June 18, 1946. G. H. ARENSTEIN 2,402,143

PARACHUTE PACK

Filed June 7, 1944 2 Sheets-Sheet 1

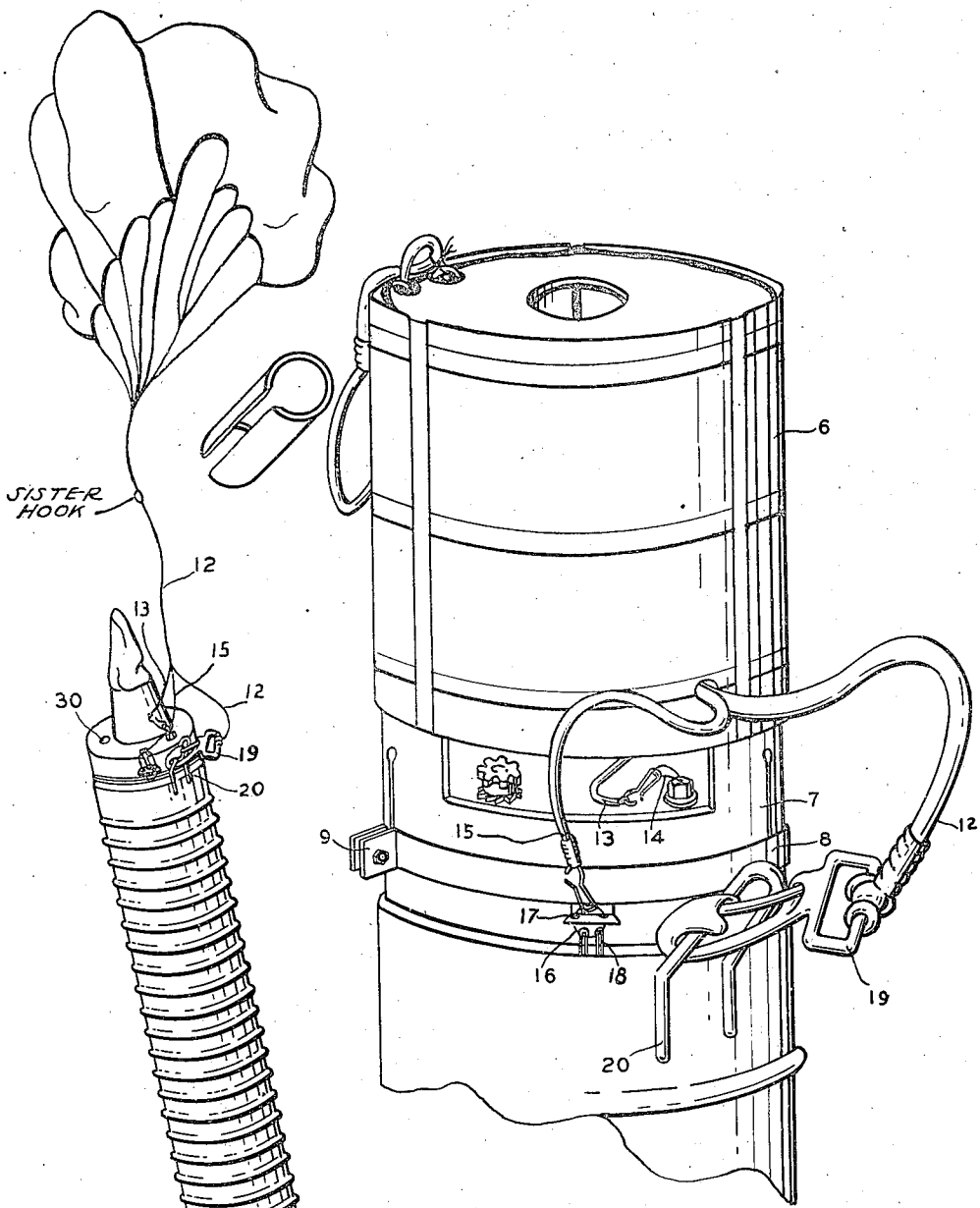

FIG. 1

FIG. 2

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PARACHUTE PACK

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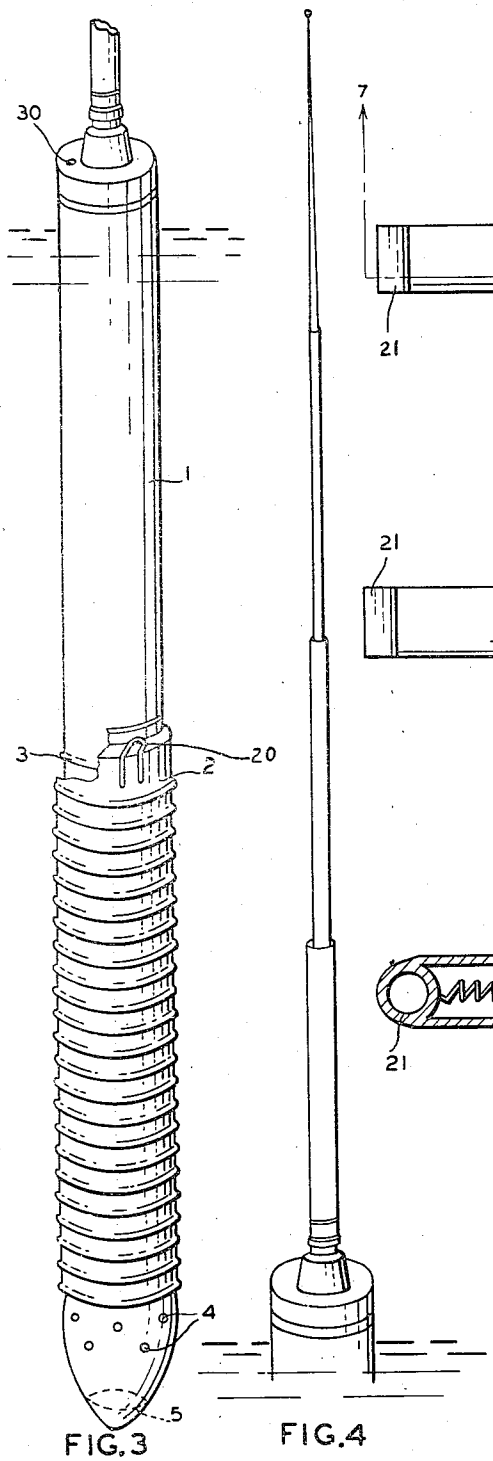

FIG. 3

FIG. 4

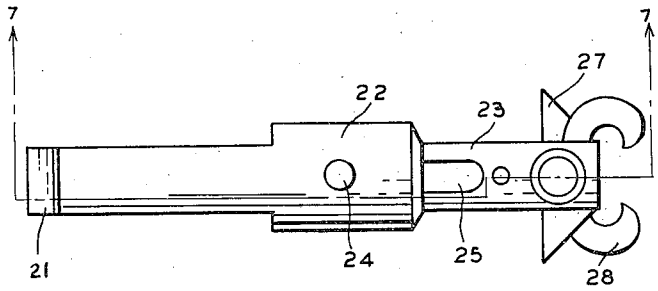

FIG. 6

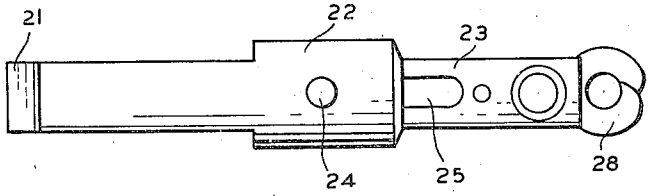

FIG. 5

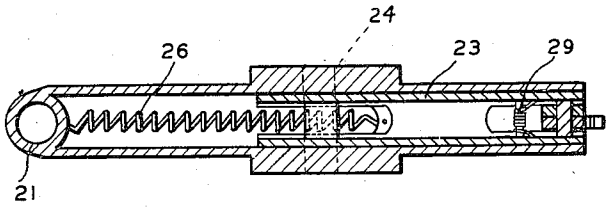

FIG. 7

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UNITED STATES PATENT OFFICE

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PARACHUTE PACK

Gilbert H. Arenstein, Dayton, Ohio, assignor to the United States of America, as represented by the Secretary of War

Application June 7, 1944, Serial No. 539,173

7 Claims. (Cl. 244—138)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

The invention to be hereinafter described relates to floatable or buoyant radio transmitting sets.

In emergencies at sea such as ship wrecks, for instance, signaling devices giving the location are invaluable aids to rescue. Many other valuable uses may be made of such devices. Spotting of life boats, or the like launched or released from wrecked ships or planes in war operations or similar spotting of enemy submarines are among other uses. In fact, it may be safely stated, that a signaling device which may be placed at a given point to deliver a given signal, while the placing plane or other agency returns to base or continues flight and relays information, may have an almost infinite number of uses or applications. Particularly are such devices valuable aids when capable of use by and with planes.

