

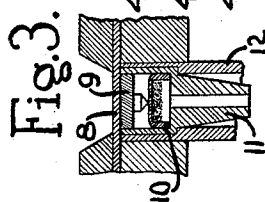
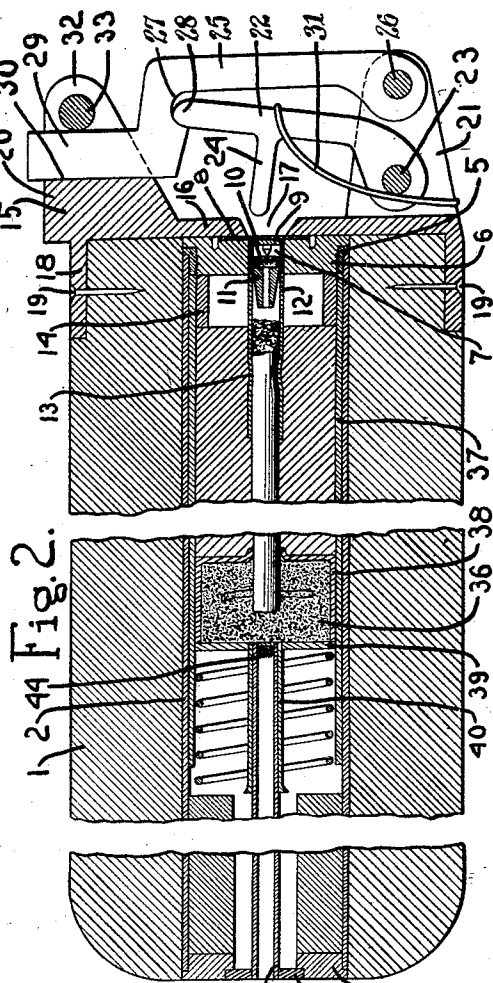
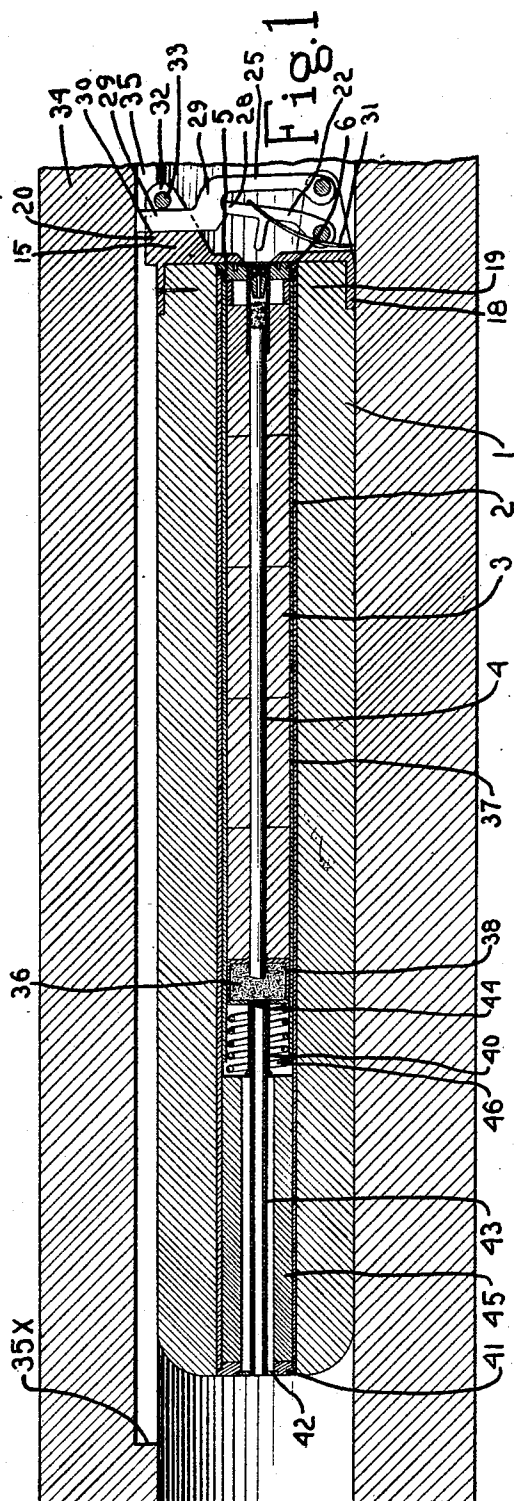
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MARINE SIGNAL

