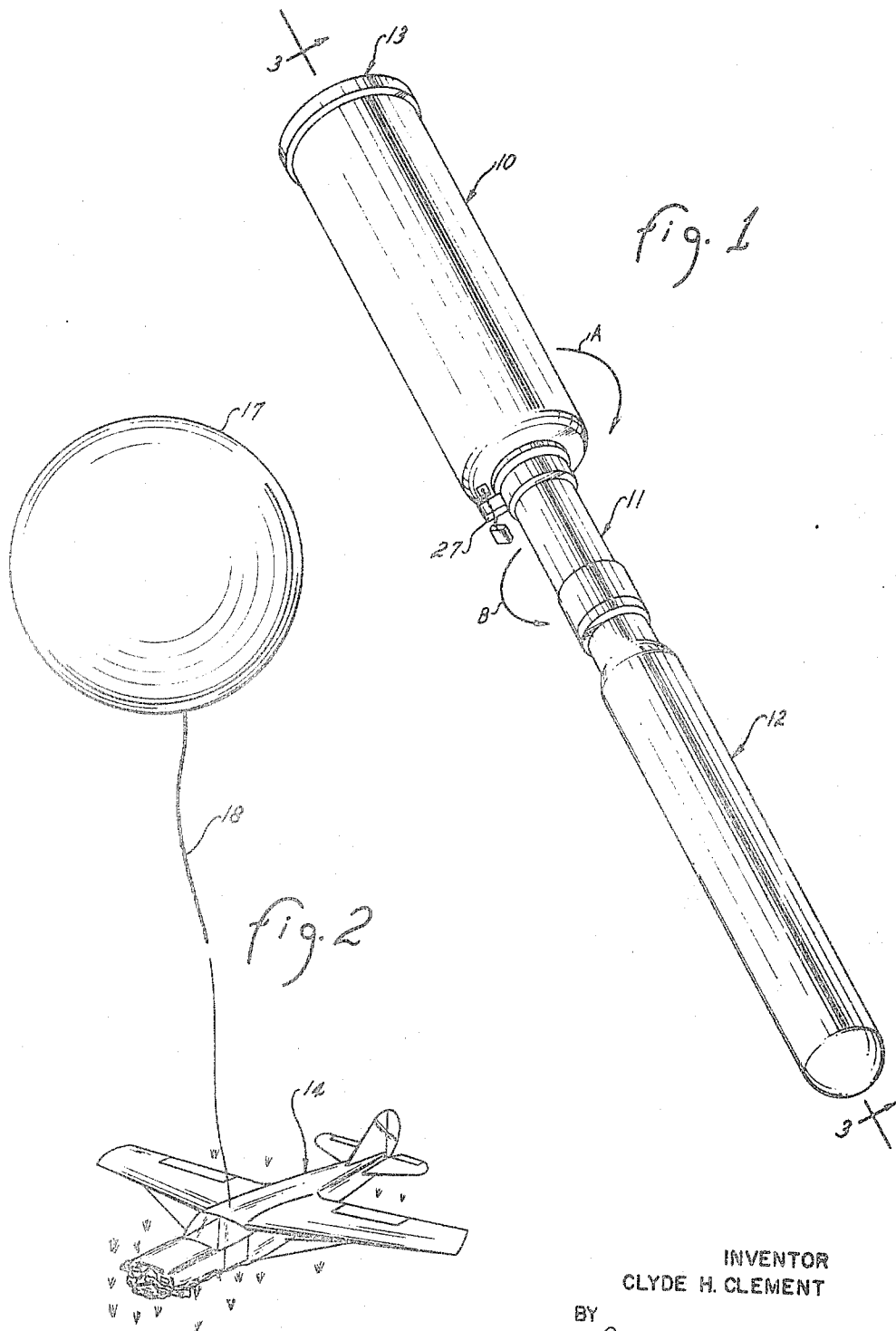
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3,487,810

