J. H. ROGERS.

RADIOSIGNALING SYSTEM.

APPLICATION FILED MAY 2, 1917.

1,349,103. Patented Aug. 10, 1920.

Fig. 1.

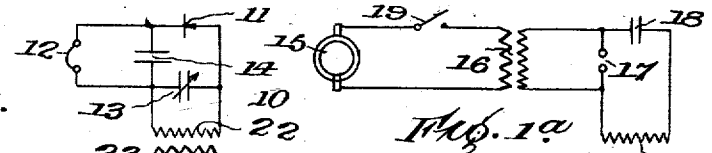


Fig. 1a

Fig. 2

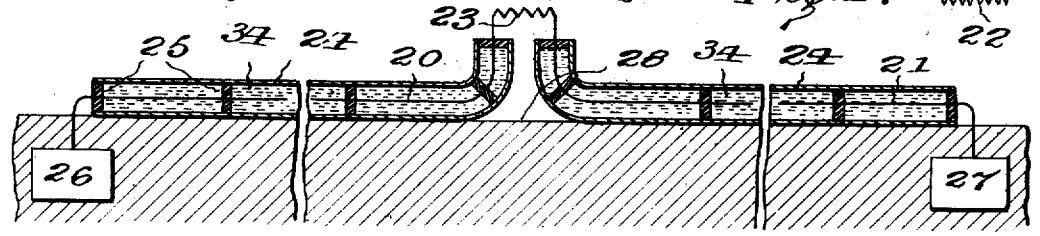
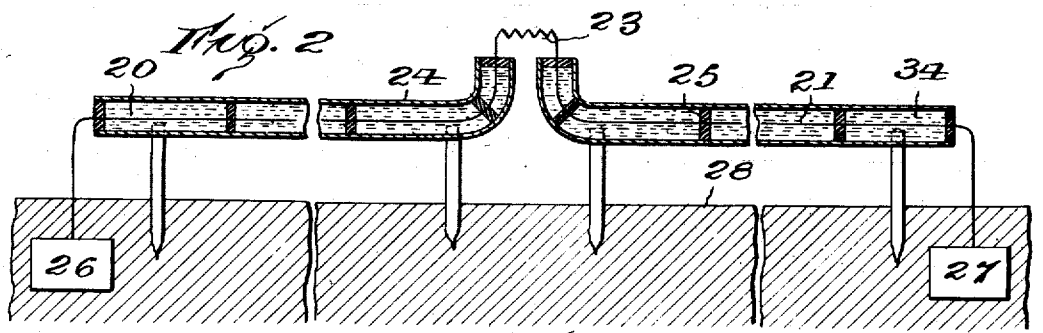


Fig. 3.



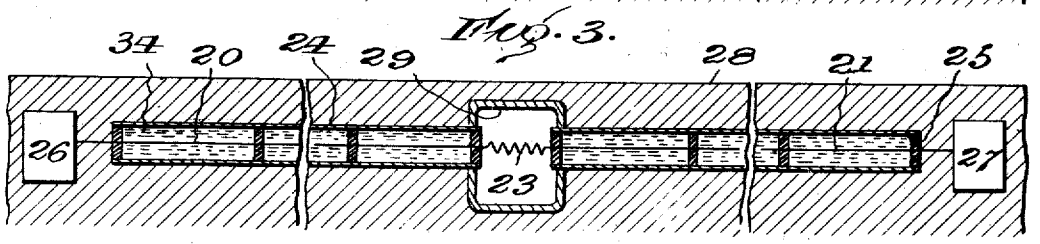


Fig. 4.

