THE NEW WHIPPLE TEMPERATURE INDICATOR FOR USE WITH PLATINUM THERMOMETERS.

The Cambridge Scientific Instrument Company, of Cambridge, England, are introducing a new temperature recorder, the "Whipple," of which we publish an illustration herewith. This temperature indicator is intended to be utilized with the Callendar platinum recorders. It was Prof. Callendar who drew the attention of the British Royal Society in 1886 to the possibility of measuring temperature based on the determination of the electrical resistance of a platinum wire, and demonstrated that the process was capable of very general application, and that the platinum resistance thermometer which he invented in co-operation with Prof. Griffiths gave consistent and accurate results over a very wide range of temperatures.

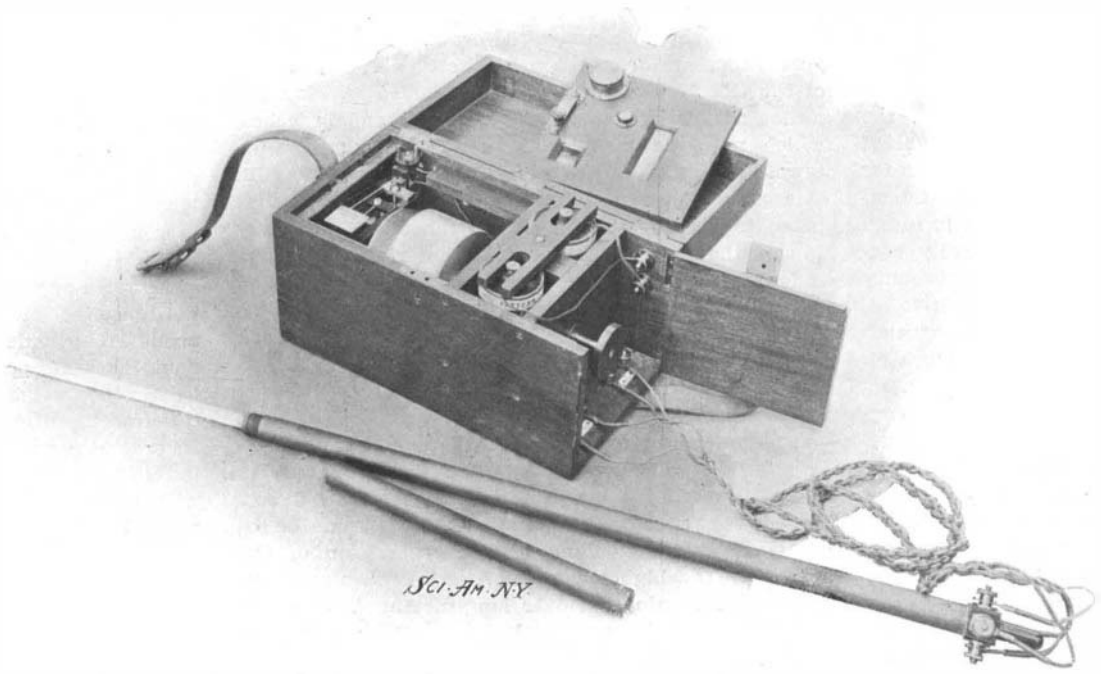
The Callendar and Griffiths platinum thermometer consists of a fine platinum wire, the resistance of which varies with the temperature. The coil of wire, generally called the bulb of the thermometer, is protected from the action of fumes and mechanical damage by means of a glass, steel, or porcelain tube, depending on the temperature it is required to register. Erroneous indication upon the recorder, owing to variations of the temperature, are rendered impossible by an arrangement of compensating leads. By this means the thermometer can be placed in positions where it would be absolutely impossible to read or use a mercury thermometer. At the same time a series of thermometers distributed over a wide area, can be read with infallible accuracy from one central point by means of an indicator and switchboard.

The Whipple temperature indicator is intended for employment with these platinum thermometers. The platinum coil constitutes one arm of a Wheatstone bridge, the other arms being formed by suitable resistances. The bridge wire differs from those generally used in connection with these indicators, since it is comparatively long, and is wound in a spiral round an ebonite drum as shown. Over this drum slides another graduated drum, the calibrations of which, however, are not regularly spaced, but are corrected so that the instruments read directly Centigrade. This last feature is the most prominent characteristic of this device over other types of indicators which have regular calibrations, and the temperatures are recorded in "platinum degrees" only, thus involving careful mathematical deductions to ascertain their Centigrade or Fahrenheit equivalents. Another distinct improvement in the Whipple apparatus is that rapidly varying temperatures may be followed with the utmost facility.

In our illustration the apparatus is shown with its top cover removed to explain the general arrangements of the mechanism. The battery power—dry-cells—is at the right, the calibrated drum in the center and the galvanometer at the left. The traveling contact is fixed inside the outer drum and presses on the spiral bridge below it. It is advanced by turning the large milled head shown at the right. In the illustration the apparatus is shown connected to the Callendar and Griffiths thermometers, which have a range from 0 deg. to 1400 deg.. C.

When the top is adjusted in position only a portion of the temperature scale and the needle of the galvanometer are to be seen through small glazed apertures. The apparatus is very compact and is specially designed with a view to easy portability, the extreme dimensions of the case being 14 inches in length by 8 inches in width and 8 inches in thickness, while its total weight is only about 20 pounds.