EMERGENCY SIGNALING DEVICE

Filed Dec. 7, 1966

3 Sheets-Sheet 1



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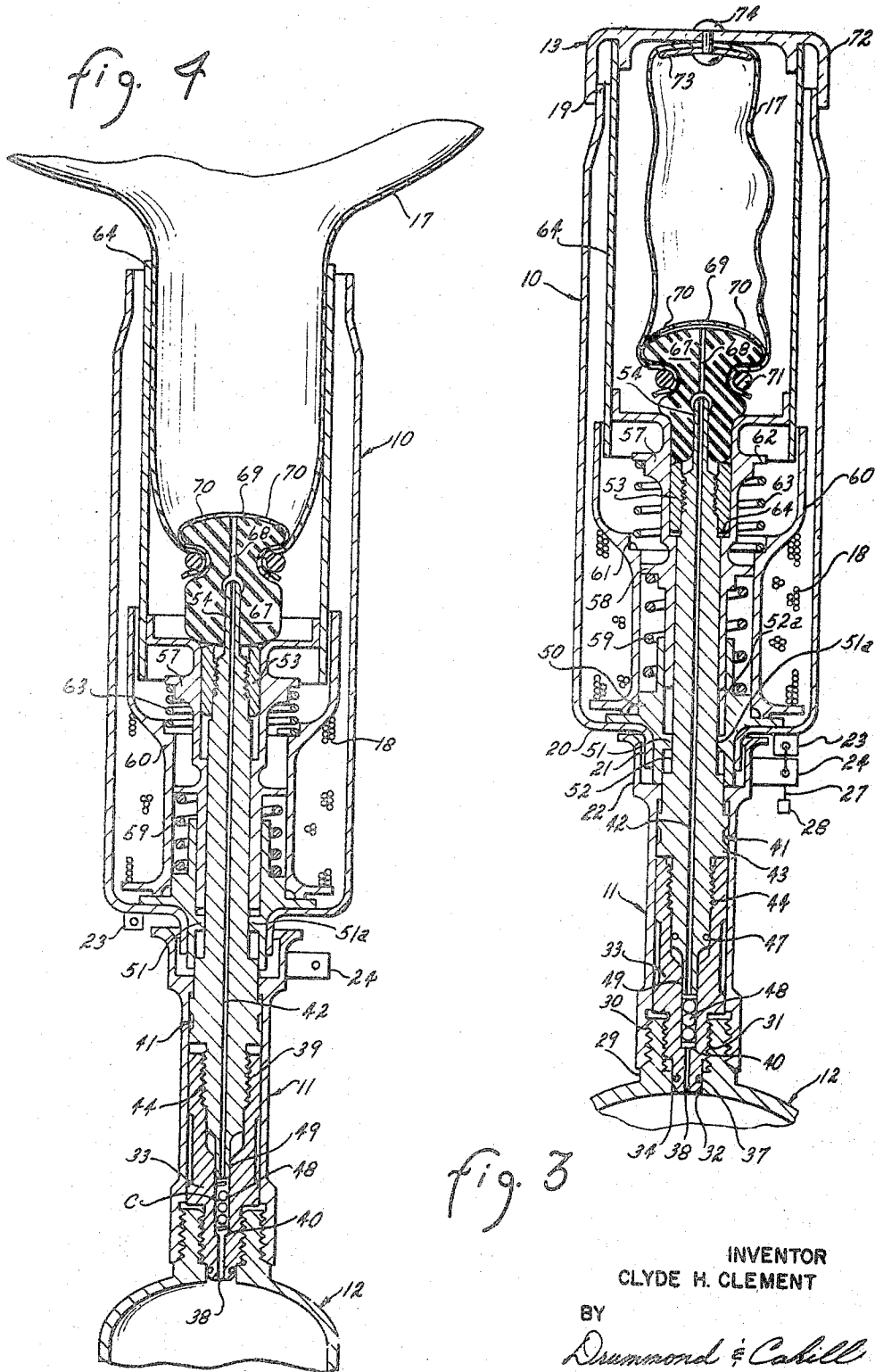
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3 Sheets-Sheet 3

