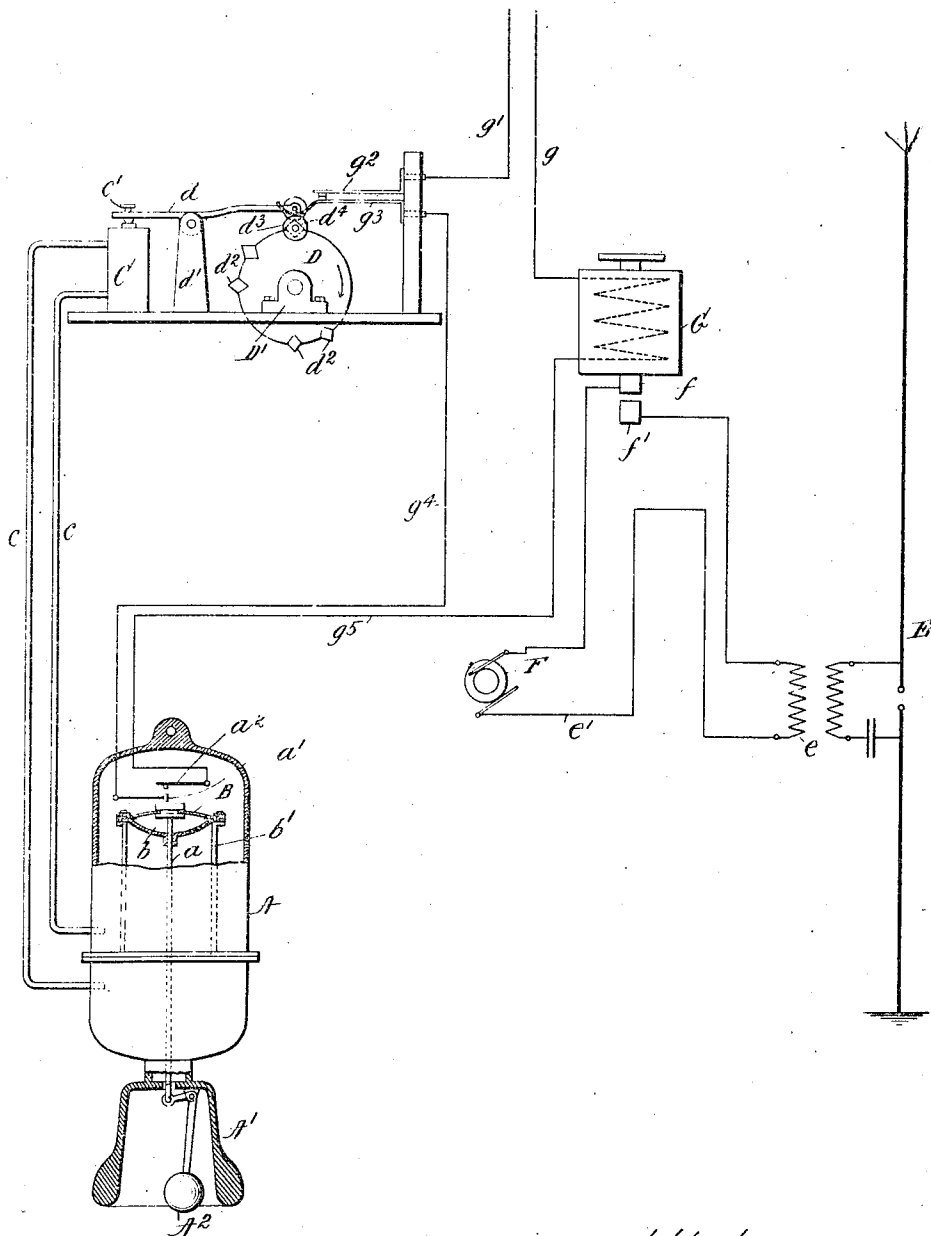


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 DEVICE FOR ESTIMATING DISTANCES.
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DEVICE FOR ESTIMATING DISTANCES.

