(No Model.)

F. B. HERZOG.

ELECTRIC SIGNALING APPARATUS.

No. 596,774. Patented Jan. 4, 1898.

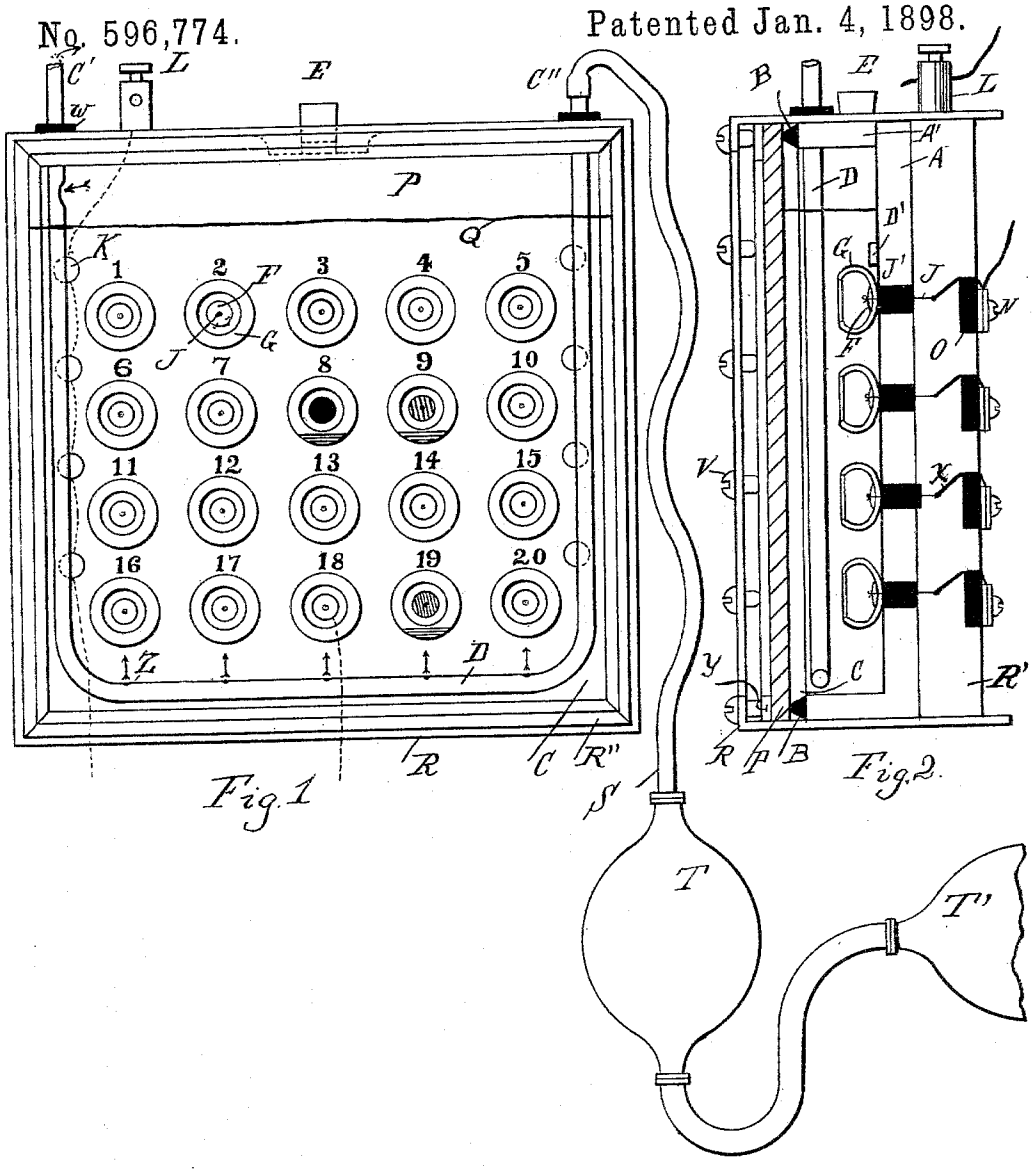


Fig. 1

Fig. 2.

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ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 596,774, dated January 4, 1898.

Application filed May 31, 1895. Serial No. 551,147. (No model.)