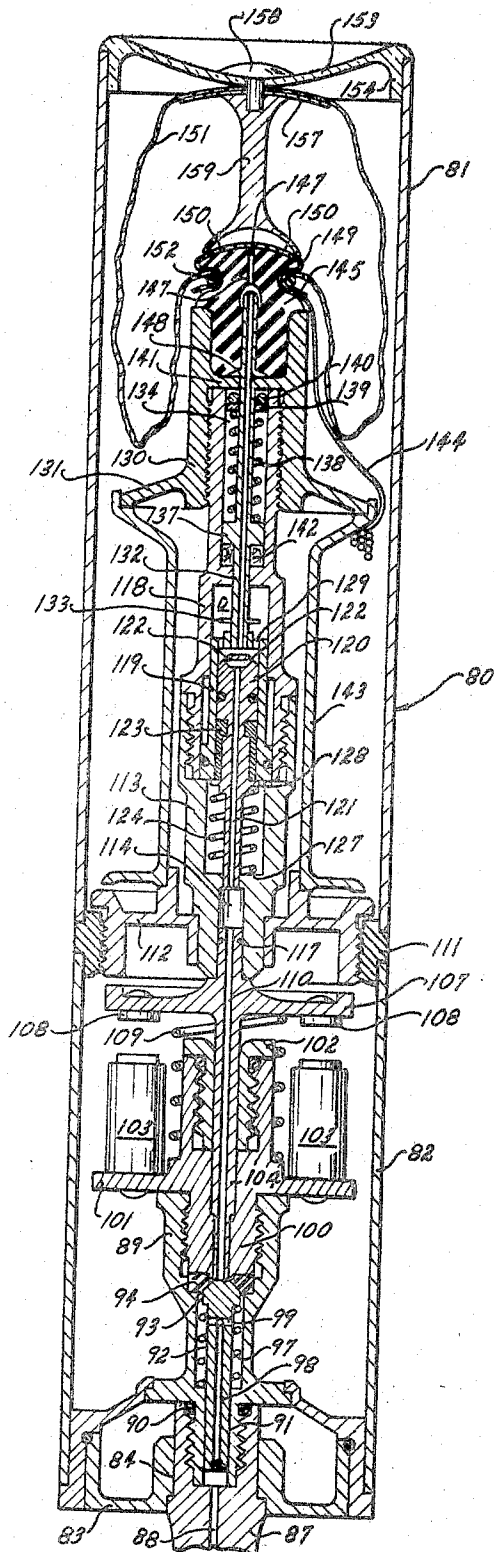


Fig. 5

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EMERGENCY SIGNALING DEVICE

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Filed Dec. 7, 1966, Ser. No. 599,784

Int. Cl. G09f 9/00; B63b 45/04

U.S. Cl. 116—124

3 Claims

ABSTRACT OF THE DISCLOSURE

An emergency signaling device is disclosed which comprehends, in alternative preferred embodiments, the manual or automatic release of a tethered signal balloon from a compact container holding the uninflated balloon, a source of lighter-than-air fluid, and valve means for inflating the balloon such that the balloon is expelled from the container upon activation.

This invention relates to communication apparatus. In particular, the invention concerns an emergency signaling device.

In a further aspect, the invention relates to an emergency signaling device containing an uninflated balloon and a supply of lighter-than-air balloon inflating gas and adapted to conveniently and expediently inflate and expel the balloon.

In a still further aspect, the invention concerns an emergency signaling device of the type above described in which the balloon remains aloft and is tethered to the site of the emergency to provide a continuous communication or signaling means.

Emergency signaling is a frequently used mode of communication. Persons lost while hiking or hunting improvise and utilize a wide variety of signaling methods. Most commonly, a lost person will resort to shouting and waving his arms. Those lost in an area where a fuel supply, brush, dead branches, and other natural combustible tinder is available, will resort to building a fire. Hunters have a universal signal comprising three rapidly fired gun shots. While these methods may be nearly adequate under certain circumstances, they leave much to be desired. For example, shouting and waving the arms is an energy-consuming task with limited range both as to sound and visibility. Building a fire requires that the environment supply the required combustible materials. Signaling with a weapon is dependent upon the required firearm and ammunition supply. The above-noted signaling methods presuppose that the distressed person is not disabled and therefore capable of perpetuating the signaling method. Further, the signaling must be accomplished at the precise time that a searcher or search party is within visual or sound range.

Mechanized units are usually equipped with more sophisticated signaling devices. These include mainly flares and flare guns and electronic communication apparatus. The use of flares, as with the methods noted above, are dependent upon human capabilities to employ such at the proper time. Electronic signaling devices, either manually operated or automatically engaged, have inherent basic limitations. If the device was not, in fact, destroyed during the crash of the vehicle, the shock and vibration may have been sufficient to render the device useless. Even if the device is operative, it is still dependent upon a continuous electric power supply.

It would be highly advantageous therefore to provide a convenient, self-contained signaling device which would provide a permanent signal which would operate independently of the provisions of the terrain, the disability of the signaler, or an external power supply source.

Accordingly, it is a principal object of the present invention to provide a signaling device which will display a continuous signal having an extended range.

A further object of the present invention is the provision of a signaling device which is self-contained and not dependent upon an external power supply source.

Another object of the invention, in one preferred embodiment, is the provision of a signaling device that is compact, lightweight, and simple to use, especially by persons afoot.

Yet a further object of the invention is to provide a signaling device to be homologated into the structure of a vehicle as, for example, an aircraft, to be triggered either manually or by the impact to display a continuous signal to aid in the location of the imperiled vehicle.

These and other, further, and more specific objects and advantages of the invention will become apparent to those skilled in the art from the following detailed description of the invention taken in conjunction with the drawings, in which:

FIG. 1 is a perspective view of the device chosen for purposes of illustrating a presently preferred, manually operated embodiment of the invention as the device would appear when ready for use;

FIG. 2 is a perspective view of a preferred embodiment of the present invention when used as a permanent signaling and spotting device in connection with a downed disabled aircraft;

FIG. 3 is an elevational view in section taken along line 3—3 of FIGURE 1 and illustrating the operative relationship of the components of the invention;

FIG. 4 is an elevational view in section of the device of FIG. 1 and illustrating the terminal phase of the operation thereof; and

FIG. 5 is an elevational view in section of another preferred embodiment of the present invention and illustrating the components thereof as adapted to be operated electromechanically.