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To all whom it may concern:

Be it known that I, ROBERT L. WILLIAMS, of Newton, in the county of Middlesex and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Devices for Estimating Distances, of which the following is a specification.

It is well known that radio signals and submarine signals originating at the same station have been used as means for determining the distance of that station from the receiving station, which may be on board a ship approaching the coast, for example. By combining with a signaling means a simultaneously-operating radio means and comparing the length of time which elapses between the receipt of the radio signals and the receipt of the submarine signals, the distance of the ship from the sending station may be determined. The submarine signaling device is usually suspended from a lightship and signals are given by a code number which identifies to the ship which particular lightship it is approaching.

Where such a submarine and radio device are thus used to give a code signal there is liable to be confusion at the receiving station owing to the plurality of signals, both submarine and wireless, which come to the observer at the receiving station, and his possible lack of ability to read the time between the kinds of signals correctly.

My invention provides means for overcoming this difficulty, and consists primarily in mechanism for sending the radio signal simultaneously with the first stroke only of the submarine code or other signal, so that having noted the moment of receipt of the radio signal, the observer may devote his attention to the reading of the submarine signal as it is received. Such submarine signal may be a code indicating the particular lightship which is being approached or may be a submarine signal from another ship.

My invention will be understood by reference to the drawing, which shows diagrammatically one embodiment thereof.

A is a submarine signal of a well known type, which comprises a bell A^1 and a striker A^2 , the striker being operated by a connecting rod a connected to a diaphragm B form-

ing a closure for a compressed air chamber b , this latter mechanism being supported upon suitable supports b^1 and the action of the diaphragm being such that as compressed air is supplied to the chamber b by suitable means (the details of which are not shown), the lifting of the diaphragm pulls up the rod a the momentum of the clapper A^2 causing it to strike the bell. Compressed air is supplied to the signaling apparatus and exhausted therefrom by means of pipes c leading from a compressed air apparatus C. Within this apparatus C is a valve (not shown) which is raised and lowered or otherwise operated in order to supply compressed air intermittently to the signaling apparatus and to permit the exhaust air to escape. A valve-operating rod is indicated at c^1 and is connected to the end of a lever d pivoted on a support d^1 and operated by means of a code wheel D, suitably mounted on two supports D^1 (one of which only is shown) and carrying dogs d^2 , these dogs being arranged to engage the lever d at predetermined intervals and operate the valve in the apparatus C at predetermined intervals to cause the clapper A^2 to strike the bell A^1 . The code wheel D may be caused to rotate in any desired manner and at any desired rate of speed.

The radio apparatus is indicated at E and need not be described as it is a well known construction. e is the primary of the transformer, which is connected by connections e^1 with an alternating current generator F, which in turn is connected with one terminal f of a relay circuit closer G, the other terminal f^1 being connected with the primary e . The relay G is connected by wires g with a source of current, which in turn is connected by a second wire g^1 with a terminal g^2 . A spring terminal g^3 is located to form a circuit closer with the terminal g^2 and is connected by the wire g^4 with the upper end a^1 of the rod a . A terminal a^2 , connected by wire g^5 with the relay G, is located within the reach of the terminal a^1 , so that as the rod a is actuated upwardly by compressed air in the chamber b , the terminal a^1 engages the terminal a^2 so as to make contact and close the circuit between g^4 and g^5 . It will be seen, however, that while this occurs at every

stroke of the rod a , the circuit is only closed through the relay G when this contact between a^1 and a^2 is simultaneous with contact between g^2 and g^3 .

5 The circuit between g^2 and g^3 is closed by means of a roll d^3 mounted on the code wheel D in line with the first dog d^4 of the series. It will be noted that on the code wheel D there are five of these dogs d^2 , d^4 so that the
10 wheel, which rotates in the direction of the arrow, will bring the dog d^4 and roll d^3 under the lever d and circuit closer g^3 , respectively, so as to push them up simultaneously. After the dog and roll have passed
15 under these parts they fall again into their normal position, until upon the further rotation of the code wheel D the second dog d^2 lifts the lever d , and so on as the wheel revolves, the code number of the submarine
20 signal in this case being 32.

