No. 793,648. PATENTED JULY 4, 1905.

R. A. FESSENDEN.

RECEIVER FOR ELECTROMAGNETIC WAVES.

APPLICATION FILED DEC. 14, 1904.

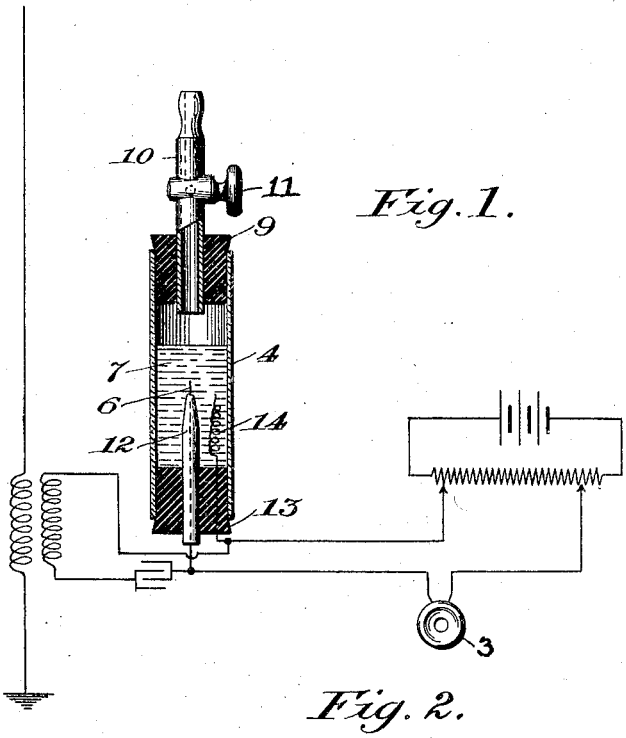
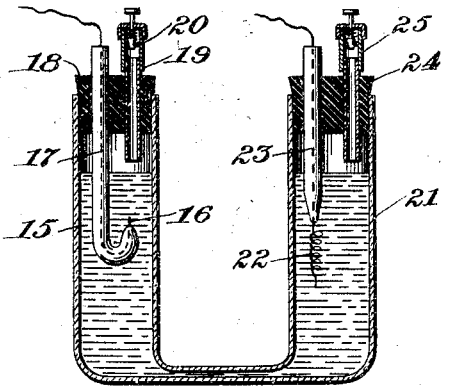


Fig. 1.

Fig. 2.



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No. 793,648. Patented July 4, 1905.

UNITED STATES PATENT OFFICE.

REGINALD A. FESSENDEN, OF WASHINGTON, DISTRICT OF COLUMBIA.

RECEIVER FOR ELECTROMAGNETIC WAVES.

SPECIFICATION forming part of Letters Patent No. 793,648, dated July 4, 1905.

Application filed December 14, 1904. Serial No. 236,860.

To all whom it may concern:

Be it known that I, REGINALD A. FESSENDEN, a citizen of the United States, and a resident of Washington, District of Columbia, have invented certain new and useful Improvements in Receivers for Electromagnetic Waves, of which the following is a specification.

The invention herein described relates to improvements in telegraph-receivers, and more particularly to that form of wireless-telegraph receiver called a "liquid barretter," in which both the highly-oscillatory currents to be detected and the constantly-flowing current from a local source both flow through a constricted conducting fluid-path and the highly-oscillatory currents produce a change in the amount of current flowing through the local circuit.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figures 1 and 2 show sectional views of different forms of receiver embodying my improvement, the receiver in Fig. 1 being shown in operative relation to the other parts or elements of a receiving-station.

In the form of receiver shown in Fig. 1, 4 is a tube, preferably of glass, closed by plugs 9 and 13, and partially or wholly filled with a suitable solution 7, which may, for example, be nitric acid or caustic soda. The plugs 9 and 13 are formed of a material incapable of being affected by the liquid in the tube. The fine-wire terminal 6 of the liquid barretter is preferably sealed in a glass tube 12, which is inserted through the lower plug 13, so that the fine-wire terminal is immersed in the solution 7. Through the upper plug 9 extends a tube 10, with stop-cock 11 and capable of being attached to a pump for varying the pressure inside of the glass tube 4. 14 is the other terminal of the liquid barretter, which is preferably large. Instead of that form of liquid barretter in which a fine-wire terminal is used other forms, such as shown in United States Reissued Letters Patent No. 12,115, may be used—as, for example, the diaphragm form shown in said patent. As a rule the liquid will not entirely fill the glass tube 4; but there will be a space filled with gas or vapor. As good results are to be obtained by decreasing the pressure on the liquid 7 and also by increasing it, depending upon the arrangement used and the results which it is desired to obtain, I desire to cover, broadly, a change of pressure, and more specifically an increase of pressure on the liquid. I have found that when tube 10 is connected to a pressure-pump, so that pressure in the tube is raised above atmospheric pressure, the signals obtained in the indicating mechanism 3 are much louder and clearer, and I have obtained very good results with pressures as high as forty and fifty pounds per square inch.