To achieve the desired objectives of my invention, I provide a tubular housing in which is encased a deflated balloon. Attached to the housing is a pressurized supply of lighter-than-air balloon inflating gas. A conduit is disposed coaxially within the housing and communicates between the pressurized gas supply and the balloon. A valve and a means for actuating the valve is located at the union of the conduit and the gas tank to control the flow of gas therebetween. A resilient boss having a longitudinal bore with a check valve located therein slidably and frictionally receives the upper end of the conduit. After the valve is opened, gas is transmitted through the conduit into the balloon where it is retained by the check valve. After the balloon has been inflated, a spring means disengages the boss from the conduit, allowing the balloon to ascend. As the balloon ascends, it is tethered by a line supplied from a spool which is coaxially mounted around the conduit within the housing. The foregoing description is generally illustrative of either of the preferred embodiments of the present invention. The preferred embodiments, one mechanically operated and the other electromechanically operated, will be hereinafter further described in detail.

Turning now to the drawings, in which the same reference numerals indicate corresponding elements throughout the several views, FIG. 1 illustrates a presently preferred embodiment of the manually operated device of the invention chosen for purposes of illustration and shows the generally tubular outer housing 10. A cylindrical adapter 11 coaxially rotatable with said housing 10 depends downwardly from the lower end thereof. An elongate cylindrical tank 12 is affixed to and extends downwardly from the adapter 11. A disc-like cover member 13 frictionally engages the outer diametrical surface of the outer housing 10.

FIG. 2 graphically depicts the signaling device of the present invention as it would appear in connection with a downed aircraft 14. The balloon 17 is tethered to the aircraft 14 by a line 18. It is evident from this illustration that the balloon 17 presents a permanent signaling and spotting device to aid searchers in the location of the distressed aircraft. It will be readily understood that the signaling balloon could be used not only by aircraft but by any other manner of vehicle or by a distressed human. Further noted is the permanence of the display, not requiring the attention of any person.

Attention is now directed to FIG. 3 which illustrates the internal operative components of the device of FIG. 1. The outer housing 10 has an open upper end 19 and a substantially closed lower end 20. An annular bearing surface 21 depends downwardly from the lower end 20. The circular upper end 22 of the adapter 20 is rotatably journaled about the annular bearing surface 21. A tab 23 having an aperture therein depends downwardly from the lower surface 20. An extension 24 which corresponds with the tab 23 and having an aperture therein depends laterally outward from the upper surface 22 of the adapter 11. A breakable seal comprising a thin, wire-like member 27 extending through the apertures in the tab 23 and the extension 24 is secured at its loose ends by a coined or minted union 28.

An annular extension 29 having an external thread 30 and an internal thread 31 and a central bore 32 extends coaxially upward from the upper surface of the tank 12. The lower end of the adapter 11 threadedly engages the external thread 30 of the extension 29. A tubular valve body 33 frictionally engaging the interior diametric surface of the adapter 11 has a threaded lower portion which engages the thread 31 of the extension 29. A rod-like extension 34 terminates the nethermost end of the valve body 33 and is coaxially housed within the bore 32. An O-ring 37 is carried annularly by the extension 34 and frictionally engages the bore 32 to create an airtight seal therebetween. A multi-diameter annular bore 38 extends centrally through the valve housing 33. A female thread 39 and a shoulder 40 are determined by the multi-diameter bore 38 within the valve body 33. An elongated cylindrical spindle 41 having a central longitudinal bore 42 is disposed coaxially within the lower end of the housing 10 and extends through the adapter 11 and terminates within the valve body 33. An enlarged annular surface 43 of the spindle 41 is rotatably journaled within the adapter 11. A spiral screwflight 44 carried by the spindle 41 immediately below the enlarged section 43 threadedly engages the female thread 31 of the valve body 33. An annular O-ring 47 carried by the spindle 41 frictionally engages the bore 38 of the valve body 33 to create a second airtight seal. A series of resilient inserts 48, here shown as neoprene or composition spheres, are compressed between the lower end 49 of the spindle 41 and the shoulder 40 within the bore 38 to create a valve arrangement to control the flow of pressurized gas contained within the tank 12.

A tubular flanged pilot 50 is secured to the lower end 20 of the outer housing 10. A pair of driving arms 51 and 51a having mutually parallel inner terminal ends extend diametrically inward from the pilot 50 and mate with corresponding flat sides 52 and 52a provided along a portion of the spindle 41. The spindle 41 is thereby allowed a degree of lateral movement within the pilot 50 and yet is rotatably engaged to be driven by the arms 51 and 51a. A nut 53 having a circular outer surface is threadedly engaged near the upper end of the spindle 41. A needle-like projection 54 extends upwardly to terminate the upper end of the spindle 41. A guide 57 coaxially and slidably encompasses the spindle 41 and the nut 53. An annular flange 58 circumvents the guide 57 approximately midway of the longitudinal axis thereof. A compression spring 59 is disposed coaxially around the guide 57 and bears

against the upper surface of the pilot 50 in the undersurface of the flange 58.