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UNITED STATES PATENT OFFICE

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MARINE SIGNAL

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This invention relates to improvements in marine signals and the general object thereof is to provide a float signal which may be ignited during submergence with certainty and which, while floating upon the surface of a body of water, will produce a signal flame or smoke, or preferably both, for approximately a predetermined period of time.

A further object of the invention is to provide a marine signal comprising a float having a chamber containing a pyrotechnical composition capable of producing a signal which can be ignited when submerged, with means for venting the products of combustion during submergence and while the float is rising to the surface of the water.

A further object of the invention is to provide a marine signal comprising a float having a chamber for a pyrotechnical material having metallic means for sealing the chamber against the admission of water under pressure.

A further object of the invention is to provide a marine signal of the character specified with novel firing and igniting mechanism.

Another object of the invention is to provide a marine signal having a chamber containing a series of two or more pellets of pyrotechnical composition with means for preventing relative movement of the pellets within the chamber, and also yieldable to the expansion of the pyrotechnical material during combustion thereof.

Another object of the invention is to provide a marine signal of the character specified with means of relatively small cross sectional area for venting the products of combustion during submergence, and means providing a relatively larger discharge orifice for the flame and/or smoke during the burning of the pyrotechnical composition.

A further object of the invention is to provide a marine signal of the above character which can be economically constructed and assembled.

These and other objects and features of the invention will more fully appear from the following description and the accom-

panying drawings and will be particularly pointed out in the claims.

In the drawings:

Fig. 1 is a longitudinal sectional view of a marine signal embodying the invention shown within the barrel of a signal-discharging device such as a pneumatic gun or the like;

Fig. 2 is an enlarged longitudinal sectional view broken into sections illustrating more clearly the mechanism of the signal; and,

Fig. 3 is a detail sectional view showing particularly the cartridge chamber with the firing pin and cartridge therein and the means for sealing the chamber against the admission of water under pressure.

The marine signal forming the subject matter of the present invention is adapted to be projected from a submarine when submerged, dropped from an airship, or projected from a vessel either above or below the water line thereof. The marine signal embodying the subject matter of the present invention is so designed and constructed that the water under pressure, when the signal is discharged from a submarine at deep submergence, will be wholly excluded from the pyrotechnical material. Firing means are provided which may be operated when the signal is projected from a suitable discharging apparatus from a submarine, or dropped from an aeroplane, or otherwise delivered, and means are provided for venting the products of combustion upon ignition which will insure maintenance of combustion when submerged and continuous operation of the signal after the float has risen to the surface of the water throughout substantially the predetermined period of time which is required for the complete combustion of the pyrotechnical composition.

The preferred embodiment of the invention illustrated in the drawings comprises a float 1, preferably of cylindrical form, and which may be of wood, or other suitable material, having relatively light specific gravity. The float is provided with a central chamber which desirably is of cylindrical form extending axially of the float and is provided with a metallic lining, preferably in the form

of a seamless brass tube 2, which desirably extends throughout the length of the chamber and forms a barrel to receive the pyrotechnical composition which desirably is in the form of cylindrical pellets 3 having a preferably cylindrical aperture or bore through which a fuse 4 may be led for purposes which will hereinafter appear. A brass ring 5, which is internally screw threaded with fine thread, is sweated into the breech end of the tube or barrel 2 and is provided with a flange which engages the end of the barrel. A breech-block 6 is screwed into the ring 5 and is provided with a peripheral flange overlying the flange of the ring 5, the construction being such that the breech end of the tube is hermetically sealed.