A second form of receiver embodying my invention is shown in Fig. 2, where 15 is one leg of the U-tube, containing a solution and having a fine-wire terminal 16, sealed in a glass tube 17, projecting through the plug 18, so that the exposed end of the fine-wire terminal will be immersed in the liquid. Through the same plug is also passed a second glass tube 19, having at its outer extremity a relief-valve 20, adapted to open only when the pressure exceeds a certain amount—for example, a pressure of fifty pounds per square inch. This relief-valve is preferably adjustable, so that pressures as high as several hundred pounds per square inch can be obtained when desired. The other leg 21 of the U-tube contains the other terminal 22 of the liquid barretter, said terminal being preferably sealed in glass tube 23, which passes through a second plug or seal 24. This leg 21 is also provided with a safety-valve 25, similar to the valve 20. In this form of receiver the gases (oxygen and hydrogen) will accumulate in the respective legs of the U-tube until a pressure has been obtained above the atmospheric pressure, dependent upon the adjustments of the relief-valves. The oxygen gas which is evolved at the fine-wire terminal 16 dissolves in the liquid, so that the latter becomes saturated with the oxygen to an extent depending, among other things, on the pressure.

When a solution of carbonates is used—as, for example, carbonate of soda—the carbonic gas is evolved and a very large per cent. is dissolved.

I have found that when the electrical waves pass through the constricted liquid-path around the fine-wire terminal they intensify the depolarization effect referred to in United States Patent No. 12,115, above referred to, and thereby produce a larger indication or effect. The change this causes in the resistance of the circuit acts in the same way as the change in ohmic resistance, and the larger indication is therefore produced.

It will be understood that the improved form of barretter described and shown herein is to be arranged in operative relation to a receiving-aerial and preferably in operative relation to the aerial and tuned circuit, which is preferably a closed tuned circuit, as shown in Fig. 1.

What I claim is—

1. A receiver for electromagnetic waves having a constricted conducting fluid-path under pressure different from that of atmospheric pressure.

2. A receiver for electromagnetic waves having a constricted conducting fluid under a pressure greater than that of atmospheric pressure.

3. A receiver for electromagnetic waves having a constricted conducting fluid-path and means for holding such fluid-path under a pressure different from atmospheric pressure.

4. A receiver for electromagnetic waves having in combination a holder or receptacle containing a liquid means for forming a constricted conducting fluid-path in said liquid, and means for maintaining on said liquid a pressure different from atmospheric pressure.

5. A receiver for electromagnetic waves in combination a holder or receptacle containing a liquid, two terminals projecting into the liquid, one of said terminals being made of fine wire, and means for maintaining on said liquid a pressure different from atmospheric pressure.

6. A receiver for electromagnetic waves having in combination two connected holders or receptacles containing a liquid, two terminals projecting respectively into the holders or receptacles, means for forming a restricted conducting-path in the liquid and means for maintaining a pressure in said receptacles greater than atmospheric pressure.

7. A receiver for electromagnetic waves having in combination a holder or receptacle containing a liquid, means for forming a constricted conducting fluid-path in the liquid and means for producing and maintaining on the liquid a pressure greater than atmospheric by the decomposition of the liquid.

8. A receiver for electromagnetic waves having in combination a U-tube containing a liquid, means for forming a constricted conducting fluid-path in the liquid, means for decomposing the liquid in the U-tube and means for regulating the pressure in the tube due to decomposition of the liquid.

9. A receiver for electromagnetic waves having in combination a U-tube containing a liquid, a fine-wire terminal immersed in the liquid in one leg of the tube, a second terminal immersed in the liquid, said terminals being in operative relation to an aerial and a local circuit, and means for regulating the pressure in the tube due to the decomposition of the liquid by electric current.

10. A receiver for electromagnetic waves having a constricted electrolytically conducting fluid-path under pressure different from that of atmospheric pressure.