To all whom it may concern:

Be it known that I, FELIX BENEDICT HERZOG, a citizen of the United States, and a resident of the city, county, and State of New York, have invented a new and useful Improvement in Electric Signaling, of which the following is a specification.

My invention relates especially to that form of signaling apparatus in which the terminals of several outgoing lines are grouped together, each controlling a separate indicating device. This is commonly called an "annunciator." It has special reference to an annunciator which shall be exceedingly small for a given number of indications, very simple, delicate, reliable, and not easily put out of order.

The invention consists, essentially, in submerging in a suitable bath a number of contact-terminals under conditions which will enable the circuit differentiation at the distant end to be observed at the annunciator by means of the electrolysis which takes place in the solution and is as to some of its effects visible at the observed terminal. As to this feature this application is a continuation of an application, Serial No. 493,422, filed by me December 11, 1893.

Referring to the drawings, Figure 1 is a front view, and Fig. 2 a side view in section, of one of many forms in which this invention may be operated.

A tank of suitable material—such as porcelain, glass, or rubber A—is covered by a plate of transparent material, such as celluloid or glass P, and a soft-rubber continuous band or gasket B is placed between them in such manner that when pressure is applied by means of the screws V these will press a sash Y against the glass and compress the rubber gasket, thus making a water-tight tank with a transparent front. This tank is filled as far as may be necessary with a fluid Q, the details of which will be described hereinafter. The tank is suitably mounted in an outer box R', the front of this having an opening through which the glass plate may be seen, and around the edges of which opening are placed the holes in which the screws V operate whenever the apparatus is made up. The bottom of the tank is pierced in a number of places, and each hole is plugged up in a suitable manner—as, for instance, by means of the soft-rubber elastic plug J'. Through this plug passes a fine wire of platinum, and this wire supports a platinum disk F on the glass side of the tank, and on the other side the wire is directly or by means of an intermediate conductor X connected to suitable terminals or binding-posts N. From each binding-post a line leads to the controlling-point, (herein supposed to be an ordinary push-button circuit-closer.) The disk F may be fastened directly against the tank or the plug within which its supporting-wire is embedded, and this construction is indicated by K, or there may be an intermediate device, such as a small glass cup or bulb G, as shown in Fig. 2. This bulb of course has a small hole under the platinum plate, so as to permit the supporting-wire to pass through the bottom of the tank; but the front side of the bulb is open, so that the solution within the tank is at all times in contact with the plate.

The operation of the parts described is as follows: One or more of the disks or plates K form one terminal of the battery (preferably considered as the common wire) and the other plates lead to different distant points. The solution is so made up that it will conduct the current from the coöperating battery and will at the same time be decomposed by its passage. This decomposition may be in part or wholly visible by reason of the appearance of bubbles of various gases or by reason of the change of appearance of one or the other electrode, whether this change be due to a chemical action in which the electrode is itself affected or to a change in the electrolyte seen at the electrode as a deposit. There are many ways in which the solution and electrode may be combined to produce effects which differ according to the commercial requirements, such as permanency of deposit, delicacy, rapidity of deposit, varying resistance effect of the deposit, and many others, but for the sake of simplicity only one form will be described at present. The solution is one containing iodid of potassium, the electrodes are of platinum, and as a result with a suitable battery the circuit-closure at the distant station will be followed by the instantaneous appearance of the brown stain

characteristic of iodin upon the one electrode operated and the appearance of gas-bubbles upon the common wire electrode.

As thus far described the apparatus and method disclose an operative and very useful device. The next step in meeting ordinary commercial requirements for an annunciator of the accepted type is to make the stain last longer than it would under the conditions described, in which, owing to the greater specific gravity of the free iodin deposited, the stain will quickly disappear, in part slipping down into the solution and in part being carried upward by a stream of gas disengaged by secondary action from the water while the iodin is in process of decomposition. I have devised two ways of securing a stain of satisfactory duration. The one is by increasing the specific gravity of the solution in any suitable manner, such as by the addition of glycerin, and the other is by confining both the iodin which is dropping off and that which is carried upward within the individual cups or bulbs G. In practice it is easy by varying the depth and shape of the cups, the strength of current, and the specific gravity and strength of the solution to adjust these factors so that the stain will be visible all the way from, say, fifteen seconds to fifteen hours.