The breech-block 6 is provided with a central cylindrical aperture, preferably extending therethrough and forming a cartridge chamber 7. The outer end of the chamber is covered and hermetically sealed by a thin plate 8 of pliable metal, preferably a copper disk, which is sweated to the outer face of the breech-block 6 and which forms a hermetic seal. A firing pin 9 is loosely mounted in the cartridge chamber 7 and comprises a flat head which engages the pliable sheet metal plate 8 and has a central point which engages a cartridge 10 which is mounted in a fuse cone 11 which in turn is seated in the end of a preferably copper tube 12 which is pushed over the fuse cone and extends into the aperture of the breech-block.

The tube 12 preferably extends beyond the fuse cone into the central aperture of the adjacent pellet of pyrotechnical composition and the fuse 4 extends into the tube 12 in proximity to the fuse cone. The tube 12 may be provided with a crimp 13 to determine the position of the unfrayed end of the fuse. A spacing ring 14, of fibrous material, desirably is interposed between the breech-block and the end of the adjacent pellet of pyrotechnical composition.

Any suitable mechanism may be provided for firing the cartridge to ignite the fuse. In the preferred construction illustrated herein a bronze firing head 15 is provided which comprises a flat circular plate 16 having a central aperture 17 in alinement with the cartridge chamber of the breech-block 6 and a peripheral flange 18 which is secured upon the rabbeted end of the float 1 with a push fit and brads 19 or other suitable fastening devices.

The plate 16 is provided with rearwardly extending bosses 20 and 21, the bosses 21 being two in number, and extending in parallelism from the plate 16 to provide a support for the hammer and trigger mechanism. The hammer 22 is pivotally mounted upon a pintle or rod 23 which is secured in the bosses 21, (one of which is shown) and is provided centrally with a head 24 adapted

to be projected against the pliable metal plate 8 to cause the firing pin 9 to impinge upon and to fire the cartridge 10.

A trigger 25, which is pivotally mounted upon a pintle or rod 26 secured in the boss 21, extends normally in substantial parallelism with the hammer and is provided with a curved or re-entrant recess 27 which normally engages the end 28 of the hammer.

The trigger is provided with an offset extension 29 which extends through the bifurcated end of the boss 20 and normally rests against a shoulder 30 in such position that the head 24 of the hammer is normally held out of engagement with the pliable metal plate 8 against the action of a spring 31 which tends to force the hammer toward said pliable metal plate 8. The ears 32 of the boss 20, provided by the bifurcation of said boss, are provided with suitable apertures to receive a safety pin 33 which, when in position, will prevent actuation of the trigger. The end of the extension 29 of the trigger projects beyond the boss 20 a sufficient distance to permit actuation of the trigger when the safety pin 33 is removed.

Usual signals of this type are discharged from a pneumatic gun or released from a tube 34, as illustrated in Fig. 1, having a longitudinally extending slot 35 to receive the end of the trigger, the slot 35 terminating short of the muzzle of the discharging apparatus to provide a shoulder 35a which will engage the end of the trigger which projects into the slot and as the signal passes from the end of the discharging device will cause the trigger to move about its pivot sufficiently first to cock the hammer against the action of the spring 31 and when the end of the hammer passes out of the recess 27 to release the hammer so that the spring will project the head of the hammer against the pliable plate 8, thereby causing the firing pin to impinge upon the cartridge and fire the same.

The firing of the cartridge will ignite the fuse 4 which desirably comprises a line of slow-burning powder enclosed in a fibrous casing. The remote end of the fuse preferably extends through the pyrotechnical composition and, as shown, beyond the end of the pellet most remote from the breech and enters into a starter 36 which may be a mass of thermite or other readily ignitable and powerful burning mixture.

Desirably the pellets are contained in a fibrous tube 37 and the starter 36 is held in a metallic, preferably zinc container 38 having a cover 39 preferably in the form of a fibre disk having a central aperture in which a short copper tube 40 is secured. The inner end of the copper tube is covered with a thin paper disk to hold the starter composition in the container.