A generally elongate tubular spool 60 carrying the pivoting line 18 on its outer indented surface is coaxially disposed within the outer housing 10. The spool 60 is locationally secured at its lower end by engagement with the pilot 50. The flange 58 of the guide 57 is locationally and slidably journaled within the inner diametrical surface of the spool 60. A shoulder 61 is provided near the upper end of the spool 60 to coaxially oppose a flange 62 provided near the upper end of the guide 57. A compression spring 63 disposed between the shoulder 61 and the flange 62 coacts to retain the spool 60 within the lower portion of the outer housing 10. A shoulder 64 integral with the internal surface of the guide 57 abuts the undersurface of the nut 53 to retain the guide 57 in its operative location with the spindle 41 against the action of the springs 59 and 63. An elongate tubular balloon container 64 attached at its lower end to the guide 57 extends upwardly therefrom coaxially within the housing 10.

A cylindrical resilient boss 67 having a central longitudinal bore 68 which slidably frictionally receives the needle-like end projection 54 of the spindle 41 is frictionally engaged within the internal diameter of the guide 57 and rests upon the nut 53. The flexible membrane 69 having a series of spaced apertures 70 positioned near its outer diameter encompasses the upper surface of the boss 67. The balloon 17, having an opened lower end, encompasses the outer diametrical surface of the boss 67 concurrent with the membrane 69. An annular band 71 encompasses the boss 67 to secure the membrane 69 and the balloon 17 in an airtight arrangement. A flexible cap 13 having a downwardly extending circular lip portion 72 frictionally engages the outer diametrical surface of the upper end 19 of the outer housing 10. The upper central portion of the balloon 17 abuts the undersurface of the cap 13 and is secured thereto by a resilient washer 73 located internal of the balloon and a rivet 74 extending through the cap 13, the balloon 17 and the washer 73.

To operate the presently preferred manual embodiment of the present invention, the operator grasps either the gas tank 12 or the adapter 11 in one hand and the outer housing 10 in the other. A counter-rotating force is now applied to the components as depicted by the arrows A and B of FIG. 1. This movement breaks the thin wire-like seal 27 and allows the internal components of the device to interact without further manual manipulation.

FIG. 4 depicts the interaction of the mechanical components of the previously described manually operated preferred embodiment of the present invention during the initial operative stages. As the housing 10 and the adapter 11 are counter-rotated as hereinabove described, the arms 51 rotationally drive the spindle 41. As the spindle rotates, the threaded portion 44 thereof, being in operative engagement with the thread 39 provided within the valve body 33, is forced rotationally upward. As the spindle 41 retracts upwardly, the distance between the end 49 thereof and the shoulder 40 is increased relieving the pressure upon the spherical seal 48 and creating a gas permeable chamber C. The lighter-than-air balloon inflating gas contained under pressure within the tank 12 now flows into the bore 38 of the valve body 33 through the chamber C and continues upwardly through the longitudinal bore 42 within the spindle 41. As the pressurized gas continues upwardly, it is expelled from the bore 42 and enters the bore 68 provided within the boss 67. The pressure of the gas causes the flexible membrane 69 to recede upwardly away from the top of the boss 67, thereby allowing communication with the apertures 70 through which the gas passes to inflate the balloon 17. After the pressurized gas has been expended into the balloon 17, an equalized atmospheric pressure condition exists within the balloon 17, the tank 12 and the conduit passages

therebetween. The resilient membrane 69, which acts as a one-way checkvalve, now relaxes and abuts the boss 67, disrupting gas communication between the bore 68 and the apertures 70, thereby retaining the gas within the balloon 17. During the time the balloon was being inflated, it exceeded the capacity of the container 64 creating an upward pressure upon the undersurface of the cover member 13, dislodging its frictional engagement with the housing 10. The balloon is now fully inflated. However, the lower end thereof and the attached boss 67 are still frictionally engaged within the internal diameter of the guide 57 and the needle-like extension 54 of the spindle 41 is still frictionally engaged within the bore 68 of the boss 67. Slight manual pressure is now exerted downwardly upon the container 64 compressing the springs 63 and 59. The boss 67 is prohibited from downward movement by abutment against the upper surface of the nut 53. This movement forces the boss 67 to be expelled from the inside diameter of the guide 57. As the boss is so expelled, its resiliency causes it to return to its natural free-form which is diametrically larger than the internal diameter of the guide 57. After the housing 64 and the guide 57 have been retracted sufficiently, the boss 67 is completely expanded whereupon the undersurface thereof abuts the upper surface of the guide 57. The downward pressure exerted upon the container 64 is now released whereupon the compressed springs 59 and 63 urge the guide and the container upwardly. This spring action is sufficient to overcome the friction created between the needle projection 54 and the bore 68, unseating the boss 67 from the spindle 41 and allowing the balloon to ascend. The boss 67 is attached to the free end of the line 18 carried by the spool 60. As the balloon rises, the line 18 is unreeled in a manner analogous to that of common spinning reels until the balloon has reached its maximum ascent as limited by the supply of line carried by the spool.