As thus far described the invention is perfectly operative; but a still further improvement is to combine with a solution an element which shall produce as nearly as possible a balance between the electric decomposition and appearance of color and a chemical recombination which shall at all times keep the solution in its normal condition. This I do by adding hyposulfite of sodium or any other suitable material.

As already described, the electrolytically-produced signal may be arranged to last any desired length of time within proper limits, and the effect of the gradual change due to the chemical combinations referred to will be that inspection of the device will often clearly show the relative order of several calls or operations, or if the circuit-closures be of varying length this also will be indicated. The various terminal plates are suitably numbered in some way, such as by having the numbers painted or in some other way affixed to either the bottom of the tank or on the front glass or on individual strips, (shown in section as D′, Fig. 2.) No. 8, for instance, shows a stronger deposit than No. 9, and hence with circuit-closures of uniform duration it is evident that No. 9 was operated considerably earlier than No. 8. The operation is so uniform that for any given solution and plant an operator accustomed to the effect can infallibly detect and note a number of gradations in color, &c., and hence in time of operation.

In order to make the device still more perfect, I have designed various forms of agitators by means of which the fluid can be quickly circulated, with an accompanying disappearance of all indications. The form I prefer is the blower shown. In this a tube D is inserted in the solution, and by means of the bulb T and the small holes Z air is pumped into the solution, and after rising in the shape of bubbles it passes out through some suitable vent-hole, such as C′. It is a great desideratum to have the air-bubbles wash every part of the tank, and I have found it necessary for the best operation of the particular form of blower herein shown to make the openings of the bulbs which are over each platinum terminal large enough to admit of free circulation of the liquid within the bulb when the entire liquid in the tank is circulated. In a tank of the proportion shown it is difficult to get the air-bubbles as far from the side in which they enter as is desirable unless the air-holes Z are graded with respect to size. This gradation is the invention of Charles Herrmann and is very desirable, although not necessary to the sufficiently perfect operation of the device. Suitable valves of ordinary construction are in the bulb T. (These are not shown.) In order to make a more continued flow or circulation, a second bulb T′ may be added, and this bulb alone will be compressed by the operator, the bulb T operating merely as an equalizer.

There are various other details of construction, such as the provision whereby cement or wax of suitable composition is poured on the under side of the tank, and supporting-plates of insulating material O are arranged for the various binding-posts, and a cork or plug E is fitted to close the hole through which solution is admitted into the tank, rubber collars *w* making the connections around the ends C′ and C″ of the tube air-tight.

Of course it will be seen that it is not essential that the bulbs be used, nor that the tank be used, as the terminals may be just as well arranged so as to drop into the tank or reservoir, such as, for instance, would be the case if the various terminals were inserted in a bottle of glass or jar, in which case, if they were inserted from the top, they might be visible from every side, nor is the agitation necessary by means of a blower of air. I have obtained good results by shaking the receptacle itself. When desired, a bell may be arranged in series with a common wire. If desired, there are various forms of solution such as the one described, in which, while the circuit remains closed at the distant station or in any other way as long as current is flowing through a plate, then if the direction of current be reversed the stain made by the flow in one direction will be dissipated by the reverse flow. If the tank be arranged horizontally, then the stain will last very much longer if the individual cup or bulbs be used.

I claim—

1. An annunciator comprising a receptacle

containing a transparent electrolyte and a series of electrodes located therein, visible therethrough, and corresponding to a series of substations; separate lines connecting these electrodes to the various substations; a circuit-controlling device located at each substation and adapted to control the flow of current through its own line and electrode; the said electrode and electrolyte being relatively so constituted that variations in the current passing through any one or several of the electrodes will produce, in the annunciator, electrochemical reactions of a character adapted to vary the appearance of each of these electrodes and thereby locate the operated substations, substantially as described.

2. An annunciator comprising the receptacle containing a transparent electrolyte and a series of electrodes located therein, visible therethrough, and corresponding to a series of substations; separate lines connecting these electrodes to the various substations; a circuit-controlling device located at each substation and adapted to control the flow of current through its own line and electrode; the said electrodes and electrolyte being relatively so constituted that variations in the current passing through any one or several of the electrodes will produce, in the annunciator electrochemical reactions of a character adapted to vary the appearance of each of those electrodes and thereby locate the operated substations, together with a device, located at the annunciator-station, and adapted, when operated, to restore the original appearance of those electrodes, substantially as described.