In the past there have been great difficulties in the production of such a device for use by planes and to cooperate with planes. For such uses the device must, usually, be dropped from a considerable height by a plane going at considerable speed. Almost without exception, it will be dropped into a body of water. That involves difficulties of buoyancy, even keel or upright floating position, antenna erection and maintenance of such erections, and many other minor difficulties.

The present invention adequately overcomes the above difficulties and provides a buoyant radio transmitter signaling set which may be readily launched from a plane and will automatically right itself on landing, erect an antenna, start a code signal of known approximate range and continue that for an approximate given period. The construction is simple, compact, durable and efficient. Particularly has the whole device been reduced to the least practicable dimensions while at the same time retaining greatest practicable strength in the cylinder walls and other parts subject to shock or sudden pressure or strain and, especially, providing complete water proof protection for all operative parts subject to damage by water.

In order to more clearly disclose the construction, operation and use of the invention, reference should be had to the accompanying drawings forming part of this application. Throughout the several figures of the drawings, like reference characters designate the same parts in the different views.

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In the drawings:

Fig. 1 is an enlarged side elevation, assembled, showing only the upper end of the cylinders;

Fig. 2 is a diagrammatic view showing the first operation after launching;

Fig. 3 is a side elevation of the cylinders extended;

Fig. 4 is a side elevation of the telescopic antenna extended;

Fig. 5 is a side elevation of the sister hook in operative or holding position, with load on;

Fig. 6 is a like view, in inoperative position, with load released; and

Fig. 7 is a cross section on line 7—7 of Fig. 6.

Because of the scale of the drawings, Fig. 2 does not show any of the parts shown on the top of cylinder 1 and Figs. 3 and 4 indicate, only, the location of the soluble plug which is not visible in Fig. 1.

Referring to the drawings in detail 1 indicates a cylindrical container in which are housed the transmitter, the extensible antenna and the mechanism for operating one and actuating the other.

The cylinder 1 with its contents is sufficiently buoyant to maintain afloat the assembly, including the outer cylinder 2 which, as will later appear performs a double function. For this purpose, each cylinder is provided with a stop 3 in the form of a rib, plate or the like so positioned or disposed that the one on cylinder 2 engages that on cylinder 1 as cylinder 2 approaches the end of cylinder 1, as will more clearly appear hereinafter. In order to assist in this telescopic action of the cylinders, cylinder 2 is provided with a plurality of perforations 4 in its lower end for water inlet and it has a lead weight 5 in its extreme lower end.

Within cylinder 1 is a suitable radio transmitting set of predetermined range and provided with means to set it to transmit a known selected code signal. Likewise its operative life, while limited, is known and definite so that, when the buoy containing it has been placed and the transmitter started, as will be later disclosed, it will be known how long such signal may be expected to be transmitted. Likewise the time of starting may be predetermined and prearranged.

To the upper end of cylinder 1 is clamped a parachute container 6. The parachute container is cylindrical and of substantially the same diameter as cylinder 1. It is provided with a resilient split extension 7 adapted to fit about and receive

the upper end of cylinder 1. To draw this extension tight, to clamping position, it is provided with a band or ring 8 with spaced end ears 9 to receive a suitable tightening bolt and nut. The container 6 is cemented or similarly secured to the extension 7 and may be ripped therefrom by the same operation that rips open the container and releases the parachute, as will hereinafter be more fully set forth. In effect, the flexible clamping extension and parachute container are one element, though not, actually, integral. Within this container is disposed the parachute, the load cord from the parachute, and a static cord by which the parachute is released from its container.

The present invention is not concerned either with the transmitter itself, the antenna or antenna erecting means as individual units or the unit or units comprising the timing mechanism determining the starting of the signals or the duration of operation. Accordingly, those features and units will not be further illustrated or described in this application.

The timing mechanism by which the beginning of operations of the transmitter and the time of erections of the antenna are controlled, may be set from the outside in well known manner. Its starting is initiated by a suitable pull switch with connections to the parachute, so that as the cylinders constituting the signal buoy descend the switch will be pulled to on and these mechanisms started or their starting initiated or prepared.

