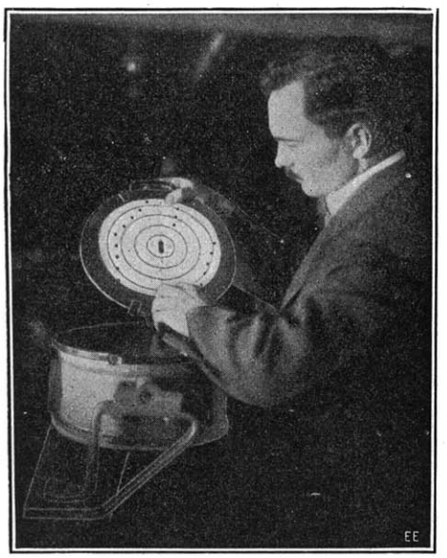
Locating Vessels at Sea by Radio and Sound Waves

AS all scientists know, there is a marked difference between the velocity of wireless and sound waves as transmitted through the ether and the air respectively. As a matter of fact, the radio waves are propagated through the ether at a speed of 186,000 miles per second, while



Mr. Otto Fricke, Inventor of the Radio Fog Compass.

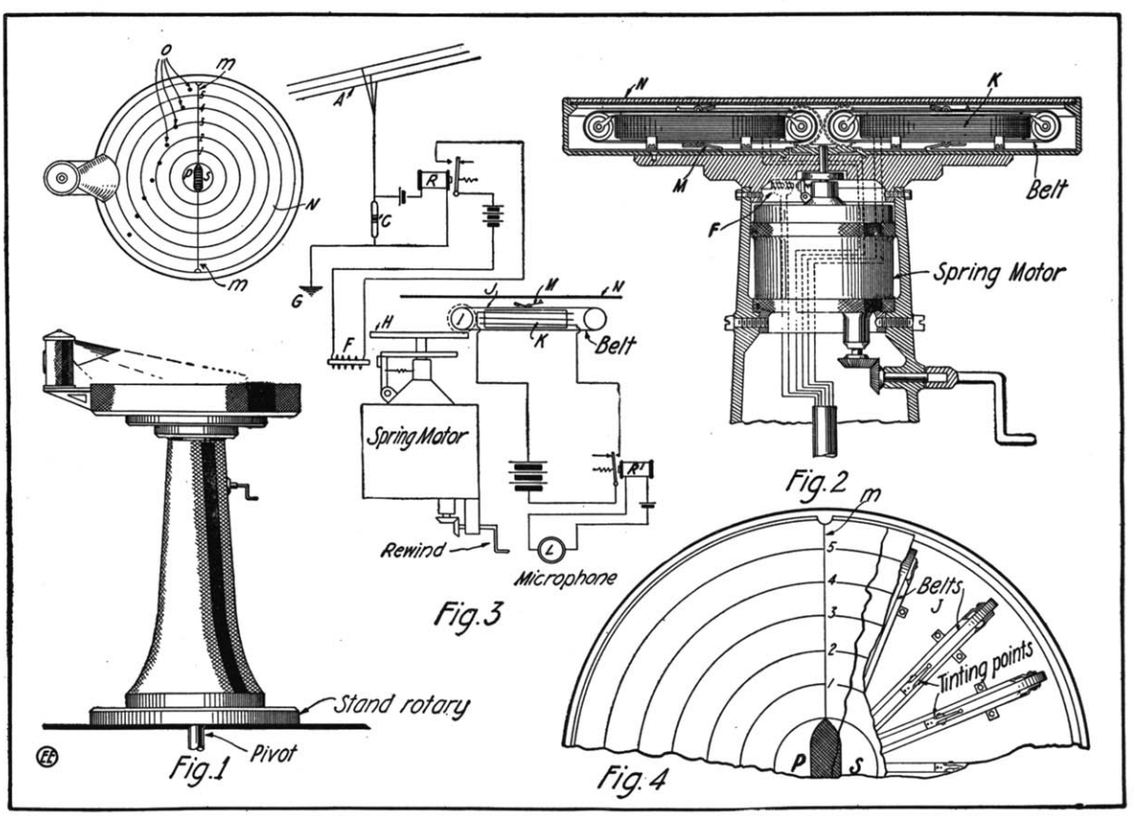
sound waves travel at considerably lower velocity or approximately 1,125 feet per second in ordinary still air. With these two important facts in mind, it has remained for an ingenious inventor, Mr. Otto Fricke, of New York City, to perfect a new form of course-plotting instrument which, when installed on a ship, will enable the navigation officer in charge to ascertain directly how far away and at what angle another ship is located, even though it be enshrouded by fog. The apparatus works automatically and is certainly one of the most remarkable inventions ever brought forth toward the end of safeguarding the great ships that sail the high seas, and moreover it is not limited in its adptations to large bodies of water, but may be used also in lakes, harbors, rivers, etc.