The distressed person may now anchor the signaling device to his person, a bush, vehicle, or any other convenient anchorage and have a permanently displayed signaling or marking device to aid searchers in his rescue.

Attention is now directed to FIG. 5 which shows another preferred embodiment of the device of the present invention particularly adapted to be electromechanically operated. First provided is an elongate tubular outer housing comprising an upper section 81 and a lower section 82. A circular end panel 83 having a central longitudinal opening 84 is secured along the lower terminus of the outer housing 80. A cylindrical adapter is secured by its outer upper diametrical surface within the opening 84. (Not herein expressly denoted but to be understood by those skilled in the art, the lower end of the adapter 87 is enjoined with a tank of pressurized lighter-than-air balloon inflating gas as previously illustrated in connection with the foregoing detailed description of the preferred manually operated embodiment of the present invention.) A central bore 88 extending longitudinally through the adapter 87 communicates with the aforementioned pressurized gas tank. A valve body 89 is disposed coaxially within the lower portion of the lower section 82 of the outer housing 80 and threadedly engages the upper end of the adapter 87. An annular O-ring seal 90 is positioned between the union of the valve body 89 and the adapter 87 to insure an airtight seal therebetween. A central circular bore 91 extends the lower portion of the valve body 89. A cylindrical valve stem 92 is slidably located within the bore 91. The valve stem 92 has an enlarged conical head 93 which mates with an annular valve seat 94 carried by the valve body 89. A compression spring 97 encompassing the valve stem 92 acts to maintain continuous mating between the conical head 93 and the valve seat 94. A passage 98 extends coaxially a lateral portion of the valve stem 92, terminating below the conical head 93. A series of radial openings 99 communicate between the central passage and the external diametric surface of the valve stem 92.

A carrier member 100 having an extended flange 101 is threadedly engaged at its lower end within the upper end of the valve body 89. A plunger guide 102 having a threaded outer surface and a longitudinal extending bore is secured within the upper end of the carrier member 100. A series of electromagnets 103 are secured to and extend upwardly from the flange 101. A plunger 104 is slidably housed by the plunger guide 102. An annular flange 107 extends from the upper portion of the plunger 104. A series of magnet discs are carried by the flange 107 and are spaced so as to communicate with the electromagnets 103. A compression spring 109 encompasses the upper portion of the carrier member and bears against the flange 107 and the flange 101 to retain the electromagnet 103 and the magnet discs 108 in a spaced-apart relationship. A coaxial passage extends longitudinally through the plunger 104.

An annular union 111 adjoins the upper section 81 and the lower section 82 to form the outer casing 80. A horizontal support member 112 is carried internally by the union 111. A gland 113 is carried by the support member 112 coaxially with the outer housing 80. A counterbore 114 slidably receives the upper end of the plunger 104. An annular O-ring 117 is carried by the upper end of the plunger 104 and frictionally engages the walls of the counterbore 114. A cylindrical upper guide 118 threadedly engages the upper end of the gland and extends upwardly therefrom. A tubular shuttle 119 is slidably housed within the lower diametrical bore of the upper guide. A cylindrical anvil 120 is slidably disposed within the shuttle 119. A central conduit 121 opening at the bottom of the anvil 120 terminates near the upper end thereof. A series of radial passages 122 communicate between the central conduit 121 and the chamber formed internal of the shuttle 119. An annularly expanding spring 123 encompasses a recess provided in the outer surface of the anvil 120 within the shuttle 119. A compression spring 24 encompasses the lower extension of the anvil and bears against an internal shoulder 127 within the gland 113 and a flange 128 integral with the anvil 120 to retain the upper surface of the anvil 120, the shuttle 119 and the annular expanding spring 123 within the upper guide 118. A series of passages 129 extend longitudinally through the upper surface of the shuttle 119.