One of the principal features of the in-

vention relates to means for preventing the admission of water under pressure to the pyrotechnical material. This is accomplished in the present invention by providing the muzzle end of the barrel with a metal, preferably a brass, end piece 41 which is sweated into the end of the metal tube 2. This brass end piece is provided with a central bore which is counterbored to receive a brass disk or washer 42 which is sweated upon the end piece 41.

The brass washer 42 has soldered to it a small copper tube 43 which extends axially of the barrel through the short tube 40 to the inner end thereof and is closed by a fusible metallic plug 44.

By reason of this construction the barrel of the signalling device is hermetically sealed and is capable of resisting water under any pressure due to submergence by a submarine, while the fusible plug 44 provides means for initially venting the products of combustion from the thermite and pyrotechnical composition when ignited.

Desirably a fibrous cylinder, such as a paper tube 45, is fitted within the tubular lining 2 of the signal and extends approximately to the end of the short tube 40. A spiral spring 46 under compression is interposed between the inner end of the fibrous tube 45 and the cover 39 of the container for the starter composition. The spring 46 exerts a sufficient pressure against the casing containing the starter mixture to maintain the pellets of pyrotechnical composition in close contact with each other and prevent relative movement thereof, but is yieldable when the pyrotechnical composition is ignited to permit expansion of the composition.

It will be obvious that the device as constructed can be readily assembled, as the parts forming the hermetic closure for the muzzle of the barrel may be united before the end piece 41 is sweated upon the end of the barrel 2. The other mechanisms within the barrel, including the pyrotechnical material, can be introduced from the breech end of the tube before the breech-block 6 is screwed in. The firing pin, the cartridge and the fuse cone may be assembled in the breech-block before it is screwed into the barrel. The firing head may be finally applied to the float and secured in any suitable manner thereupon as above described.

In the operation of the device the safety pin 33 is first removed; the signal is placed in the barrel 34 of the pneumatic gun, or other projecting device, with the extension 29 of the trigger projecting into the slot 35 in the barrel 34. When the signal is pneumatically propelled, or otherwise discharged, from the barrel or tube 34, the trigger extension 29 will engage the shoulder 36 at the end of the groove 35 first to withdraw the trigger and cock the hammer 22 against the tension of the

spring 31, and thereafter upon further movement of the trigger will cause disengagement of the extension 29 of the hammer from the recess 27, thereby permitting the spring to impel the hammer against the pliable metal disk 9, thereby actuating the firing pin to discharge the cartridge. The flame from the cartridge will ignite the fuse which, during the movement of the signal while still submerged, will transmit its flame to the starter mixture 36.

Ordinarily the delay in time between the ignition of the fuse from the cartridge and the transmission of its flame to the starter mixture will be sufficient to enable the signal to rise to the surface of the water, and the gases which are generated by the burning of the fuse will accumulate in the chamber of the tube 45 and in the chamber between the inner end thereof and the starter container. If the fusible plug 44 is melted by the ignition of the starter composition as the signal approaches the surface of the water, the pressure of the gases flowing from the small tube 43 will be sufficient to prevent the water from entering the tube so that extinguishment of the ignited signal will be avoided. After the fusible plug 44 has melted, the products of combustion primarily escape through the vent tube 33, but upon continuation of combustion this passage will be insufficient to carry off the products of combustion and the cover 39 of the starter container will yield against the tension of the spring 46 to the expansion of the burning pyrotechnical composition, and to the pressure of the gases produced, and permit the hot gases and flames to escape not only through the central vent tube 43, but also around said tube until the heat will become sufficient to fuse the disk 42, thereby permitting the escape of the flame and smoke also through the larger aperture which surrounds the vent tube 43, so that when the signal is floating upon the surface a relatively large discharge orifice for the flame is provided through which the flame and smoke will be projected during the predetermined period of time which is required to consume the entire amount of pyrotechnical material.