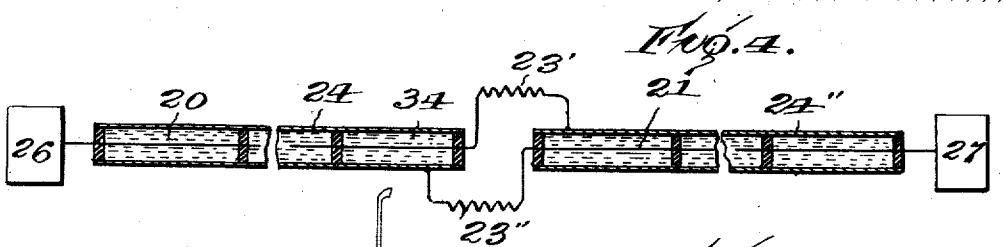
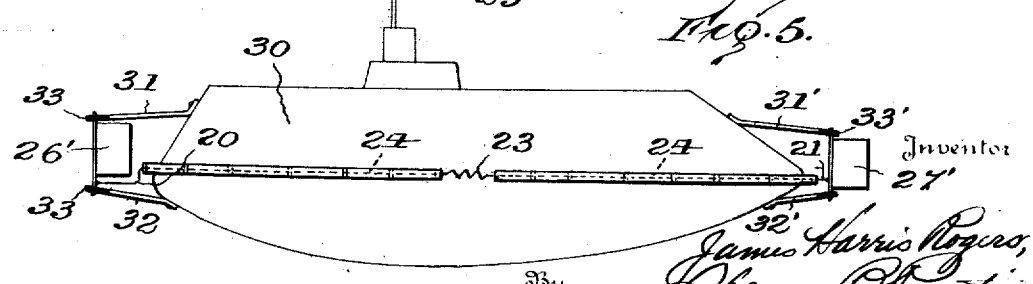


Fig. 5.



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UNITED STATES PATENT OFFICE.

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RADIOSIGNALING SYSTEM.

1,349,103. Specification of Letters Patent. Patented Aug. 10, 1920.

Application filed May 2, 1917. Serial No. 165,875.

To all whom it may concern:

Be it known that I, JAMES HARRIS ROGERS, a citizen of the United States, residing at Hyattsville, in the county of Prince Georges and State of Maryland, have invented new and useful Improvements in Radiosignaling Systems, of which the following is a specification.

My invention relates to radio signaling or the sending and receiving of signals through space by means of electromagnetic waves, and it pertains particularly to the disposition of the radio conductor or conductors.

In the course of my experiments I have discovered that grounded radio conductors or antennæ are highly efficient when disposed horizontally or substantially parallel to the surface of the earth, and surrounded by or inclosed in a uniform metallic screen practically throughout their length, but insulated therefrom. The advantages of long prostrate (as distinguished from erect) antennæ are thus obtained and the objectionable effects of certain forms of static conditions are eliminated.

The invention consists in the novel construction and arrangement of apparatus and parts thereof for sending and receiving radio signals hereinafter described and claimed, and illustrated in the accompanying drawings, in which drawings—

Figure 1 is a diagrammatic view showing the screen for the antennæ resting upon the surface of the earth, receiving instruments being shown associated with the antennæ;

Fig. 1ª shows a conventional arrangement of sending instruments which may be substituted for the receiving instruments for transmitting signals;

Fig. 2 is a view similar to Fig. 1, but showing the inclosing screen for the antennæ elevated above the surface of the earth, the instruments, receiving or transmitting, being merely indicated by one of the coupling coils;

Fig. 3 is a similar view showing the inclosing screen buried beneath the surface of the earth;

Fig. 4 shows diagrammatically a modification; and

Fig. 5 is a similar view showing the invention applied to a boat or vessel, such as a submarine.

Referring to the drawings, 10 indicates the signal instruments, which in Fig. 1 are those for receiving signals, while in Fig. 1ª the instruments for sending signals are shown. In Fig. 1, 11 is a detector of any type, preferably an audion, 12 a telephone, and 13 and 14 the usual condensers. Any desired type of instruments and arrangement of connecting circuits may be employed.

In Fig. 1ª suitable sending instruments are conventionally shown. These comprise a generator 15, transformer 16, spark gap 17, condenser 18 and key 19.

The above-mentioned instruments are well known in the art of radio or magnetic wave signaling, and need not be further described.

20 and 21 are two antennæ extending in different directions from the signal instruments, and are shown associated with these instruments by indirect coupling, as coils 22 and 23 of a transformer. These antennæ may extend in opposite directions, and in order to attain maximum efficiency arrangement may be made so that they may be disposed in a line at right angles to the wave fronts when receiving. Such an arrangement is fully described in application S. No. 130,603, which has since issued as Patent No. 1,322,622, dated Nov. 25, 1919.