A bell housing 130 having a radial flange 131 extending from its lower end is threadedly engaged over the upper end of the upper guide 118. A needle-like conduit 132 is slidably journaled near its lower end within the upper guide 118 and near its upper end within the bell housing 130. A relatively thin flange 133 is carried by the lower end of the needle conduit 132 within the chamber D created by the hollow core of the lower end of the guide 118. A counterbore 134 extends coaxially downward from the upper end of the guide 118. An annular pilot 137 integral with the needle conduit 132 is slidably engaged within the counterbore 134. A compression spring 138 is disposed coaxially within the counterbore 134 and bears at its lower edge against the pilot 137. The upper end of the spring 138 bears against a washer 139 and an annular seal 140 which, in turn, abuts the internal flange 141 of the bell housing 130. The downward travel of the conduit 132 is delimited by the abutment of the pilot 137 against the seal 142. A spool 143 carrying line 144 is disposed coaxially about the upper guide 130 and the gland 113 within the housing 80. The spool 143 is locationally retained by the support member 112 and the flange 131.

A resilient boss 145 having a coaxial longitudinal bore 147 is frictionally engaged within the upper internal diametric surface of the bell housing 130. The bore 147 slidably and frictionally receives the upper end of the needle conduit 132. A flange 148 carried by the upper portion of the conduit 132 abuts the lower end of the resilient boss 145. A flexible membrane 149 having a series of spaced apertures 150 positioned near its outer perimeter encompasses the upper surface of the boss

145. A balloon 151 having an opened lower end encompasses the upper diametrical surface of the boss 145 concurrent with the membrane 149. An annular band 152 encompasses the boss 145 to secure the membrane 149 and the balloon 151 in an airtight arrangement. The loose end of the line 144 is also secured to the boss by the annular band 152. A flexible cap 153 having a downwardly extending circular lip portion 154 frictionally engages the inner diametrical surface of the upper end of the outer housing 80. The upper central portion of the balloon 151 abuts the undersurface of the cap 153 and is secured thereto by a resilient washer 157 which is retained by a fastener 158 extending through the cap 153 and into a rigid column 159 which rests on the upper surface of the boss 145.

In operation the electromagnets 103 are first given an electrical energizing pulse which attracts the magnet discs 108, pulling the plunger 104 downwardly. The plunger exerts downward pressure upon the valve stem 92, compressing the spring 97 and unseating the valve head 93 from the valve seat 94. The pressurized gas contained within the tank now flows through the bore 88 upwardly through the passage 98, out through the ports 99 and through the opened valves into the central passage 110 of the plunger 104. The pressurized gas exists the passage 110 into the counterbore 114 and continues upwardly through the conduit 121 in the anvil 120 and exits through the passages 122. A small portion of the pressurized gas enters the needle conduit 132; however, the greatest accumulation proceeds through the passages 129 into the chamber D. The chamber D now becomes highly pressurized. The movable object of this pressure is the anvil 122. As the pressure is sufficient to overcome the spring 124, the anvil is pushed downwardly within the shuttle 119. After the anvil 120 has moved downwardly a sufficient distance, the annular spring expands, abutting the undersurface of the shuttle and thereby retaining the anvil. The lower end of the anvil now abuts the upper end of the plunger 104 to retain the plunger in the position initially described in connection with the energization of the magnets 103. At this stage of the operative cycle, the electrical current supply to the electromagnets 103 may be discontinued. It will be readily understood by those skilled in the art that the above-described operative process is nearly instantaneous. Therefore, the electromagnets need only an initial energizing pulse.

The pressurized gas within the system now has only a single avenue of escape. The gas, therefore, travels upwardly through the needle conduit 132 and into the bore 147 of the boss 145. The pressurized gas now pushes the flexible membrane 149 away from the upper surface of the boss 145 and allows the gas to escape through the apertures 150 into the balloon 151. Concurrently, pressure is directed to the underside of the column 159 causing the cover 153 to be urged upwardly and disengaging same from its frictional engagement with the outer housing 80. The boss 145 is still retained in its original position while the balloon 151 escapes through the open end of the outer housing 80 where inflation continues until the gas pressure in the balloon equalizes with the atmospheric pressure. At this stage, the gas pressure within the system is equalized and the flexible membrane 149 resumes its original position against the upper surface of the boss 145 to act as a one-way check valve and disrupt the communication of gas between the bore 147 and the apertures 150. The diminished gas pressure can no longer overcome the force exerted by the compression springs 124, 109, and 97. The resultant force of the aforementioned springs drives the valve stem 92, the plunger 104, the anvil 120, and the shuttle 119 upwardly. During this phase, the shuttle 119 abuts the flange 133, causing the needle conduit 132 to move upwardly, compressing the spring 138. The flange 148, being integral with the needle conduit 132 and disposed under the lower edge of

the boss 145, urges the boss upwardly, disengaging it from its initial frictional location. The balloon is now free to ascend to a height limited by the line 144 supplied by the spool 143.