While the signal is floating, the weight at the breech end of the signal will be sufficient to maintain the float in substantially vertical position. The firing head and breech block may, however, be made of such weight that a substantial portion of the barrel of the float will extend above the surface of the water, so that the possibility of suppression of the signal by waves dashing over the signal will be practically obviated.

The pyrotechnical composition, which may be of any usual character, will contain sufficient oxidizing and reducing agents to be inextinguishable in the presence of such water as may be projected upon it while floating.

It will be understood that the particular embodiment of the invention disclosed herein is of an illustrative character and is not restrictive, and that various changes may
 5 be made in form, construction and arrangement of parts within the meaning and scope of the following claims.

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

1. A marine signal comprising a float having a heavy base, a barrel having a chamber containing a pyrotechnical composition capable of burning continuously for substantially a predetermined period of time,
 15 means carried by said base for igniting said composition, means hermetically sealing said barrel to prevent admission of water under pressure to said pyrotechnical composition during submergence including fusible means
 20 of relatively smaller area than said barrel for venting the products of combustion of said composition when ignited during submergence.

2. A marine signal comprising a float having a chamber provided with a metallic wall forming a barrel, a pyrotechnical composition within said chamber capable, when ignited, of producing flame and smoke for substantially a predetermined period of time,
 30 means carried by said float for igniting said composition, means for preventing admission of water under pressure to said barrel during submergence including a venting tube of relatively small diameter extending
 35 from the otherwise closed muzzle of said barrel into proximity to the pyrotechnical composition and having a fusible plug to vent the products of combustion of said
 40 pyrotechnical material when burning during submergence.

3. A marine signal comprising a cylindrical wooden float having a central cylindrical chamber provided with a metallic
 45 wall forming a barrel, a pyrotechnical composition within said chamber capable of burning for substantially a predetermined period of time, means operable upon release or discharge of said signal for igniting said
 50 composition, metallic means of relatively smaller diameter than said barrel hermetically sealing said chamber against the admission of water under pressure to said composition while submerged including fusible
 55 means to vent the products of combustion of said pyrotechnical material when burning during submergence.

4. A marine signal comprising a cylindrical wooden float having a central chamber provided with a tubular metallic wall forming a barrel, a pyrotechnical composition within said barrel capable, when ignited, of producing flame and smoke for substantially a predetermined period of time, a watertight
 60 metallic closure for the breech of said barrel

providing sufficient weight to maintain said float in substantially vertical position, means for igniting said pyrotechnical composition at the end remote from said breech, means
 70 for sealing the muzzle of said barrel against admission of water under pressure including a fusible disk at the muzzle of said barrel having a central venting tube provided with a fusible plug located in proximity to said pyrotechnical composition.

5. A marine signal comprising a cylindrical wooden float having a central chamber provided with a tubular metallic wall forming a barrel, a pyrotechnical composition within said barrel capable, when ignited, of
 80 producing flame and smoke for substantially a predetermined period of time, a watertight metallic closure for the breech of said barrel providing sufficient weight to maintain said float in substantially vertical position, means for igniting said pyrotechnical composition at the end remote from said breech, means for sealing the muzzle of said barrel including a tube of relatively small cross sectional area extending inwardly from said
 85 muzzle and provided at its inner end with a closure fusible by heat of combustion to vent the products of combustion.

6. A marine signal comprising a cylindrical float provided with a central chamber
 90 having a tubular metallic wall forming a barrel, a pyrotechnical material in said barrel, a watertight breech-block detachably secured to said barrel having a central aperture forming a cartridge chamber and a thin
 95 plate of pliable sheet metal secured to said breech-block closing said aperture, a firing pin in said cartridge chamber engaging said sheet metal plate and the cartridge, means for firing said cartridge, a fuse extending
 100 through said pyrotechnical composition, and a starter at the end of said fuse remote from said breech-block operable to ignite said composition.