Within the parachute container 6 is arranged the parachute by which the buoy is delivered to position. Static cord 11 is provided with a suitable loop for connection to a frame member of the plane. A portion extending from that loop is free, and a following portion is embedded as a rip cord in the side wall of the container 6 extending completely from top to bottom. Or one or more branch cords may be run off from the static cord and embedded as rip cords in the wall of the container 6. As this rip cord portion is pulled, the cylinder 6 will be split lengthwise so that the parachute is freed. The static cord end is connected to the parachute top and as the buoy, and parachute container assembly, launched from the plane, descends, the static cord, after opening container 6, pulls the parachute which opens to carry the buoy to position. At about the point where the parachute opens, a weaker inserted section of the static cord breaks and the chute is then cut loose or freed. The assembled buoy cylinders are now suspended by the load cord 12.

The connections between load cord and buoy are so arranged and of such nature as to insure final delivery of the buoy in most effective position and with the starting mechanism properly timed and set. To that end, the load cord 12, itself capable of sustaining the entire load of the assembled buoy cylinders, is provided with connections to the cylinders or to mechanism within them operable by those connections to the point of their respective ruptures which occur at predetermined strain points, less than that of the load cord. Thus, assuming the parachute has opened and the cylinders are suspended by the load cord; a pull-switch cord 13 leading from the load cord and connected to a loop 14 which leads through the end of cylinder to a switch in the cylinder, first receives the full load. The loop 14 is designed to sustain a predetermined strain, sufficient to operate the switch but insufficient to

sustain the weight of the buoy. So, as it is pulled to its breaking point, the transmitter operating mechanism and the trigger mechanism for exploding the antenna raising charge will be initiated. As the strain resistance is exceeded loop 14 breaks. As the buoy continues down, the load will next be imposed on a second cord 15 branched from the load cord and connected to a loop 16. The loop 16 passes through eyes 17 and 18 or the like on cylinders 2 and 1, respectively. This loop, like loop 14, is of predetermined strength or resistance, less than that of the load cord. Loop 16 is of sufficient strength to couple the two cylinders or suspend cylinder 2 from 1, but not of sufficient strength to sustain the weight of both cylinders, assembled. As the strain falls on 16 it breaks, allowing the whole load to be taken through load line 12, hook 19 and handle 20 on cylinder 2. There are no other branch cords from the load cord to the buoy. Instead, the lower end of the load cord is connected direct to the outer cylinder by any suitable means such as a snap hook 19 on lower end of the load cord 12 and strap, loop or handle 20 on the upper end of outer cylinder 2. As the buoy continues down, it first submerges and then quickly resurfaces. The outer cylinder 2 receives the first full impact as it lands and so protects the inner cylinder 1. The strengthening corrugations stiffen shell 2 and protect cylinder 1 against the shock of landing.

From the time that the parachute opens, the load cord is under strain of the full load or weight of the buoy, either directly or through the cord 13 or 15. After the transmitting mechanism and the trigger mechanism have been initiated or prepared for operation, as above, and after the outer cylinder has been released from the inner cylinder in their telescoped relations, as above, the problem remains of getting rid of the parachute to prevent fouling of the buoy, especially the antenna, and consequent complete inoperativeness of the buoy. To that end, a special automatic releasing device or sister hook assembly construction is interposed in the load cord, constructed to operate as the load strain is decreased—see Figures 5, 6 and 7.

This hook assembly is inserted in the load line or cord by connecting the parachute end to an eye 21 on one end of a tubular housing 22 within which is reciprocably mounted a block 23 which is guided by pin and slot connections 24 and 25 on the tube and in the block, respectively. The block is held normally retracted within tube 22 by coil tension springs 26. When so retracted, the tails 27 of a pair of cooperating sister hooks 28 are held closed by the tube. The operative hook ends are similarly closed or in operative position. Due to the shape or design of the operative or outer hook end, that closed position will be equally maintained by any rod, rope or like connection seated in the closed hooks provided there is appreciable weight or tension on that connection. The buoy end of the load line or cord is connected to the closed sister hook by a loop, ring or like means seated in the assembled or closed hook ends. That weight, in turn, extends springs 26 and withdraws block 23 to the point where tails 27 are beyond the end of housing 22. As the buoy lands, the load on hooks 28 is suddenly relieved. At that instant, a coil spring 29 in the end of block 23, carried by a pin or post to the rear of tails 27, comes into play. It bears against the two tails and instantly swings them on their pivot to open position. That, of course,

also swings the sister hooks 28 to open position. That, in turn, releases the parachute which will drift to one side or the other and all probability of fouling will be avoided. Since spring 29 comes into operation instantly on the sudden decrease of load on hooks 28, those hooks will be swung open and tails 27 spread before the tension of springs 29 can appreciably retract block 23. Consequently, there is no danger of hooks 28 reclosing before the buoy is released, because the tails will be engaged by the end of tube or housing 22 by the withdrawing action of springs 26.