11. A receiver for electromagnetic waves having a constricted electrolytically conducting fluid under a pressure greater than that of atmospheric pressure.

12. A receiver for electromagnetic waves having a constricted electrolytically conducting fluid-path and means for holding such fluid-path under a pressure different from atmospheric pressure.

13. A receiver for electromagnetic waves having in combination a holder or receptacle containing a liquid means for forming a constricted electrolytically conducting fluid-path in said liquid, and means for maintaining on said liquid a pressure different from atmospheric pressure.

14. A receiver for electromagnetic waves comprising an electrolyte and a terminal of small area under pressure different from that of atmospheric pressure.

15. A receiver for electromagnetic waves comprising an electrolyte and a minute terminal under a pressure greater than that of atmospheric pressure.

16. A receiver for electromagnetic waves comprising an electrolyte and a terminal of small area in combination with means for passing a decomposition-current through the same in combination with means for confining and for venting the gases liberated by decomposition.

17. A receiver for electromagnetic waves comprising an electrolyte and a minute terminal in combination with means for confining gases liberated at said terminal and for predetermining the upper limit of pressure of the liberated gases.

18. A receiver for electromagnetic waves comprising an electrolyte and a minute terminal in combination with means for confining gases evolved from said electrolyte and for adjustably regulating the limit of pressure of said gases.

19. A receiver for electromagnetic waves comprising an electrolyte and a minute terminal in combination with means for applying a predetermined voltage across the same and

means for adjustably determining the pressure on said electrolyte and terminal.

20. The combination of an electrolytic cell with means for adjustably applying an electromotive force across the same and means for maintaining said cell under pressure greater than that of the atmosphere.

21. In a receiver for electromagnetic waves and in combination, a holder or receptacle containing an electrolyte, two terminals projecting into the electrolyte, one of said terminals being made of fine wire and means for maintaining on said liquid, a pressure greater than atmospheric pressure.

22. In a wireless-telegraph receiving system, a closed tuned circuit, a receiver in series therewith comprising a minute terminal and an electrolyte in combination with means for supplying and adjusting the amount of continuous current-flow from a local battery through said cell and means for limiting the rise of pressure on said cell due to decomposition of the electrolyte.

23. An electrolytic cell comprising an electrolyte, terminals and a casing, in combination with means for varying the pressure in said cell.

24. An electrolytic cell comprising an electrolyte, terminals and a gas-tight casing of means for raising the internal pressure of said cell.

25. An electrolytic cell comprising an electrolyte terminals therefor and a casing in combination with a relief-valve.

26. An electrolytic cell comprising an electrolyte terminals and a gas-tight casing therefor in combination with an adjustable relief-valve for adjusting the accumulation of pressure due to decomposition of the electrolyte.

27. A receiver for electromagnetic waves comprising a constricted conducting fluid-path in an electrolyte and a gas-tight casing in combination with a relief-valve.

28. A receiver for electromagnetic waves comprising an electrolytic cell provided with an adjustable relief-valve.

29. A gas-tight electrolytic cell arranged to vent at a predetermined pressure above that of the atmosphere.

30. An electrolytic cell comprising a casing an electrolyte therein, a gas-tight closure therefor, a circuit connection through said stopper, a terminal of small area in the electrolyte and means for relieving internal pressure when raised above a predetermined excess over that of atmosphere.

31. A receiver comprising a casing, an electrolyte therein, a gas-tight closure for said casing, a minute terminal carried by said closure and projecting into the electrolyte and means for relieving internal pressure when raised to a predetermined degree over that of the atmsophere.

32. A receiver comprising a cell, an electrolyte therein, a gas-tight stopper for closing said casing to maintain an internal pressure a predetermined degree higher than that of atmosphere, for the purpose set forth.

33. A receiver comprising a casing, an electrolyte therein, a gas-tight closure therefor in combination with a terminal of small area mounted upon said closure and projecting into the electrolyte, said receiver being provided with an adjustable relief-valve.

34. A receiver comprising a casing and an electrolyte therein and a closure therefor, said closure carrying an upwardly-directed terminal of small area and an adjustable venting means.

35. A receiver comprising a casing and an electrolyte, and two gas-tight closures for said casing, one closure carrying an upwardly-directed terminal of small area and the other closure carrying means for predetermining or varying the internal pressure of the cell.

Signed at Washington, District of Columbia, this 14th day of December, A. D. 1904.

REGINALD A. FESSENDEN.

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