7. A marine signal comprising a cylindrical float provided with a central chamber having a tubular metallic wall forming a barrel, a pyrotechnical material in said barrel, means for sealing the muzzle of said barrel having fusible means to vent the products of combustion of said composition upon ignition while submerged, a watertight breech-block detachably secured to said barrel having a central aperture forming a
 110 cartridge chamber and a thin plate of pliable sheet metal secured to said breech-block closing said aperture, a firing pin in said cartridge chamber engaging said sheet metal plate and the cartridge, means for firing said
 115 cartridge, a fuse extending through said pyrotechnical composition, and a starter at the end of said fuse remote from said breech-block operable to ignite said composition.

8. A marine signal comprising a cylindrical float provided with a central chamber

having a tubular metallic wall forming a barrel, a pyrotechnical composition in said barrel, means for sealing the muzzle of said barrel having fusible means to vent the products of combustion of said composition upon ignition while submerged, a watertight breech-block detachably secured to said barrel having a central aperture forming a cartridge chamber and a thin plate of pliable sheet metal secured to said breech-block closing said aperture, a small tube extending into said cartridge chamber and containing a cartridge, a firing pin intermediate of and engaging said cartridge and said sheet metal plate, means for firing said cartridge, a fuse extending axially through said pyrotechnical composition into said small tube and in proximity to said cartridge, and a starter at the end of said fuse remote from said breech-block to ignite said composition.

9. A marine signal comprising a cylindrical float provided with a central chamber having a tubular metallic wall forming a barrel, pyrotechnical composition in said barrel, means for sealing the muzzle of said barrel, a water-tight breech-block detachably secured to said barrel having a central aperture forming a cartridge chamber and a thin plate of pliable sheet metal secured to said breech-block and closing said aperture, a firing pin in said cartridge chamber engaging said sheet metal plate and the cartridge, a firing head secured to the end of said float comprising a spring-actuated hammer, and a trigger operable first to cock and then to release said hammer to fire the cartridge, a fuse ignitable by said cartridge extending through said pyrotechnical material, and a starter at the remote end of said fuse to ignite said pyrotechnical composition.

10. A marine signal comprising a cylindrical float provided with a central chamber having a tubular metallic wall forming a barrel, pyrotechnical composition in said barrel, means for sealing the muzzle of said barrel, a water-tight breech-block detachably secured to said barrel having a central aperture forming a cartridge chamber and a thin plate of pliable sheet metal secured to said breech-block and closing said aperture, a firing pin in said cartridge chamber engaging said sheet metal plate and the cartridge, a firing head secured to the end of said float comprising a spring-actuated hammer, a trigger releasably engaging said hammer normally holding said hammer out of effective engagement with said sheet metal plate and operable when actuated first to cock and then release said hammer to fire the cartridge, and removable safety means for preventing actuation of said trigger.

11. A marine signal comprising a float having a central chamber provided with a tubular metallic wall, a series of cylindrical pellets of pyrotechnical composition in said chamber, means for sealing the ends of said chamber

against the admission of water under pressure, means for igniting said pyrotechnical composition, and resilient means interposed between one end of the series of pellets and the sealing means for the adjacent end of the chamber operable to prevent relative movement of said pellets and yieldable in response to expansion of the pyrotechnical composition during combustion thereof.

12. A marine signal comprising a cylindrical float having a central chamber, a seamless metal tube lining said chamber and forming a barrel, a fibre tube fitting within said barrel and containing a series of pellets of pyrotechnical composition, firing mechanism at the breech of said barrel, a fuse extending through said pellets, a starter container at the end of said fuse remote from the breech, a cover for said starter container, means for sealing the muzzle of said tube, and a spring interposed between said sealing means and said cover acting to prevent relative movement of said pellets and yieldable in response to expansion of said pellets during combustion.

