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COMPLETE SPECIFICATION.

“Hertzian-wave Projecting and Receiving Apparatus Adapted to Indicate or Give Warning of the Presence of a Metallic Body, such as a Ship or a Train, in the Line of Projection of such Waves”.—

I, CHRISTIAN HÜLSMEYER of 3 Grabenstrasse, Düsseldorf, Germany, Engineer do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

5 This invention consists, broadly, of improved apparatus for projecting electric waves in any desired direction combined with improved apparatus for receiving said waves when reflected back from any metallic body, such as a ship or a train, said receiving apparatus being adapted to put into action an audible or a visible signal and thus give warning of the presence of such metallic body
10 in the line of projection of the waves.

My invention is based upon the property of electric waves of being reflected back towards their source on meeting a metallic body, and will be readily understood by imagining a transmitting and a receiving station such as indicated placed side by side at the same point and so arranged that waves pro-
15 jected from the transmitter can only actuate the receiver by being reflected from some metallic body, which, at sea, would presumably be another ship.

I have illustrated my invention in the accompanying drawing, in which:

Fig. 1 is a diagrammatic view showing a ship A fitted with my apparatus, and a ship B whose presence is detected thereby.

20 Fig. 2 is a sectional view of the apparatus, and

Figs. 3 and 4 are sectional views of details thereof.

My apparatus comprises a transmitting and a receiving station similar to those used in wireless telegraphy, with this difference that the two stations are situated in close proximity to each other and are so arranged and, con-
25 structed that they cannot directly influence one another. In view of the fact that ships are at times subject to considerable rolling, pitching and like motion, which might otherwise render the apparatus practically useless, I mount both the transmitter and receiver similarly to a compass-box, about as shown in Fig. 2, so that they are maintained by the action of gravity in an approximately
30 vertical position. In the pivotally mounted hollow semi-sphere *c*, I also mount an induction coil *d*, the current from which actuates the transmitter. Said induction coil receives its primary current from any suitable source, for example, from accumulators, batteries, or from a dynamo generating either an alternating or a continuous current. In the case of a continuous current, I
35 provide a suitable transformer. The secondary current of the induction coil *d* is conducted by wires through a hollow spindle *e* to two insulated rings *f*, *f'*, fixed thereon. On said spindle *e*, I rotatably mount a sleeve or the like *g* which carries or is integrally formed with a funnel-shaped reflector or screen *l* adapted to confine the electric waves emanating from the oscillator *h* and to assist in
40 projecting them in any desired direction. The high tension and correspondingly insulated current from the induction coil is taken off the rings *f*, *f'* by means of brushes *i* and *k* and transmitted to the oscillator, immediately behind which and within the projector screen, *l* a concave reflector *m* is mounted whereby

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Hülsmeier's Hertzian-wave Projecting and Receiving Apparatus.

the electric waves are projected at a suitable angle. To obviate any possibility of waves passing direct from the transmitter to the receiver, I may provide a metal partition or guard *t* between them.

Preferably formed integrally with the sleeve *g*, and extending upwards from the partition *t*, I provide a, in plan view, semi-circular casing *n* which contains or partly surrounds the receiver wire *o* or a series of such wires or antennae and acts as a wave collector and a screen to keep off waves from foreign sources. If desired, however, I may dispense with the casing *n* and I may fix the receiver wires to the ropes or other parts of the rigging of the ship, said wires being of course properly insulated. One end of the receiver wire-*o* is fixed indirectly to, but insulated from, the top of the hollow spindle *e*, and its continuation outside the casing *n* is insulated from electric waves by enclosing it in a metal tube or casing; consequently the only electric waves which, normally, will be received by the wires *o* will be those coming from a direction facing the casing *n*. The continuation of the wire *o* goes to the coherer which, on being actuated by the current from the wire *o*, closes a local circuit and thus operates a suitable audible or visible signal situated at such suitable part of the ship that the proper officer can hear or see it.

As the apparatus so far described can only transmit and receive electric waves to and from a comparatively limited field at any particular moment, the wave projecting apparatus and the receiver casing *n* are rotated together, preferably intermittently—in a horizontal direction by means of suitable spring-operated or other mechanism—of which I have only indicated the driving wheel *q* in the drawing. Electric waves emanating from the oscillator are thus projected towards each point of the compass in turn, and on meeting a metallic body such as a ship are instantly reflected and actuate the coherer. The rotation of the casing *n* with the wave-projecting apparatus ensures that only reflected waves originating from said apparatus and waves from outside sources which come in the same direction can influence the coherer; and in order to practically prevent the latter class influencing the coherer the transmitter and receiver are electrically tuned to each other.

When the officer in charge is stationed at some distance from the apparatus, it is preferable to employ electrically operated mechanism to rotate the apparatus and to provide at his post a suitable dial rotating synchronously therewith, or that the driving wheel *q* be provided with contacts *p* corresponding to the points of the compass and adapted on the actuation of the coherer to close a circuit and thereby release or actuate a drop signal or other indicator, so that, in either case, said officer is made aware instantly of the direction from which the warning comes.

Fig. 1 shows the application of my invention to a vessel A. In this figure, *r* indicates the wave-projecting apparatus, the electric waves emanating from which are being reflected from another vessel to the receiver *o*, the direction of said waves being indicated by lines and arrows.