As the outer cylinder 2 drops to fully extended position, as in Fig. 3, due to its weighted lower end, it will act as a keel and thoroughly stabilize the buoy, maintaining it in an erect and efficient operative position, the cooperating ribs, or stops preventing the outer cylinder passing entirely beyond the inner one. The mechanism is so timed that by the time the buoy resurfaces or very shortly thereafter, the antenna will be erected. This antenna is telescopic and is so constructed as to automatically maintain its extended, or projected condition practically permanently. The details of the construction of that antenna are no part of the present invention and, accordingly, will neither be illustrated nor described in the present application.

The inner cylinder is made absolutely tight or water proof against all leakage even of moisture, such as might prevent or seriously affect operation of any of the contained mechanism.

As a matter of protection to the public, especially navigation, whether in times of peace or war, and as a matter of secrecy and avoiding disclosure of information in wartime emergencies, it is desirable to destroy or remove any such buoy after a period of time predetermined as probably sufficient to accomplish its designed purpose. To that end, the inner cylinder is provided with a plug of soluble material 30. As shown in the drawings, this plug is in the top of cylinder 1. That, of course, enables inflow of water at the top as soon as the plug dissolves. Any other suitable location enabling inflow at or near the top should accomplish the same result. Normally, after resurfacing, the buoy, including both cylinders, floats with only a few inches of cylinder 1 above water. Consequently, comparatively little inflow will be required to sink and destroy any of these buoys. On the other hand, the buoy must remain afloat for at least the full period of its life to assure its maximum utility or useful life. Accordingly, the plug material is selected to dissolve in water of known approximate temperature and given character (salt or fresh, for instance) only after expiration of the known operative or effective life of the transmitter of the respective buoy. Thus, if the particular transmitter will operate for 24 hours, the plug 30 should be of such material as will not dissolve in less than 24 hours and preferably would require considerably longer than 24 hours to dissolve. Briefly, the operation is as follows:

The chosen code signal will be set in the transmitting mechanism, the timer for exploding the charge of the ballistic antenna will be set, and the loop of the static cord will be connected to the strut or other frame member of the plane. Then, as the buoy is launched, the static cord begins to pull out. As it does so it first rips open the container 6 and then it pulls out the parachute. As it pulls out the parachute it approaches the limit of its extension. Continued drop breaks the weakened section of the static cord so that the parachute is now completely clear of the plane and carrying the buoy, alone. The buoy, in its descent, connected to the load line, next, strains the connection between the load line and the loop 13, pulling the switch which starts the preset transmitting mechanism and the antenna raising mechanism. Continuing descent puts the strain on loop 16 which is severed, allowing the whole load to be taken through load line 12, hook 19 and handle 20 on cylinder 2. Now the load cord or line takes the whole load direct. The load on the load line either direct or indirect retains the sister hook extended and operative. As the load lands, the strain is suddenly relieved and the sister hook instantly opens and disconnects the parachute which floats to one side and eliminates possibility of fouling.

It is thought that the construction, operation and use of the several parts of the invention, and the order of the steps in the operation will be clear from its preceding detailed description.

Many changes may be made in the construction, arrangement and disposition of the several parts of the invention within the scope of the appended claims, without in any way departing from the field of the invention and it is meant to include all such within this application wherein only one form has been disclosed by way of illustration and with no intent to in any degree limit the invention thereby.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. In combination in a buoyant signal transmitting device adapted to be launched from a plane at considerable height, into a body of water below, two cylinders telescopically disposed one within the other, means preventing complete separation of said cylinders, preset transmitting mechanism and cooperating locked starting mechanism disposed within the inner cylinder, severable connections between said cylinders maintaining them telescoped, a parachute container connected to said inner cylinder, a parachute in said container, load cord connection between said parachute and said outer cylinder, connections between said load cord and the lock of said locked starting means automatically unlocking said starting mechanism at a predetermined point in the descent of the cylinders, connections between said load cord and the aforesaid severable connections automatically severing the same at a predetermined point in the descent of the cylinders, and means automatically disconnecting said parachute from said outer cylinder as said cylinders land.