Given the problem that we are to locate a ship situated several miles from a given point as regards its exact distance from this point, and also the geographical direction in which it lies from this same point, the inventor had to set about and develop an apparatus which would solve this scientific conundrum. Owing to the relatively small distance over which this apparatus is supposed to work, when adopted by marine agencies, the well-known but freaky "vacuum space" effects occurring in fog banks and the like and which cause a great difference in the propagation of sound waves through the air, may be ignored.

Mr. Fricke and his remarkable course-plotting instrument are depicted in the accompanying illustration. The diagrammatic views will aid in the explanation of this most wonderful electro-mechanical device.

At Fig. 1 there is shown the general appearance of this instrument. As will be noted this resembles very much the usual compass installed on board ship, as it rests on a vertical pedestal, which also carries a shaded lamp for night readings. In the upper compartment of the apparatus is located a sufficiently strong spring motor with suitable winding handle extending from the side of the pedestal. This motor has its power transmission clutch controlled by a small electro-magnet, F, as indicated in Fig. 2. This magnet is connected up with a wireless circuit (see Figs. 2 and 3), comprising a relay R, coherer C, antenna A and ground G. When a wireless impulse or wave is sent out by the distant "fog hidden" vessel, it impinges upon this antenna and practically instantaneously actuates the electro-magnet F, which then releases the spring motor, aforementioned. The vertical shaft in line with same then rotates and as it carries a worm wheel H, it causes the gear wheels I (a number of which are placed radially about the case as shown in Fig. 4) to rotate. When these gears rotate they carry along, over suitable drums, small belts J (see Fig. 4). Attached to the top and bottom of each of these belts are what is termed "tinting points." As observed from Fig. 3, these are pivotly supported and on one wing of the tinting point, is secured a small piece of soft iron. Inside of each belt is an electro-magnet which is operated or controlled by a relay R^1. This relay is normally open, but if a sound signal, such as from a siren or whistle, strikes the sensitive microphone L the relay will be closed, and likewise the electro-magnet K will be energized, thus attracting the iron armature of the traveling tinting point M. At this juncture the marker is impelled upward, owing to the armature being attracted downward by electro-magnet K, and it will leave a mark or spot on a translucent thin paper disk or dial mounted in the top of the apparatus case (see Figs. 1 and 3).

To recapitulate, it may be said that upon the arrival of a wireless signal from the distant vessel, the spring motor clutch is released, as before described, and all the radial belts start moving outward from the center, carrying with them their tinting points. Ordinarily these points do not leave any mark or record on the translucent paper dial. A few seconds after the receipt of the radio signal, the sound signal arrives, thus actuating in turn certain microphones located about the decks of the ship; it being understood that several of these microphones are to be placed symmetrically both fore and aft and amidships on the vessel, so as to pick up sounds from any direction. These microphones are moreover protected by suitable housings or funnels so that only sounds from a very limited radius will affect any specific instrument. Supposing that a wireless signal has started the apparatus and the belts are all moving slowly outward toward the periphery of the upper drum. When the sound signal comes into effect several seconds later, it causes the relay R^1 to close and in this way to energize the electro-magnet K within the moving belt. This particular magnet will, of course, be connected to a certain microphone located on