Thus the relay G is only energized to close the circuit at f , f^1 through the primary of the radio apparatus when the circuit closers a^1 , a^2 and g^2 , g^3 are closed simultaneously.
25 The receiving operator gets the single instantaneous radio signal and later hears the first blow of the submarine signal and by measuring the time between the receipt of the radio signal and the first blow of the
30 submarine signal, can calculate his distance from the lightship or other station. The code signal of the submarine apparatus notifies him of the particular light ship he is approaching.

35 It is evident that this invention may be embodied in other types of apparatus from that shown and also that what is termed the "submarine apparatus" may be in fact operated in the air. In other words,
40 the invention as described in the claims is not limited to any specific apparatus nor submarine use but to the comparison of distances by means of the travel of sound through different media or by different
45 waves.

What I claim as my invention is:—

1. In a signaling system, in combination, a submarine signaling apparatus and a radio transmitter, and means whereby said transmitter will be operated to give a single signal simultaneously with said apparatus during a portion of the operation of said apparatus, and said apparatus will operate independently of said transmitter during
55 the remaining portion thereof.

2. In a signaling system, in combination, a submarine signaling apparatus; a radio transmitter comprising a circuit closer and means adapted to cause the operation of said
60 submarine signaling apparatus to give a predetermined number of signals and to operate said circuit closer to close its circuit simultaneously with the giving of the first of said submarine signals.

65 3. In a signaling system, in combination,

a submarine signaling apparatus adapted to give a predetermined series of signals and comprising a code wheel and a radio transmitter comprising a normally open circuit having a circuit closer, means for operating
70 said circuit closer located on said code wheel to close the circuit simultaneously with the giving of the first of said series of submarine signals.

4. In a signaling system, in combination,
75 a submarine signaling apparatus adapted to give a predetermined series of signals, and a radio transmitter comprising a normally-open circuit, means for closing said circuit comprising a second normally-open circuit,
80 and means for closing said second circuit comprising a code wheel having a series of dogs corresponding to the desired code adapted to operate said apparatus, and means on said code wheel adapted to engage
85 the circuit closer of said second circuit to close it once simultaneously with the operation of the first dog of said series.

5. In a signaling system, in combination, a submarine signaling apparatus adapted
90 to give a predetermined series of signals, and a radio transmitter comprising a circuit, means for closing said circuit comprising a second normally-open circuit, means for closing said second circuit com-
95 prising a code wheel having a series of dogs corresponding to the desired code adapted to operate said apparatus, and means to engage the circuit closer of said second circuit to close it simultaneously with the operation of the first dog of said series, and means located in said submarine signaling apparatus whereby each of said dogs will cause the operation of said submarine signaling apparatus to give a signal.
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6. In a signaling system, in combination, a submarine signaling apparatus adapted to give a predetermined series of signals, and a radio transmitter comprising a circuit, means for closing said circuit comprising a second normally-open circuit, means for closing said second circuit comprising a code wheel having a series of dogs corresponding to the desired code adapted to operate said apparatus, and means adapted to
115 engage the circuit closer of said second circuit to close it simultaneously with the operation of the first dog of said series, means located in said submarine signaling apparatus whereby each of said dogs will cause the
120 operation of said submarine signaling apparatus to give a signal, and means also located in said submarine signaling apparatus whereby the giving of a signal thereby will close a second circuit closer in said second circuit.
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7. A pneumatic submarine signaling apparatus and means for operating it comprising a compressed air container and an operative connection between said container
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and said apparatus, a valve therein whereby compressed air may be delivered from said container to said apparatus, and means for operating said valve intermittently, and a radio transmitter and means for operating it comprising a normally-open circuit, a relay adapted to close said circuit, and a circuit for said relay having two circuit closers, one located in said signaling apparatus to be operated thereby and the other adapted to be operated by said valve-operating means.

ROBERT L. WILLIAMS.