3. An annunciator comprising a receptacle containing a transparent electrolyte and a series of electrodes located therein, and visible therethrough; means adapted to control the flow of current through the several electrodes; the said electrodes and electrolyte being relatively so constituted that variations in the current passed through any electrodes will produce, in the annunciator, electrochemical reactions adapted to change the appearance of those electrodes; together with means for agitating the electrolyte and thereby restoring the normal appearance of the electrodes, substantially as described.

4. The combination, in an annunciator, of a receptacle containing a transparent electrolyte, a series of electrodes located therein and visible therethrough; means for sending a current through one or more electrodes; materials entering into the relative composition of electrodes and electrolyte adapted when a current is passed through them to produce and locate at the corresponding electrode a substance acting to change the appearance thereof; together with means, controlled at the annunciator and adapted to remove the said substance at will, and restore the normal appearance, substantially as described.

5. The combination, in an annunciator, of a receptacle containing a transparent electrolyte, a series of electrodes located therein and visible therethrough; means for sending a current through any electrode; and a solution comprising materials which coöperate with the electrode to produce and locate at the electrode upon the passage of a current through it, a substance which changes the appearance of the electrode; together with means for agitating the solution without moving the annunciator; and thereby hastening the dissipation of said visible substance, substantially as described.

6. The combination, in an annunciator, of a receptacle containing a transparent electrolyte, a series of electrodes located therein and visible therethrough; means for sending a current through an electrode; and a solution comprising materials which coöperate with the electrode to produce and locate at the electrode upon the passage of a current through it, a substance which changes the appearance of the electrode; together with means for agitating the solution through air-pressure and thereby hastening the restoration of the normal conditions, substantially as described.

7. The combination, in an annunciator, of a receptacle containing a transparent electrolyte, a series of electrodes located therein and visible therethrough; means for sending a current through any electrode; and a solution comprising materials which coöperate with the electrode to produce and locate at the electrode upon the passage of a current through it, a substance which changes the appearance of the electrode, together with means for agitating the solution by the passage of air through a duct leading from without the annunciator to a point within the solution, substantially as described.

8. The combination, in an annunciator, of a receptacle containing a transparent electrolyte; a series of electrodes located therein and visible therethrough; means for sending a current through one or more electrodes; materials entering into the relative composition of electrodes and electrolyte adapted when a current is passed through them to produce and locate at the corresponding electrode a substance acting to change the appearance thereof; together with means added for the purpose of retarding the time of dissipation which is characteristic of the relative composition of electrodes and electrolyte selected to produce said coloring substance, substantially as described.

9. The combination, in an annunciator, of a receptacle containing a transparent electrolyte; a series of electrodes located therein and visible therethrough; means for sending a current through one or more electrodes; materials entering into the relative composition of electrodes and electrolyte adapted when a current is passed through them to produce and locate at the corresponding elec-

trode a substance acting to change the appearance thereof; together with an additional substance added in solution to the electrolyte and adapted to increase its viscosity and thereby to retard the time of dissipation characteristic of the coloring substance and coöperating elements, substantially as described.

10. The combination, in an annunciator, of a receptacle containing a transparent electrolyte; a series of electrodes located therein and visible therethrough; means for sending a current through one or more electrodes; materials entering into the relative composition of electrodes and electrolyte adapted when a current is passed through them to produce and locate at the corresponding electrode a substance acting to change the appearance thereof; together with a mechanical obstruction placed between adjacent electrodes and adapted to limit the free circulation of the electrolytic solution; substantially as described.

11. The combination, in an annunciator, of a receptacle containing a transparent electrolyte, a series of electrodes located therein and visible therethrough; means for sending a current through one or more electrodes; materials entering into the relative composition of electrodes and electrolyte adapted when a current is passed through them to produce and locate at the corresponding electrode a substance acting to change the appearance thereof; said substance being deposited on the electrode and having a tendency to leave it; together with a mechanical projection or irregularity in the annunciator placed where it will catch the deposits as they leave the several electrodes and detain them in recognizable proximity to their respective electrodes; substantially as described.