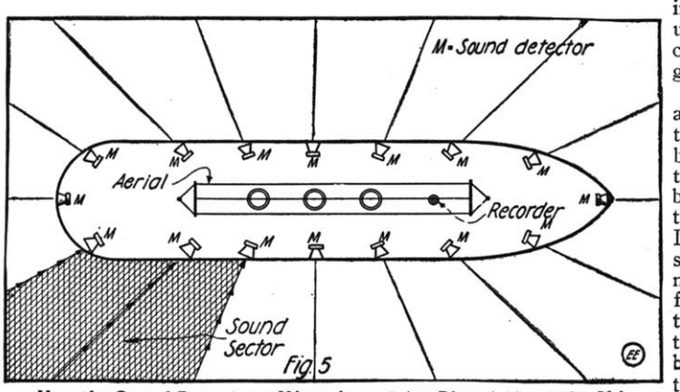


Details of Remarkable Radio Fog Compass Which Charts Location of Hidden Ships Automatically.

a certain part of the ship *geographically* speaking, i.e. facing North, East, South or West, or to intermediate points of the compass. At this stage the electro-magnet K, as stated previously, attracts the iron armature on the tinting pencil M, leaving an identification mark or spot on the dial.

A series of such identification marks corresponding to a successive set of signals as sent out by the ship are perceived at 0 in Fig. 1. Hence it is clear how the record would finally appear to the navigator of the vessel, whose location is indicated at PS (Port and Starboard) in the center of the dial. The line MM indicates the course of the vessel seeking the information, while each radial line extending outwards on the dial represents a distance of one mile. The instrument may, of course, be designed for various distances and is not limited to the exact layout here described.

The arrangement of the sound detectors or microphones about the decks of the vessel are indicated at Fig. 5 and also the relative relation of an incoming sound wave. In case this sound wave sector, so to speak, would affect three microphones for example; then three positions of the distant ship would be registered on the apparatus and the correct range would be the "mean" of the three values registered. After each wireless impulse and sound signal have duly recorded their effects on the dial, which is normally one spot or point on same, all of the traveling belts stop; that is, they are then ready for the next radio impulse to release the clock work for the second registration. The number of points thus recorded by the tinting pencils on the dial will conjointly correspond to the number of radio and sound signals sent out by the vessel giving the information desired. It being presumed, of course, in all this discussion, that if such an apparatus as this is adopted for marine purposes, that some prearranged working arrangement or schedule will be thoroughly understood and observed by the officers in charge of the various ships availing themselves of this latest advance in science. Where the course-plotting compass is to be used in harbors or other bodies of water, in which a great number of vessels are congested, its functions may be properly performed if all the vessels so equipped will exercise care to send out their signals alternately, in much the same manner as ships under similar conditions now exchange ordinary wireless telegraphic signals or messages.



How the Sound Receptors (Microphones) Are Placed About the Ship

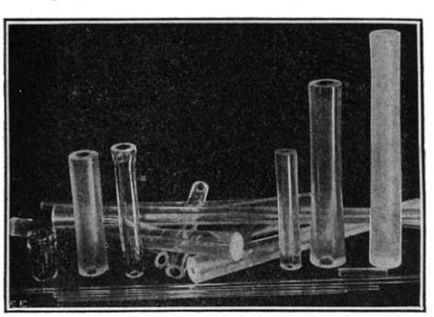
Not only will this device, if adopted, prove of great benefit to the navigators of vessels at sea, but it can also be used to detect the direction and distance of icebergs or rocky promontories from the vessel sailing in such regions. In this event the vessel's siren is sounded when the spring motor is manually released. In view of the fact that the sound wave has to travel to the reflecting surface of the distant berg or rock and then back again, before it can actuate the microphones, etc., the spring motor of the device would be arranged to turn at half its normal speed. Apparently it would be an easy matter in this way to ascertain the approximate distance and direction of such a menace to the safe passage of ships. So far, however, the device has not had an opportunity to demonstrate its practical value.

BORO-PORCELAIN—A NEW INSULATOR.