13. A marine signal comprising a cylindrical float having a central chamber, a seamless metal tube lining said chamber and forming a barrel, a fibre tube fitting within said barrel and containing a series of pellets of pyrotechnical composition, firing mechanism at the breech of said barrel, a fuse extending through said pellets, a starter container at the end of said fuse remote from the breech, a cover for said starter container, having a central aperture, means for sealing the muzzle of said barrel including a tube extending into the aperture in said cover and having at its inner end a closure of fusible material, and a spring interposed between said muzzle-sealing means and said cover.

14. A marine signal comprising a cylindrical float having a central chamber, a seamless metal tube lining said chamber and forming a barrel, a fibre tube fitting within said barrel and containing a series of pellets of pyrotechnical composition, firing mechanism at the breech of said barrel, a fuse extending through said pellets, a starter container at the end of said fuse remote from the breech, a cover for said starter container, a breech-block for said barrel having a central aperture forming a cartridge chamber and pliable means for sealing the same, a firing head engaging said breech-block, spacing means intermediate of said breech-block and the end of the adjacent pellet, a tube extending from said cartridge chamber into said adjacent pellet, a fuse extending through said tube and said pellets, a starter container at the remote end of the series of pellets enclosing the end of said fuse, means for sealing the muzzle of said barrel and spring-actuated means intermediate of said muzzle-sealing means and said starter container operable to prevent relative

movement of said pellets and yieldable in response to expansion of the pyrotechnical material when ignited.

15. A marine signal comprising a cylindrical float having a central chamber, a seamless metal tube lining said chamber and forming a barrel, a fibre tube fitting within said barrel and containing a series of pellets of pyrotechnical composition, firing mechanism at the breech of said barrel, a fuse extending through said pellets, a starter container at the end of said fuse remote from the breech, a cover for said starter container, a breech-block for said barrel having a central aperture forming a cartridge chamber and pliable means for sealing the same, a firing head engaging said breech-block, spacing means intermediate of said breech-block and the end of the adjacent pellet, a tube extending from said cartridge chamber into said adjacent pellet, a fuse extending through said tube and said pellets, a starter container at the remote end of the series of pellets enclosing the end of said fuse, a cover for said starter container, a metallic disk sealing the muzzle of said barrel having a central tubular member extending through the cover of the starter container and having at its end a fusible closure, a sleeve fitting said barrel engaging said sealing disk, and a spring under tension interposed between the inner end of said sleeve and the cover for said starter container.

16. A marine signal comprising a float having a chamber containing a pyrotechnical composition capable of burning continuously for a substantially predetermined period of time, means for igniting said composition, means for preventing admission of water under pressure to said pyrotechnical composition during submergence including a relatively small tubular member having fusible means preliminarily to vent the products of combustion of said pyrotechnical material when ignited, and associated sealing means fusible by the heat of combustion to provide a relatively large discharge opening for the flame and/or smoke of the burning composition.

17. A marine signal comprising a cylindrical float having a central chamber, a metal tube lining said chamber and forming a barrel containing a pyrotechnical material, firing mechanism at the breech of said barrel, a fuse extending through said pyrotechnical material, a starter at the end of the fuse remote from the breech, means for sealing the muzzle of the barrel including a metallic disk having centrally secured thereto a tube of relatively long diameter extending into proximity to the starter and provided with a closure of fusible material, whereby upon ignition of said starter said closure will be fused preliminarily to vent the products of combustion and the disk thereafter fused by the heat of combustion to provide a relatively

large discharge aperture for the flames and smoke produced by said combustion.

18. A marine signal comprising a float having a central chamber provided with a tubular metallic wall forming a barrel, a pyrotechnical composition within said barrel capable when ignited of producing flame and smoke for substantially a predetermined period of time, a watertight metallic closure for the breech of said barrel, means for firing the pyrotechnical material at the end remote from said breech, a watertight metallic closure for the muzzle of said barrel comprising fusible members of relatively small and large areas operable upon ignition of the material first to vent the products of combustion through the smaller fusible area and thereafter upon fusion of the larger member to provide a relatively large aperture for the escape of the flames and products of combustion.

In testimony whereof, I have signed my name to this specification.

ROBERT J. ANDERSON.