The antennæ are each inclosed in a metallic screen shown as a metal pipe 24 in which the antenna is mounted by spacers or disks 25 of insulating material, such as porcelain, clay, fiber or the equivalent, so that while each antenna is inclosed substantially throughout its length by the metallic screen it is insulated therefrom. At the outer end, or end away from the instruments, each antenna 20 and 21 is connected to earth plates 26 and 27 respectively.

The length of each antenna may be selected to suit the conditions under which each system is to work, and may be several hundred or a thousand feet, or more. The pipe or screen may be of iron or other metal suitable to accomplish the purpose, and serves to protect the antenna from certain static conditions which would or might interfere with the sending or receiving of signals.

The surface of the earth is indicated at 28, and in Fig. 1 the antennæ and their inclosing screens are shown resting upon and in contact with the surface of the earth substantially throughout their length.

In Fig. 2 the antennæ and their inclosing

screens are shown supported above the surface of the earth, and may or may not be insulated therefrom. In this figure, as also in Figs. 3, 4 and 5, the sending and receiving instruments, whichever is connected for use at any given time, is merely indicated by one coil 23 of the coupling.

In Fig. 3 the antennæ and their inclosing screens are shown buried beneath the surface of the earth, in which case the instruments may be in a covered chamber 29 below ground.

In Fig. 4 is shown an arrangement in which, instead of associating one set of signal instruments with both antennæ, two sets of instruments are provided, one set 23′ being connected to antenna 20 and screen or pipe 24″, and instruments 23″ being connected to antenna 21 and screen or pipe 24″. In this way two sets of instruments may be used simultaneously, both sets for sending or receiving, or one set for sending and the other set for receiving.

In using the term "surface of the earth" I intend to designate the surface where there is water as well as where there is land. The invention is therefore equally applicable to boats or vessels, particularly submarines on which it is operative whether afloat or submerged. Such an embodiment of the invention is shown in Fig. 5, in which the vessel is indicated at 30, and the other parts designated as in Figs. 1, 2 and 3, so that they require no further description. The screens 24 are preferably extended through sheating or hull, so that each antenna is inclosed substantially throughout its length within the vessel. The ground plate 26′ at the forward end of the vessel is preferably pivotally mounted at its forward edge on brackets 31, 32 so as to swing freely with the movements of the vessel, but is insulated therefrom as shown diagrammatically at 33, 33. The antenna 20 is connected to plate 26′ in any suitable manner. Ground plate 27′ is similarly mounted on brackets 31′, 32′, at the stern of the vessel, and is connected to antenna 21. These plates may be mounted in any other suitable manner.

In all of the embodiments of the invention the pipe or screen is preferably filled with oil such as is ordinarily used in transformers, for the purpose of preventing brush discharge, this being indicated at 34.

In accordance with the patent statutes I have described what I now believe to be the best embodiment of the invention, but I do not wish to be understood thereby as limiting myself or the scope of the invention, as many changes and modifications may be made without departing from the spirit of the invention and all such I aim to include in the scope of the appended claims. For instance, each antenna is shown as a single wire or conductor, whereas it might be composed of multiple conductors.

What I claim as new and desire to secure by Letters Patent of the United States, is—

1. A radio signaling system comprising an antenna extending horizontally substantially parallel to the surface of the earth, signal instruments associated with said antenna at one end and a ground connection at the other end, and a metallic screen in intimate contact with the earth substantially throughout its length and inclosing said antenna.

2. A radio signaling system comprising an antenna extending horizontally substantially parallel to the surface of the earth, signal instruments associated with said antenna at one end and a ground connection at the other end, and a metallic screen upon and in contact with the earth and inclosing said antenna substantially throughout its length but insulated therefrom.

3. A radio signaling system comprising an antenna extending horizontally substantially parallel to the surface of the earth, signal instruments associated with said antenna at one end and a ground connection at the other end, and a metallic screen buried beneath the surface of the earth and inclosing said antenna substantially throughout its length but insulated therefrom.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JAMES HARRIS ROGERS.

Witnesses:
ALEX J. HASSON,
WALTON C. CARROLL.