What is known as Boro-porcelain has been developed and brought out for all kinds of insulation requirements for both high and low potential by a progressive specialist in this line. Boro-porcelain insulator tubes, etc., are shown in the illustration herewith. They possess a number of very valuable characteristics and properties for this class of work.

It is claimed that it satisfactorily replaces porcelain because of its low expansion coefficient, its resistance to breakage both from thermal and mechanical causes, its high resistance to reagents and its perfect transparency.

The linear coefficient of expansion (25 to 350 degrees C.) is 0.0000032 lower than that of porcelain; about one-third that of lead glass. The new substance is very neat and pleasing in appearance and may be examined throughout for defects, as each insulator is inspected by polarized light to show any internal strains, and after this examination it is not necessary to test them electrically, as a body free from internal strains will give its maximum strength, electrical and mechanical, and this has been proven to run very uniform. It is bruitted that it is most valuable when used in the form of tubing, as it shows very little static leakage. The material is adaptable to high-frequency currents or to any other requirements which incur great changes of temperature, fog, dust, lightning or static flashovers, etc.


Boro-Porcelain—A New Transparent Insulator

LIGHT REDUCES CRIME.

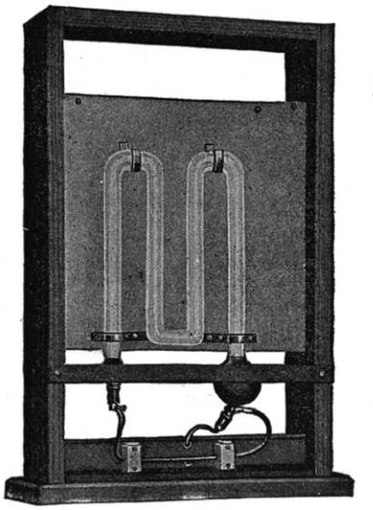
Captain Thomas P. Flahive, of the Kansas City police department, testifying in the Kansas City Supreme Court, stated that street lights were quite as important as policemen in preventing crime.

Captain Flahive is credited with being the best informed person on police matters in the West. He said that the need of policemen is greatest when there are fewest lighted lamps in residence and business districts. Captain Flahive's testimony supports what noted police authorities have said for years—that one lamp was equal to several policemen.

THE PHOTOGRAPHER'S IDEAL ELECTRIC LAMP.

A good deal of experimental work has been conducted in order to obtain a lamp for the photographer which will give perfect results. The ordinary incandescent lamp (both the gas and electric) is unsuitable for taking pictures, as the high lights of the photograph are entirely lost and, furthermore, details are not clearly brought out.

The Cooper-Hewitt mercury vapor lamp has overcome these deficiencies and to-day most all photographers employ this lamp for the production of light for their work. However, several defects were still to be overcome in conjunction with this mercury arc, and recently a new lamp was made wherein all of these were eliminated. This lamp is illustrated herewith. It consists of a standard form of mercury lamp in the shape of the letter M, although different shaped tubes are made, according to the amount of space to be illuminated. The pool of mercury is held in the lower right-hand end of the tube, as perceived, while the other terminal is placed on the other end of the tube as usual. Behind the tube a "light" transformer is placed, which is nothing more nor less than a red reflector. This reflector is flat, as seen, and is covered with certain chemicals which transform the well-known bluish-green light developed by the ordinary mercury vapor lamp to a *whitish light,* which is the most desired in rapid photographic work.


New Mercury Vapor Lamp for Photographers

DATE OF ISSUE.—*As many of our readers have recently become unduly agitated as to when they could obtain The Electrical Experimenter, we wish to state that the newsstands have the journal on sale between the fifteenth and the eighteenth of the month in the eastern part of the United States and about the twentieth of the month west of the Mississippi River. Our subscribers should be in possession of their copies at these dates. Kindly bear in mind, however, that publications are not handled with the same despatch by the Post Office as a letter. For this reason delays are frequent, therefore kindly be patient and do not send us complaints as to non-arrival of your copy before the twenty-fifth of the month.*