2. In combination in a buoyant signal transmitting device adapted to be launched from a plane at considerable height, into a body of water below, two cylinders telescopically disposed one within the other, means preventing complete separation of said cylinders, preset transmitting mechanism and antenna raising and cooperating locked starting mechanism disposed within the inner cylinder, said outer cylinder being provided with a perforated and weighed lower end whereby, in extended position, it constitutes a keel for the two cylinders, severable connections between said cylinders maintaining them telescoped, a parachute container connected to said inner cylinder, a parachute in said container, load cord connection between said parachute and said outer cylinder, connection between said load cord and the lock of said locked starting means automatically unlocking said starting mechanism at a predetermined point in the descent of the cylinders,

connection between the load cord and the aforesaid severable connection automatically severing the same at a predetermined point in the descent of the cylinders and permitting the outer cylinder to assume its keel position, and means automatically disconnecting said parachute from said outer cylinder as said cylinders land.

3. In combination in a buoyant signal transmitting device adapted to be launched from a plane at considerable height, into a body of water below, two cylinders telescopically disposed one within the other and provided with cooperating stops whereby complete separation is prevented, said outer cylinder being provided with a perforated and weighted lower end and adapted, in extended position, to act as a keel, preset transmitting and antenna raising mechanism and cooperating locked starting mechanism disposed within said inner cylinder, a telescopic antenna in said inner cylinder, a plug of predetermined solubility in the wall of said inner cylinder adapted to open said cylinder at a predetermined time for inflow of water and sinking of the device, a parachute container connected to said inner cylinder, a parachute therein, a static cord connected to said parachute and having rip-cord connection with said container and adapted to be connected to the launching plane, severable connection between said cylinders, connection between the other cylinder and the parachute load line, connection between said load line and the aforesaid locking mechanism for unlocking the same at a predetermined point in the descent, connection between said load line and the aforesaid severable connection between the cylinders for severing the same at a predetermined point in the descent, and means for automatically disconnecting the parachute from the cylinders as the cylinders land.

4. In combination in a buoyant signal transmitting device adapted to be launched from a plane at considerable height, into a body of water below, two cylinders telescopically disposed one within the other, the outer one in extended relation constituting a stabilizing keel for the two, means carried by each cylinder adapted to engage cooperating means carried by the other and limiting separating movement between said cylinders, severable connections between said cylinders maintaining them telescoped, a parachute container connected to said inner cylinder, a parachute in said container, means for releasing said parachute, load cord connections between said parachute and said outer cylinder, and connections between said load cord and the aforesaid severable connections automatically severing the same at a predetermined point in the descent of the cylinders.

5. In combination in a buoyant signal transmitting device adapted to be launched from a plane at considerable height, into a body of water below, two cylinders telescopically disposed one within

the other, the outer one in extended relation constituting a stabilizing keel for the two, means carried by each cylinder adapted to engage cooperating means carried by the other and limiting separating movement between said cylinders, severable connections between said cylinders maintaining them telescoped, a separable parachute container connected to said inner cylinder, a parachute in said container, a rip cord connected to said container and to said parachute and provided with means for connecting to a plane, load cord connections between said parachute and said outer cylinder and connections between said load cord and the aforesaid severable connections automatically severing the same at a predetermined point in the descent of the cylinders.

6. In combination in a buoyant signal transmitting device adapted to be launched from a plane at considerable height, into a body of water below, two cylinders telescopically disposed one within the other, the outer one in extended relation constituting a stabilizing keel for the two, means carried by one of said cylinders enabling sinking of both said cylinders at a predetermined time, means carried by each cylinder adapted to engage cooperating means carried by the other and limiting separating movement between said cylinders, severable connections between said cylinders maintaining them telescoped, a parachute container connected to said inner cylinder, a parachute in said container, means for releasing said parachute, load cord connections between said parachute and said outer cylinder and connections between said load cord and the aforesaid severable connections automatically severing the same at a predetermined point in the descent of the cylinders.

7. In combination in a buoyant signal transmitting device adapted to be launched from a plane at considerable height, into a body of water below, two cylinders telescopically disposed one within the other, the outer one in extended relation constituting a stabilizing keel for the two, a plug of predetermined solubility in the wall of the inner cylinder adapted to open said cylinder at a predetermined time for inflow of water and sinking of the device, means carried by each cylinder adapted to engage cooperating means carried by the other and limiting separating movement between said cylinders, severable connections between said cylinders maintaining them telescoped, a parachute container connected to said inner cylinder, a parachute in said container, means for releasing said parachute, load cord connections between said parachute and said outer cylinder and connections between said load cord and the aforesaid severable connections automatically severing the same at a predetermined point in the descent of the cylinders.

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