As hereinbefore described in connection with the manually operated embodiment of the present invention, a permanent signaling device is hereby displayed. The preferred electromechanical embodiment of the device of the present invention is highly adaptable to numerous situations. In its simplest form, it could merely be secured to a storage battery or other electrical impulse supply to provide a readily available stationary signaling device. In a more sophisticated adaptation, the device could be homologated into the external structure of an aircraft or other moving vehicle in connection with a sensory device designed to given an electrical impulse upon impact. Various other adaptations, modifications, and changes in the device herein chosen for purposes of illustration will readily occur to persons skilled in the art. Such modifications and variations while not explicitly denoted in the foregoing detailed specification do not deviate from the teachings of the present invention and are intended to be included in the spirit and scope thereof which is limited only by a fair interpretation of the following claims.

Having fully described and disclosed the invention and what I conceive to be the presently preferred embodiment thereof in such a manner as to enable those skilled in the art to understand and practice the same, I claim:

1. An emergency signaling device comprising:
 - (a) a tubular housing;
 - (b) a conduit coaxially disposed within said tubular housing, said conduit having first and second open ends;
 - (c) a tank for storing fluid under pressure depending from said tubular housing;
 - (d) valve means for controlling fluid communication between said tank and said first end of said conduit;
 - (e) a resilient boss having a longitudinal bore adapted to frictionally receive said second end of said conduit;
 - (f) a check valve within said boss oriented to permit fluid flow from the second end of said conduit;
 - (g) a balloon packed within said tubular housing, said balloon having an opening secured circumferentially around said boss;
 - (h) a spool of line disposed coaxially around said conduit within said tubular housing, one end of said line being secured to said balloon;
 - (i) means for opening said valve means such that fluid stored within said tank flows through said conduit and through said check valve to inflate said balloon; and
 - (j) means responsive to the inflation of said balloon for expelling said balloon from said tubular housing.
2. An emergency signaling device comprising:
 - (a) a rotatable tubular housing;
 - (b) a spindle disposed coaxially with respect to and partially within said housing, said spindle being engaged to rotate with said housing and constrained to limited longitudinal movement therewithin, said spindle having a central longitudinal bore;
 - (c) a cylindrical adapter rotatably secured to said housing and enclosing the portion of said spindle without said housing;
 - (d) a tank for storing fluid under pressure affixed to said adapter;
 - (e) valve means within said adapter for controlling fluid communication between said tank and the longitudinal bore of said spindle;
 - (f) a resilient boss having a longitudinal bore adapted to receive the end of said spindle within said housing such that the longitudinal bore of said spindle communicates with the longitudinal bore of said boss;

- (g) a check valve within said boss oriented to permit fluid flow from the longitudinal bore of said spindle to the longitudinal bore of said boss;
- (h) a tubular balloon container disposed coaxially within said housing; 5
- (i) a balloon packed within said container, said balloon having an opening secured circumferentially around said boss;
- (j) a spool of line disposed coaxially around said spindle within said housing, one end of said line being secured to said balloon; 10
- (k) first spring means urging said balloon container away from said spool;
- (l) means for opening said valve means such that fluid stored within said tank flows through the longitudinal bore in said spindle, through the longitudinal bore in said boss, and through said check valve to inflate said balloon, and; 15
- (m) means responsive to the inflation of said balloon for expelling said balloon from said container and said housing. 20
3. An emergency signaling device comprising:
- (a) a tubular housing having upper and lower portions;
- (b) a tank for storing fluid under pressure depending from the lower portion of said housing; 25
- (c) a plunger disposed coaxially within the lower portion of said housing, said plunger having a longitudinal bore, spring means urging said plunger upwardly into a first position within said housing; 30
- (d) electromagnetically operated means for urging said plunger against and overcoming the force of said spring means such that said plunger is translated longitudinally into a second position, when said electromagnetic means is energized; 35
- (e) means for retaining said plunger in said second position after said electromagnetic means is de-energized;
- (f) valve means coupled to said plunger to open when said plunger is translated longitudinally to said second position in response to the energization of said electromagnetic means, said valve means connected to said tank to control the flow of fluid therefrom; 40

- (g) a spool of line disposed coaxially around said plunger within said tubular housing;
- (h) a conduit longitudinally aligned with said plunger and extending from said plunger away from said tank;
- (i) a resilient boss having a longitudinal bore adapted to frictionally receive the end of said conduit away from said plunger;
- (j) a check valve within said boss oriented to permit fluid flow from said conduit to the longitudinal bore of said boss;
- (k) a balloon packed within the upper portion of said housing, one end of said line secured to said balloon, said balloon having an opening secured circumferentially around said boss such that fluid is delivered to inflate said balloon when said plunger assumes said second position, and;
- (l) means responsive to the inflation of said balloon for expelling said balloon from said housing.

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LOUIS J. CAPOZI, Primary Examiner

U.S. Cl. X.R.