The instrument is now used by the British Admiralty for temperature measurements of naval boilers.



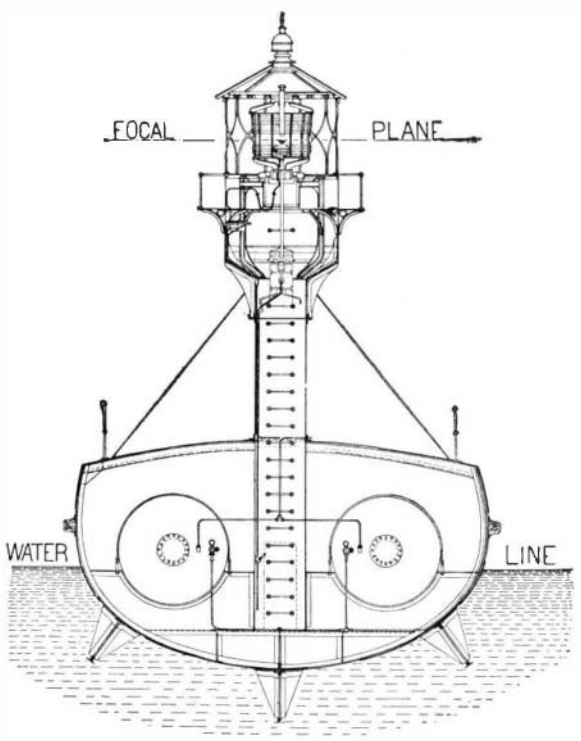
THE WHIPPLE TEMPERATURE INDICATOR FOR USE WITH PLATINUM THERMOMETER.

AN AUTOMATIC LIGHTSHIP.

BY WALDON FAWCETT.

During the past few years a radical improvement has been made over all previously existing systems of lighted signals by the use of gas-lighted buoys, supplied with tanks of compressed gas, which burn continuously day and night without attention for periods ranging from three months to a year, according to the size of the receptacle. The originators of this system have lately taken another step in advance, still further departing from the usual oceanic beacon, by the construction of a lightship which is independent of outside attention in the same degree as are the less powerful lights previously referred to.

The permanent lightship, as it might perhaps be designated, was built at Port Glasgow, Scotland, for a London firm of well-known lighting engineers, and has been stationed off the west coast of Scotland at the Otter Rock, near Islay, where it is subjected to great stress of weather at almost all seasons of the year. The steel hull, which is built of extra strength, is fitted with fin and web keels, three feet in depth, which are expected to co-operate with the extreme beam of the vessel to reduce rolling to a minimum.



CROSS SECTION OF THE LIGHTSHIP AT THE LANTERN.

By means of two steel, water-tight bulkheads, the vessel is divided into three water-tight compartments. The central division of the hold is occupied by two large welded steel gas tanks, which have a combined storage capacity for sufficient gas to supply the vessel for several months. Midway in the vessel is a circular steel tower surmounted by the lantern, which is thus given an altitude of twenty-five feet above the level of the water. The gas connections are carried on the inside of this tower, and there is also provided a ladder which affords access to the lantern for the supply men, who make periodical visits to the unmanned lightship.

The experiments already made with this system of maritime beacons prove conclusively that the light in the Otter Rock vessel can be depended upon to burn continuously and reliably for a number of months. The approximate duration of the light can always be predetermined, and there is no danger whatever of the light's being extinguished either by wind or spray. The gas is stored in the tanks in the hold at a pressure of 150 to 180 pounds per square inch, and a very efficient apparatus is provided for regulating the pressure to the burners. Surrounding the lantern is a platform on which an attendant may stand to light the beacon or adjust the flame. Within the tower is the fitting valve, by means of which connection is made to the tanks for the purpose of charging with gas, and this valve also controls the gas supply from the tanks to the lantern.

The light is given by a cluster of flat flames around a central jet, and the lantern is provided with a special lens which renders the light visible at a distance of from eight to twelve miles. Tanks are used to transport gas from the plant where it is manufactured to the lightship. When a supply vessel reaches the Otter Rock craft a hose is connected to the valve and to the source of supply, the valves at each end of the hose are opened, and the gas flows into the tank.

In order to enable the Otter Rock vessel to render service in warning imperiled vessels when there is a fog and when the light could not consequently be seen the craft is provided with a large bell, mounted on deck, which is made to ring automatically by means of a highly ingenious device which utilizes the gas as it passes from the tanks to the lantern to actuate the bell clapper. The bell is also provided with an ordinary tongue designed to be actuated by the roll of the vessel; but inasmuch as the water is usually comparatively quiet during the existence of a fog, this latter apparatus is of little value at the time when the sounding of the bell is most essential. The apparatus for ringing the bell by means of the flow of gas consists of a vessel covered by a flexible diaphragm. The pressure of the inflowing gas causes the diaphragm to rise, lifting a rod connected with a lever arm, to which hammers and counterweights are attached. When a hammer has struck the bell the movement automatically stops the flow of gas to the space under the diaphragm and the latter falls back into its original position. Powerful springs also keep the hammers off the bell after impact and otherwise assist in the operation of the apparatus. There is never a possibility that force will be lacking to ring the bell so long as there is any gas whatever in the tanks, since it is possible with a con-

AUTOMATIC UNMANNED LIGHTSHIP AT THE OTTER ROCK, SCOTLAND.