It will be obvious that the various parts of my improved apparatus may be modified somewhat and arranged differently without departing from my invention.

Having now particularly described and ascertained the nature of my invention, and in what manner the same is to be performed I declare that what I claim is:—

1. Improved Hertzian-wave-projecting and receiving apparatus adapted to indicate or give warning of the presence of a metallic body, such as a ship or a train, in the line of projection of such waves, comprising a projecting and a receiving apparatus situated in proximity to each other and so arranged and constructed that electric waves emanating from the former can only indirectly influence the latter and thus actuate the coherer and indicator on being reflected from a metallic body in the line of projection, substantially as set forth.

Hülsmeier's Hertzian-wave Projecting and Receiving Apparatus.

2. In apparatus such as claimed in Claim 1, a funnel-shaped projector provided with a concave reflector, adapted to project in a particular direction electric waves emanating from the oscillator.

5 3. In apparatus such as claimed in Claims 1 and 2, mounting both the projecting and the receiving apparatus similarly to a compass-box, so that they are maintained by the action of gravity in an approximately vertical position.

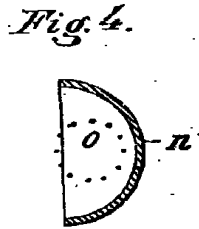
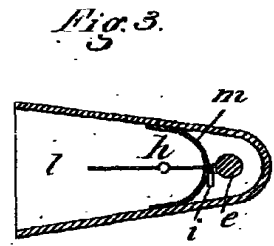
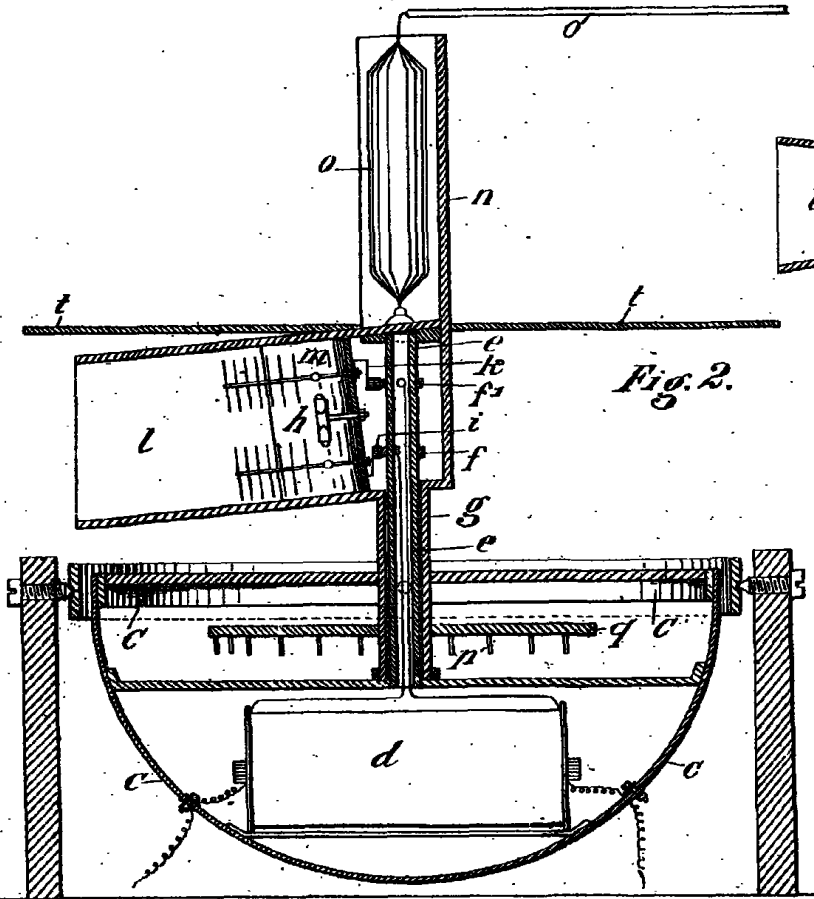
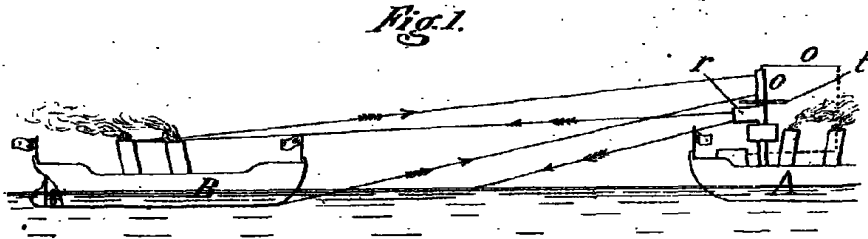
4. In apparatus such as claimed in Claims 1 and 2, a semi-circular casing such as *n* carried by the sleeve *g* and adapted to act as a wave collector and screen for the receiver wires or antennae.

10 5. In apparatus such as claimed in Claims 1, 2 and 4 means for intermittently rotating together the wave projecting apparatus and the wave collector or screen *n*.

15 6. In apparatus such as claimed in Claims 1 to 5, the employment of a suitable dial rotating synchronously with the driving wheel *g* of the apparatus, provided with contacts corresponding to the points of the compass for the purpose of indicating at a distance the direction from which electric waves are being received at any moment.

Dated this 10th day of June 1904

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[This Drawing is a reproduction of the Original on a reduced scale.]

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