12. An annunciator comprising a receptacle containing a transparent electrolyte and a series of electrodes located therein, visible therethrough and corresponding to a series of substations; separate lines connecting these electrodes to the various substations and by way of these to one pole of a generator; a circuit-closer located at each substation and operating to send a current of one polarity through its own line and electrode; the said electrode and electrolytes being relatively so constituted that current passed through any electrode will produce, in the annunciator, chemical reactions of a character adapted to vary the appearance of that electrode; and a common return from the battery connected with an additional electrode; whereby the operation of several of the circuit-closers at the same time will cause a current of one polarity to pass through the several electrodes and thence through the common electrolyte to the common return; substantially as described.

13. In combination with the containing vessel and fluid electrolyte, the visible electrodes surrounded by the open bulbs immersed therein, substantially as described.

14. The combination of a base-plate supporting a number of electrodes, a transparent front plate, an elastic packing as a gasket between said front plate and a suitable backing, means for fastening the plate and backing with the gasket between them so as to make a water-tight cell adapted to contain an electrolyte and means for removing the front plate whereby access is given to the electrodes for purposes of repair or inspection without moving the wires connecting the same to external circuits, substantially as described.

15. In combination with an annunciator comprising a receptacle adapted to contain a fluid electrolyte and a series of electrodes located therein and visible therethrough, an electrolyte comprising a solution of iodid of potassium, and a fluid of greater density than water added to the dissolving fluid so as to retard the dissipation of the iodin liberated during the operation of the annunciator, substantially as described.

16. In combination with an annunciator comprising a receptacle adapted to contain a fluid electrolyte and a series of electrodes located therein and visible therethrough; an electrolyte adapted when decomposed by a current through one of the electrodes to indicate said electrode by changing its appearance; said electrolyte being less viscous than glycerin and having added to it glycerin or its equivalent so as to retard the dissipation of the products of electrolysis which have changed the appearance of the electrode; substantially as described.

17. The combination of a suitable receptacle and an electrolyte therein; and coöperating therewith, a support of insulating material normally submerged and bearing a series of electrodes each of which comprises a conductor one end of which extends into the solution and the other end of which is protected from the solution by the support; and, in contact with the ends, which extends into the solution, a metallic plate substantially as described.

18. In an electrolytic annunciator the base-plate consisting of insulating material perforated, a plug for each perforation, conductors passing through the plugs, fastening-pieces adapted to attach the outer ends of these conductors to the supporting-plate and a mass of insulating composition, over this.

19. An annunciator comprising a receptacle containing a transparent electrolyte and a series of electrodes located therein, visible therethrough and corresponding to a series of substations; separate lines connecting these electrodes to the various substations; means at these substations for sending a current through the corresponding electrodes; the said electrodes and electrolyte being relatively so constituted that on the passage of current electrochemical reactions will be produced and vary the appearance of that electrode; together with means controlled at the annunciator-station and adapted to restore the original appearance by the reactions fol-

lowing a reversal of the current from the direction of flow which produced the original change; substantially as described.

20. In combination, in an annunciator comprising a receptacle adapted to contain a fluid electrolyte, a series of electrodes located therein, and visible therethrough, and the electrolyte comprising a solution containing, first, a comparatively-colorless ingredient, adapted and acting to coöperate with other ingredients to produce and locate at an electrode suitably connected with a distant current-controlling device, a comparatively-colored substance, as the result of the electrochemical action of a current passing through the circuit, the electrode and the solution; second, an ingredient coöperating chemically with the resultants of the said electrochemical action to maintain the normal condition and appearance of the solution, substantially as described.

21. In combination, in an annunciator comprising a receptacle adapted to contain a fluid electrolyte, a series of electrodes located therein and visible therethrough and the electrolyte comprising a solution containing, first, a comparatively-colorless ingredient, such as iodid of potassium, adapted and acting to coöperate with other ingredients to produce and locate at an electrode suitably connected with a distant current-controlling device, a comparatively-colored substance, such as iodin, as the result of the electrochemical action of a current passing through the circuit, the electrode and the solution; second, an ingredient such as glycerin for increasing the viscosity of the solution, so as to retard the dissipation of the coloring substance; and third, an ingredient such as hyposulfite of sodium, coöperating chemically with the resultants of the said electrochemical action to maintain the normal condition and appearance of the solution, substantially as described.

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